



AECOM is a long term strategic partner for the UK government. The benefits of AECOM's scale and reach mean we have unique access to global expertise, with a strong domestic base staffed by experts to assist the UK government meet its infrastructure goals. We have a history of delivering major infrastructure in partnership with governments around the world.

The team at Aecom are delighted to have this opportunity to feed in to the National Infrastructure Commission's Consultation. In order to answer the questions in this consultation as comprehensively as possible we have had experts from our energy, transport and water divisions contribute our response.

*Q1. The Government has given the National Infrastructure Commission objectives to:*

- *foster long-term and sustainable economic growth across all regions of the UK*
- *improve the UK's international competitiveness*
- *improve the quality of life for those living in the UK*

*What issues do you think are particularly important to consider as the Commission works to this objective?*

**Water:** AECOM believes that it is important to develop the evidence base for how changes in expenditure deliver changes in performance which contribute to desired outcomes, in terms of services to customers and the environment; this is a longstanding challenge for long term asset management planning in the water sector. Similarly, defining and agreeing metrics for sustainability and quality of life have been fraught – some consensus is emerging over the role and use of economic approaches such as natural capital/ecosystems services, and advocated by Defra and Ofwat as well as bodies such as the Natural Capital Coalition.

We hope that the Commission's position on looking at demand side interventions as well as supply side options is continued throughout the NIA process, as it is in synch with water sector direction one example of this is the role of behavioural economics in managing demand for water supply and loads on the wastewater network; e.g. Ofwat's promotion of 'co-creation' and 'co-delivery' of solutions with water customers.

The Commission's emphasis on the poor record for Long Term Planning (LTP) is in keeping with Ofwat's recent promotion of LTP, there are 30 references to LTP in Ofwat's 'Towards Resilience' document (November 2015). But Defra has promoted a consistent water direction for a decade, and companies have attempted asset management planning to make cases for long term expenditure, based on societal benefits and long term modelling, at the last three price reviews, and will continue to in PR19.



AECOM also thinks the commission should consider the role flood risk management plays in sustainable economic growth as well as working with nature and more naturalised infrastructure solutions that contribute to wellbeing and quality of life.

**Transport:** We also believe that these objectives need to be articulated into a series of key outputs and outcomes (for example, what are the metrics that will demonstrate an improvement in quality of life?) to be meaningful. It is important to know how it can be demonstrated that investment in existing or new infrastructure has contributed to this. The role of transport in achieving these objectives is critical, but the links to other sectors may be difficult to assess unless the appraisal methods and performance measures to assess these are further developed.

It would be helpful to set out a series of high level logic maps that articulate how the NIC sees the linkages between sectors across a number of themes (e.g. addressing carbon targets), so the role of and interdependencies between sectors are understood, and inform later prioritisation.

There should be a more comprehensive economic evaluation (Cost Benefit Analyses) for transportation projects (especially rail) to include wider gains in terms of economic benefits for areas, a good example of this is the development gain along the Crossrail 1 route). New routes should come with infrastructure investment, especially housing, where appropriate.

**Energy:** The energy system in the UK is an essential element in providing the platform for long term, sustainable growth across the UK and for improving UK competitiveness and must be enabled through cost effective investment that contributes to;

- Providing very low carbon generation as close to demand as possible
- Providing affordable energy to intensive users to remain and prosper in the UK
- Providing domestic customers with affordable energy and the information to make choices
- Providing greater access to energy (power and heat) to all vulnerable groups in society
- Creating a mix of new build projects and life extension of assets to maintain security

It is important that the NIA considers the overall emission impact and macro-level economic aspects of the UK energy system and promotes a portfolio approach to future requirements, and avoids specific focus on projects at an individual level, to best meet the objectives set by Government.

The most beneficial energy system in the UK to address affordability and climate, over the next three decades, has not yet been articulated to a sensible level of definition, or enabled for delivery. The advancement of low carbon generation over the past decade has been commendable but is underwritten by substantial financial incentives. Cost reduction and innovation in new technologies related to the energy assets have the potential to further advance possibilities for redefinition of the energy system and how to optimise to get 'more from less'.



As the transition from a system dominated by large central generation to a more sustainable supply mix with higher contribution from local, embedded generation, there will be the need for extended levels of support, actions by new stakeholders and further modifications to market structure. The NIA should look to include emerging stakeholders and not rely solely on current incumbents.

AECOM also believe that a robust nationwide broadband network is paramount to foster strong economic growth across the whole of the UK. We believe universal access to high quality and fast broadband is essential for business across the country.



Q2. Do you agree that, in undertaking the NIA, the Commission should be:

- *Open, transparent and consultative*
- *Independent, objective and rigorous*
- *Forward looking, challenging established thinking*
- *Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?*

*Are there any principles that should inform the way that the Commission produces the NIA that are missing?*

AECOM agrees that the Commission should work to these principles.

**Water:** The success of the Commission in enabling “a coherent [long term] national infrastructure strategy” will hinge on taking a whole system, cross sectoral approach in itself would represent a challenge to established thinking, and make a large contribution to achieving the Commission’s objectives.

It may be helpful to frame the Commission’s role to make it explicit that the NIA will look both for opportunities as well as to address risks (e.g. the role of natural capital in enhancing wellbeing and other aspects of quality of life).

**Transport:** It is essential that the NIA takes a forward looking approach and challenges established thinking. Transport planning has relatively well developed and researched approaches, but the longer term planning can be constrained by both political and economic considerations, limiting deliverability, feasibility and affordability. To really challenge current thinking, the NIC should look beyond simple scenario testing and modelling and create visions for the future. Backcasting exercises could then be developed to understand and develop roadmaps and hence prioritised projects to achieve these, and ensure that new infrastructure or better use of existing assets helps shape the future rather than be purely driven by it.

**Energy:** The NIA must consider the terms of reference for reviewing the energy system and the motivations for investment to ensure that the future project timeline recognises appropriate scenarios for development. Work done by National Grid, ETI and other bodies provides for various pathways for development that are conditioned by economic and environmental beliefs.

It is assumed that the NIA, consistent with being forward looking and challenging to established thinking, will establish one or more similar scenarios as their reference point, and will clearly show the interim gateways for initial findings and review together with a proposed road map for future actions.

Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

**Water:** The Commission's recognition of needing to balance expenditure, of asset creation and of asset maintenance, is very much in line with water sector developments in asset management planning over the last 15 years or so (e.g. the UK Water Industry Research (UKWIR) 'Common Framework for Expenditure Decision-Making'), and we agree that policies and priorities should feature among the range of recommendations. The water sector's experience in making these trade-offs is that it requires considerable thought on the metrics of risks and benefits to enable those to be made objectively. We expect that common metrics across the sectors will help to inform the NIA recommendations (see also Q9 & Q11).

We note that although the Commission's remit is to look to a 30 year horizon, the water sector is working with Defra, the Welsh government and its regulators to develop water resources planning to "at least a 50 year planning horizon", while Ofwat's 'Towards Resilience' states that "taking a long-term view is an essential element of planning for resilient systems and services... In the context of the water sector, 'long term' means looking 25 to 100 years ahead..." for both water and wastewater services.

We fully support the Commission's view that infrastructure assets includes natural assets like rivers and floodplains (para39), as this aligns with water sector developments on assessing natural capital in its decision making processes.

While we recognise that the Commission states (para41) that the NIA will look across sectors, there is however, a danger in outlining the sectors as has been done in the consultation document of perpetuating the 'silos' to which it refers. From a water sector perspective, significant steps have already been made to plan for and deliver system resilience (e.g. cascade effects of inundation of energy sector assets on water and transport sector assets) and for exploitation of opportunities (e.g. making use of the energy content of water in supply distribution networks, in wastewater and in sewage).

We refer to the subject of flood risk management as opposed to simply 'flood defence'. Preparedness and resilience need to be considered in the whole. The Commission should ensure all sources of flooding are considered (fluvial, pluvial, coastal and groundwater) and in looking at protecting key infrastructure coastal erosion needs to be considered along with flood risk.

**Transport:** The intention to look at both passenger transport and freight is essential. Both have different and specific requirements, with the latter featuring less regularly in decision-making for major infrastructure investment. The interaction with energy use and carbon targets is clearly important, as well as the role of technology, ranging from electrification to driverless vehicles and more efficient use of existing assets.

**Energy:** The NIA intent to look at Energy and Transport in an integrated way is essential, and thought should be given to how the developing infrastructure recognises the sustainability benefits of an integrated energy, water and waste system, enabling increased focus on a national agenda for



addressing resource scarcity including promoting efficient cross sector investment in the utilities industry.



*Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?*

**Water:** The emphasis on climate change's effects on availability of water (para 45) implies that the imbalanced focus on the 'slow burn', chronic effects of drought will continue. We hope that the Commission will recognise that the cross-sectoral societal shocks which result from acute overloading from more frequent high intensity rainfall events represent just as much of a challenge to deal with. We also believe that complexities around Partnership Funding and its impact on efficient delivery of flood risk management schemes

**Transport:** A multi-modal and integrated approach must be taken, but there is a critical step in understanding why people use different transport modes where and when. There is spare capacity in current infrastructure, particularly when assessed temporally rather than spatially. There needs to be some challenge as to whether continually building for 'peak' capacity is the right approach.

The balance between different and competing modes will be a critical area of review for the NIC, when set against its objectives, as investment in specific modes now will tend to 'lock in' benefits and dis-benefits. Investment in public transport, using current appraisal criteria and objectives, has not demonstrated as strong a case for investment or value for money as that in highways, but 'predict and provide' approaches to highways planning allow little scope for shaping or delivering a vision.

The interaction with the built environment needs to be extended beyond housing supply to cover at least employment centres, particularly if concentrating demand in key urban areas as a result of assumed wider benefits and agglomeration.

**Energy:** The specific impact of de-carbonised transport on the urban landscape and the wider consideration of future cities and conurbation planning will help inform the energy and utility demands in UK and is an appropriate aspect to be considered either as a direct NIA activity, or a parallel activity commissioned to others.



*Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?*

**Water:** The cascade effects of inundation impact multiple sectors. This has been evident in the various flooding and weather events in the UK over the last decade or so, which have affected power, transport, telecoms and water assets. Flood risk management is closely aligned with wastewater assets in the water sector, and progress is being made on ensuring that accountabilities and responsibilities are clear. It would be helpful if the Commission would include comment on governance around these interfaces in its recommendations.

We think one of the interdependencies that matters is water cycle impacts from all development areas (not just in the UK but global).

**Transport:** The interdependency of transport and housing and employment supply is crucial, partly but not always effectively moderated through the planning system. Going forward it is crucial to understand the interdependencies between these and ensuring this is taken into account in prioritisation.

**Energy** and Transportation have high inter-dependencies and therefore the potential assumptions on the uptake of Electric Vehicles (EVs), as opposed to other decarbonised vehicles types will be important. In general, the SMART report issued in March 2016 sets out a number of potential developments that will have to be considered.





*Q6. Do you agree that the NIA should focus on these cross-cutting issues?*

**Water:** The cross cutting issues listed are comprehensive and very relevant to the water sector. Many, such as funding/financing, resilience, evaluation methods and performance measures, have been long debated and developed, and remain prominent in the sector's thinking.

In particular, from past experience in assigning value to, and making trade-offs between, services in the water sector, we see the development of an agreed evaluation and appraisal methodology, and of risk and performance measures, as key in enabling cross-sectoral optimisation.

**Transport:** The cross-cutting themes seem appropriate but also very ambitious. There are well developed appraisal and modelling approaches in transport, but a less well developed field of evaluation. In terms of appraisal, there is a good body of evidence on its strengths and weaknesses in assessing transport infrastructure provision; but comparatively little on the interdependences with investment in other sectors, regional balances, and scenario testing beyond that prescribed by guidance (often based on out of date planning and growth assumptions).

Regarding performance measures, these need to be robust and meaningful, such that the measures would also form part of the appraisal of putative schemes (what will the scheme deliver) and its subsequent evaluation (has it delivered). The latter has been relatively poorly monitored in transport, such that even when key metrics are collected they cannot always be directly linked to the infrastructure investment.

There are specific geographical impacts of major programmes such as Crossrail, HS2, and the Northern Powerhouse. Care should be taken to align major programmes and to build on their ambition, and the NIA should consider how it supports existing programme and does not induce additional competition or tension between major programmes in different parts of the UK.

**Energy:** It is also important that the work on the NIA does not introduce additional complexity or reason for Government delay in progressing planning approvals in Nationally Significant Infrastructure Projects (NSIPs). Recent deferment of the CCS Pipeline DCO decisions in advance of the postponement of the UK CCS competition was unfortunate and appeared to be related. This was the first time an energy project DCO under PINS had suffered delay to the statutory timescales.



*Q7. Are there any other cross-cutting issues that you think are particularly important?*

The real drivers for infrastructure are only the inevitable population growth and climate change. The NIC vision(s) for the future should then map out potential scenarios – ie where and how can we distribute future populations across the UK to provide them with housing, employment and social infrastructure, and then plan infrastructure (as defined by the NIC) to generate economic growth in the best locations.

**Water:** At a technical level, it will be important to arrive at a common means of understanding and managing uncertainty in forecasts and appraisals, particularly given the long term nature of this planning. We also think it's important to balance competing needs.

**Transport:** The emphasis on geography and local growth is sensible, but should then also be linked to whether there are regeneration areas where cross-sector infrastructure investment can achieve more than the sum of its parts, and the less tangible issue around whether it is *place* or people that are the focus for such activities – which links to skills, housing provision and employment opportunities.

Investment in major infrastructure, particularly in transport, is likely to place pressure on existing local infrastructure, and it is essential that these are addressed as part of any scenarios and modelling, enabling people and businesses to make full use of new or improved infrastructure assets.

As well as a cross-sectoral approach, there must be co-ordination between local and national priorities. The definition of major infrastructure and what exactly comes under central government's responsibility, given it provides funding to local administrations for some significant local infrastructure and which are subject to scrutiny under existing government appraisal guidance, has not been clearly articulated.

**Energy:** Given the extensive debate on demographics and skills, it would also be advisable to consider cross cutting issues related to skills, training and diversity, probably in conjunction with other industry bodies. This could extend to a National Construction Consortium proposal.

*Q8. Do you agree with this methodological approach to determine the needs and priorities?*

**Water:** The scenarios approach is well established when dealing with uncertain and complex futures. Clearly there is a risk in whether or not the appropriate range of scenarios has been developed to test the futures.

The role of modelling to inform the projections within scenarios across sectors, and how the drivers interact with each other, appears to be objective and should enable transparency. It is not clear whether the modelling proposed is to model within sectors and then integrate these, or whether the models will be integrated in their overall design. There will be pros and cons for either option, but as the Commission notes in para 66, models are to inform decisions and judgements, not to make them.

**Transport:** This is again very ambitious, and evaluation of current appraisal methodologies will need to make full use of the planned expert panels and workshops. Examining models across sectors also implies examining multiple impacts, but it is not clear how these would be weighted and whether, for example, different social discount rates would apply over different timescales; e.g. to take into account the impacts of climate change and its impacts on the longevity and resilience of infrastructure. The high up-front costs in delivering major transport infrastructure can outweigh the larger but temporally more distant benefits traditionally assessed in transport.

**Energy:** The approach to prioritisation appears appropriate but must also consider the ability of the NIA to define portfolios, or types of projects, that the private sector will find attractive for investment in open commercial completion, or for completion through a structure of prescriptive bidding within a specific capacity / allocation provision to meet the demands for new energy assets.



*Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?*

**Water:** For the water sector, the two frameworks which appear to be most relevant to the Commission's needs are derived from UKWIR research for 'Water Resources Management Planning WRMP 2019 Methods', and for the 'Common Framework for Expenditure Decision-Making'. Both of these set out to provide a structured approach to optimise the economic value from portfolios of interventions, taking into account constraints, targets and uncertainty.

The former provides a process for selecting from a range of techniques and models, while the latter also includes a process by which stakeholders' views and economic values can be elicited and balanced in an optimal portfolio.

We note however that the joint Defra/Welsh Government and water sector project on 50+ year water resource planning is due for imminent completion.

The water sector uses a range of modelling tools within these frameworks, some proprietary and some developed in-house. Ofwat and the companies have undertaken benchmarking to establish which have been applied in an industry-leading way.

Flood risk management strategies and business cases combine complex issues over long periods so provide a robust model and decision making framework

**Transport:** there are well developed approaches and models used in transport that can assess different planning and infrastructure assumptions, but the scenarios are often based on outdated information (whether planning or behaviour) and the costs of updating these assumptions are high. The relationship with other sectors is not particularly well developed and the relationship with agglomeration and wider impacts is still being explored, with the assessment of such links often undertaken methodologically based on guidance but with little understanding. The guidance is being updated this year.

*Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?*

**Water:** The drivers outlined appear comprehensive in that they cover the drivers of supply and demand. In one sense, if we include natural capital assets under emerging technology (given that this is a relatively new and developing field), there is a link between the 'Technology' and 'Climate Change & Environment' drivers which is an opportunity to improve resilience.

**Transport:** It would be sensible to refer to assessing the most significant factors rather than all (as noted for population and demography). From a transport perspective, behaviour is a key driver, which is mentioned in population and demography. Pricing and affordability are also key drivers of demand. The role of technology, and in particular efforts to decarbonise transport, the potential role of autonomous vehicles, and real time information provision to all users, will drive changes. Smart ticketing may play a role on public transport, but the scope for road user pricing to better manage demand is likely to be politically driven decision. It should nevertheless play a role in scenario testing.

**Energy:** The four drivers identified are essential pillars in assessing drivers for infrastructure, but do not clearly map to the probability of investment in the priority infrastructure happening in any dependable timescale.

Specific to energy, deploying a mix of generation technologies is still an attractive short term action but the cancellation of the CCS programme, rather than the deferment and challenge for cost reduction, has undermined the ability to achieve the National Grid forecast of 11GW of CCS enabled generation by 2030. Consideration of the barriers to desired priority projects are essential.

Consideration of how projects are classified with ability to progress priority projects across different categories, say Mega, Major and Life enhancing may be appropriate. Often large regional projects have been delayed decades from inception in favour of more significant major schemes. (e.g Mersey Crossing, Nottingham Southern access, etc).



*Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?*

**Water:** The water sector has successfully developed portfolios of interventions through formal optimisation techniques since the early 2000s, to allow competing objectives to be optimised – simple prioritisation cannot achieve this. Similarly, multi-criteria analysis, while useful as an engagement tool, is open to the criticism that the weightings are not set objectively.

The sector makes use of performance measures which enable both an assignment of economic value (benefit) to changes in risks and performance (up or down) as well as modelling to show the quantum of change of performance resulting from expenditure on interventions.

As noted under our response to Q9, these are well established techniques and the Commission may find it helpful to engage with the sector and its supply chain on which may be appropriate to adopt and adapt for its own purposes.

Need to set out a multi criteria analysis with clear weighting / considerations to show the methodology is robust and definable.

**Transport:** Treasury and DfT guidance provide a starting point for developing, sifting and assessing schemes and assessing value for money in transport. However, to develop a portfolio that is truly cross-sector requires the early identification of key objectives (i.e. policy and strategy formulation) and the critical success factors that will achieve these. Value for money in itself will not be enough to allow development of a portfolio or prioritisation of work programmes and schemes within those.

The portfolio should be informed by the evaluation of existing and forthcoming infrastructure and a review of existing departmental programmes. Were these evidence-based, and how do they relate to NIC objectives?

There is a risk, in reviewing appraisal methods and potentially setting different objectives, that the NIC comes to different conclusions that will be subject to challenge. It will be critical to engage with stakeholders, expert and the public throughout.

**Energy:** In setting out a portfolio of investments that best meets the demand of the UK, it will be important to identify the appropriate vehicles for delivery, and in the case where there is a large element of public funding, whether there is the potential for a new delivery model.

e.g. On the UK NNB programme, and given the large contribution of UK Government through Electricity pricing mechanisms, is there a more cost effective way to build the replacement UK Nuclear fleet, and then on completion to offer Operational franchises to the most appropriate Operators.



*Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?*

**Transport:** The social and distributional impacts of investment have been paid little attention, but transport has direct and indirect winners and losers, with impacts associated with emissions, noise, safety, agglomeration unevenly distributed and potentially conflicting with objectives. Quality of life is mentioned as an objective of the NIC.

**Energy:** It is not clear whether the method and process suggested in the NIA will have any impact on the likelihood of projects progressing to commencement. There is a combination of Political, Economic and Technical reasons why major projects do not proceed. The ability of the NIA to influence the actions of Government in sponsoring and enabling projects is welcomed but the precise mechanism and linkage to progressing major programmes on a clear decision timeline is not yet apparent.



5 August 2016

## **Response to the National Infrastructure Assessment: process and methodology consultation**

We welcome the opportunity to respond to this important consultation.

Affinity Water is the UK's largest water-only company in the UK serving 3.5 million customers across the southeast of England. It is our aim to be the UK's leading community focused water company and part of achieving this is ensuring that we have a workforce that is able to deliver a clean, safe and secure supply of water for our customers now and into the future..

Our Business Plan for the period 2015-2020 was awarded 'Enhanced' status by our regulator Ofwat for our ambitious plans and extensive customer engagement we undertook. We believe that our recent experience could help us to be a key contributor the work of the Commission.

In our response below we:

- Outline our agreement with the broad objectives of the National Infrastructure Commission and recommend that it focuses on well co-ordinated projects which can improve the quality of life through small marginal benefits which cumulatively provide much greater benefits.
- Recommend that there is broad representation from industry and skills which will contribute to the delivery of the plans the Commission recommends, not just the ideas behind them.
- Demonstrate the skills and experience that Affinity Water, and the water sector more broadly, has in ensuring long-term planning is aligned with the expectations and needs of our customers, business and the environment.

We would be pleased to work with the Commission in developing the NIA and its future work programme.

Yours sincerely,

[name redacted]  
[job title redacted]

[name redacted]  
[job title redacted]



## Questions

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

**What issues do you think are particularly important to consider as the Commission works to this objective?**

We agree with the broad objectives that the Government has given the National Infrastructure Commission. But we would appreciate greater clarity on objective to “improve the quality of life for those living in the UK.” For Affinity Water, improving quality of life can be best achieved through the impact of well co-ordinated projects that deliver often small marginal benefits individually by cumulatively much greater benefits. The benefits can and should be wide ranging from improved resilience in service continuity, minimising disruption and impacts of asset failure through to wider environmental benefits through effective stewardship of local natural assets, in our case catchments and river basins.

There is a risk that the commission focuses solely on big ticket projects such as HS2. These projects attract headlines and overshadow other infrastructure projects which are not of a similar scale. However, we would contest that it is smaller, more localised projects which can often impact on the quality of life for nearby residents of them.

For example, much of the £500 million investment we will make over this Asset Management Period (AMP) is to upgrade our water networks and mains. These projects are vital but rarely attract a lot of attention. They provide important investment in local communities and do have a positive, long-term impact on our customers by providing continuous supply of an essential service.

If the National Infrastructure Assessment is to be a successful piece of work it must take into account smaller projects like these and identify ways in which projects from other sectors, such as transport and energy, can all work together in a co-ordinated way to achieve the objective of the improving the quality of life for those living in the UK.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

We agree with the principles that the Commission has outlined for the NIA. However we would challenge the Commission to prove the principle of ‘*challenging established thinking*’ will work in practice.

If the Commission is to be a success it needs to retain and guard it's independence from Government. The challenge of presenting a picture of UK infrastructure and plan for future needs is not new. To succeed we believe that the Commission needs to be open to regular dialogue with business and demonstrate that it can be a strong advocate for it to government.

It also must be staffed and supported appropriately. There must be broad representation from industry and skills which will contribute to the delivery of the plans the Commission recommends, not just the ideas behind them. To this end, we would be happy to suggest that the Commission consider taking secondees from the different sectors that the NIA consultation document has outlined.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

Yes.

From our perspective we believe that the water sector is already quite adept at ensuring long-term planning is aligned with the expectations and needs of our customers, business and the environment.

In all of our major plans, for example our Water Resources Management Plan or our Business Plan, we undertake extensive engagement in our supply areas. This engagement provides customers with real opportunities to influence the decisions we take about our future investment in infrastructure. We would be happy to work with the Commission to share our engagement experiences.

Although the Government have made clear that the Commission's remit will not include housing supply we would recommend that it is kept at the forefront of the Commission's mind when undertaking the NIA. It impacts across several of the cross-cutting issues as well as the key infrastructure drivers and it has an extensive impact on us as a water supplier for London and the south-east.

We would also recommend that in considering the water sector the Commission is mindful that the non-household market will be opening up to competition in April 2017 and there are strong signals that the household market will open up to competition by, or around, 2020. The changes to the current market setup will have an impact on decision making in the sector and the relationship it has with investors.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

Within the water sector we recommend that the NIA looks at two aspects of infrastructure provision.

Firstly, water companies already engage with and respond to five different regulators: Ofwat, Environment Agency, Department for Environment, Food and Rural Affairs; Drinking Water Inspectorate and CCWater.

These regulators have an impact on various parts of our business and we need to be mindful of their expectations when we are planning our infrastructure investment. We would like the Commission to show in its NIA, and in future activity, that it understands the regulatory environment of our sector, and indeed the regulatory bodies in other sectors the Consultation has identified, and it can identify a way of working across industries to ensure the efficacy of its long-term outlook on infrastructure.

Secondly, and relating to the point above, water companies currently have to plan for large scale investments within Price Review mechanisms. We believe that the Commission might be beneficial, either in its NIA or through future work, to explore the feasibility of establishing a method where by larger infrastructure projects within the water sector can be considered through a separate process which allows us to take more long term decisions. We think the benefits that such an approach could generate would be substantial, lead to the kind of long-term planning the Commission is aiming for and encourage multi-company funding of projects which have benefits across different supply areas.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

From our perspective, we are impacted on by all of the other sectors that the NIA will examine. For example, any development in our supply region impacts on the water use in our river catchments. This in turn impacts on the supply/demand balance of our region and has a long-term impact on our ability to serve our customers.

We would strongly recommend that the Commission ensure that this is reflected in the NIA.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues? / Q10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?**

We are taking question six and ten together as we believe that they are closely linked.

The Commission has identified the correct cross-cutting issues and key drivers of infrastructure that will enable it to carry out a successful NIA. However we feel the Commission might benefit from linking them together into one set of issues or drivers.

For example, in the water industry we are confined by the geographic region we supply. At Affinity Water, we supply one of the fastest growing, most economically active regions in the UK. However, our supply area has also been designated as being under serious water stress. Therefore the link between geography, local growth, population and demography is a distinction which we are currently constrained by.

Similarly we see governance and decision making closely allied with economic growth and productivity. Climate change and the environment should be considered alongside sustainability and resilience.

By linking them together, we believe the NIA will help the Commission to better achieve a whole-system approach to understanding interdependences across different sectors and issues.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

We think that there are two cross-cutting issues that the Commission should also consider.

Firstly, we think intergenerational funding should be considered as a cross-cutting issue. This raises questions of whether the challenges of tomorrow should be met and paid for today or whether we should leave them to be tackled by the next generation. Essentially, it is a question of who pays and

when. This is particularly important in the context of short term price setting mechanisms that, inevitably, bias decisions towards the near term.

Secondly, we think the Commission should have a robust approach to designing an NIA and future infrastructure plans which takes account of the North/South investment. It is commonly documented that the south-east, and London in particular, is the beneficiary of such long-term plans. To ensure legitimacy of the NIA and the Commission's future work the process must be seen to be fair, the infrastructure properly targeted and considered.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

The methodological approach outlined in the NIA consultation is adequate. It covers the most appropriate ways of determining the needs and priorities of the UK's future needs. We would, however, reiterate our earlier point that it is vital the Commission access the expertise and skills that are available across the full range of sectors the Commission will be planning for.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments? / Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

We will take question nine and eleven together.

We feel that we have extensive, relevant experience of preparing a long-term look at the future needs of our sector and the impact it will have on our customers. For example, our Water Resources Management Plan (WRMP) is a publication we must produce every five years showing how we plan to supply enough water to meet demand over the next 25 years. We must ensure that we balance the demand for water in our supply area against the available water resources whilst minimising the impact on the local environment. This is a statutory process introduced by the Water Act 2003 and there are a number of stages during which we consult our stakeholders and invite comment.

Such plans have to take account of changing circumstances while planning for the long term impacts on our environment, of our customers' usage and the potential changes in the regulatory environment. Further, it involves extensive engagement with our customers, stakeholders and neighbouring companies.

We believe this type of planning puts us in an excellent place to support the Commission in their long term planning and we would be pleased to arrange a session with the Commission to talk through our experience in more detail.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

N/A

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

The importance of effective engagement cannot be overstated in our view. As we have pointed to in some of our responses there are a number of challenges to be overcome in developing an NIA and

the view of these challenges will be shaped by factors such as sector, geography, and views on funding.

In developing our Business Plan we spoke to, and heard the views of, over 12,500 of our customers. They had a significant say in our plans and shaped the final submission we made to our regulator Ofwat. The result was our Business Plan being awarded 'Enhanced' status. From our perspective the most important aspect of this engagement was demonstrating that the responses would be properly considered and would influence our final decisions.

We would recommend that the Commission is clear on what it is engaging on and what the outcome of the engagement will be. Questions will be raised about whether the engagement is part of formal consultations or whether it would negate future consultation on future projects.

## Airport Operators Association (AOA) Response to the National Infrastructure Assessment – process & methodology consultation

### Introduction, objectives and scope

1. The Airport Operators Association (AOA) is the voice of UK airports. We welcome the Commission's consultation on the process and methodology of the National Infrastructure Assessment (NIA), as it is a sign of the open and transparent way the Commission intends to take its work forward.
2. The AOA supports the Commission's plan to analyse the UK's long-term infrastructure needs over a 10-to-30-year horizon and then articulate those in a National Infrastructure Assessment (NIA). This time-frame is consistent with the long-term planning that typifies the aviation sector. We would caution that given the uncertainties inherent to long-term predictions, the Commission should not be too prescriptive on recommendations towards the end of the 30-year horizon but leave room to revisit those in its quinquennial reviews.
3. We agree with the broad outline of the Commission's intended approach in developing the NIA and welcome the explicit inclusion of airports in the transport section. We would urge the Commission, as we have done previously, to recognise that airspace is the transport infrastructure of the skies and is as important as physical infrastructure on the ground.
4. A defining feature of UK airports is that most of them are in the private sector. We believe that the Commission should not disrupt well-functioning competitive markets that are delivering high levels of private investment in infrastructure but that it would be helpful for the Commission to advise the Government on improving the ways in which markets deliver private infrastructure investment, in particular the policy framework for approving expansion of terminals and runways at airports, as well as the finance mechanisms to support surface access infrastructure.

### Remit and plan

5. We agree with the objectives the Government has set for the Commission (**Q.1**) and the approach the Commission intends to take as it sets out the NIA (**Q.2**). The aviation sector is a crucial driver of economic growth, helping the UK to create businesses and jobs. The sector contributes over £52bn to the UK economy, supports a million jobs and pays almost £9bn a year in taxes.<sup>1</sup> Aviation connectivity is vital in facilitating trade in goods and services, tourism, business investment and innovation and productivity. The whole of the UK needs to benefit from aviation links, either direct through good access to nearby airports or through multi-modal transport connections to a UK hub airport. In particular, expanding connectivity to destinations abroad usual requires reciprocal connectivity for foreign carriers to UK destinations. The UK needs to be in a position to offer that in order to benefit from future connectivity opportunities.
6. We broadly agree with the way in which the NIA covers the transport sector (**Q.3**), though **we would urge the Commission to also consider the airspace infrastructure in the sky (Q.4)**. While airports and aircraft have developed beyond recognition in the last 60 years,

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<sup>1</sup> Oxford Economics (2014), *Economic Benefits from Air Transport in the UK*

the way air traffic is managed has not fundamentally changed since the 1960s. To use a modern analogy, the design of the UK's air corridors has been stuck in an analogue era, while the technology driving the rest of the aviation sector is going digital. Without tackling airspace modernisation, many of the benefits from improved infrastructure on the ground cannot be realised – in fact, without modernising airspace the economic cost of delays and congestion in the sky could multiply significantly over the next decade or two.

7. When considering airports as part of the transport assessment, the NIA should, in particular, consider how increasing passenger numbers can be catered for. Demand for air travel is forecast to increase 1-3% a year to 2050 and passenger numbers are predicted to increase to 315 million in 2030 and 445 million by 2050 ('constrained' forecasts)<sup>2</sup> according to the Department for Transport's 2013 passenger forecasts. The central forecasts suggest that all the South East airports would be at capacity at around 2030 and the larger airports outside the South East from approximately 2040. However, we are already seeing passenger numbers in 2015 beyond the most optimistic numbers predicted in 2013. This means that airports will reach capacity sooner than predicted. Unless action is taken to alleviate this capacity crunch there will be severe knock on effects for the UK economy.
8. **Airport development and surface access should not be considered independently from one another; they should instead form part of an integrated transport strategy** covering the entirety of the UK (Q.5). The decisions around airport expansion and the routes provided by rail developments, including HS2, will have an impact on one another. Surface access, including transport such as rail and highways, needs to provide accessible choices so that passengers continue to gain from aviation and the economy can prosper from improved connectivity. The AOA is due to publish a report later this year, authored by Capital Economics, that sets out the wider economic benefits to the community living and working near airports, which we will be glad to share with the Commission.
9. Transport links at airports influence passenger behaviour when choosing where to travel to or from. Market research undertaken by the Civil Aviation Authority (CAA) found that the cost and convenience of getting to the airport was selected as one of the main reasons for choosing an airport over other local options by 55% of respondents. This makes surface access a crucial part of the consumer journey, ranked second in the CAA poll to the availability of flight routes. People need to be connected to infrastructure in order to use it and for the economic benefits of that use to be realised. That is why Sir Howard Davies wrote to the Chancellor of the Exchequer in November 2013<sup>3</sup> saying: "surface transport improvements can encourage more use of airports which currently have spare capacity, improve the passenger experience, and make airports more attractive to airlines." He also emphasised that "serious consideration should be given to airport users when determining priorities for local transport spending". The AOA is concerned that despite this letter being written nearly three years ago, progress on these recommendations has been limited.
10. With regards to the cross-cutting issues suggested by the Commission (Q.6), the AOA would in the main agree with those. There is also an interplay between these cross-cutting issues. For example, as airport expansion is generally privately-funded, the role for the Commission and the Government is to put in place the policy framework that enables that expansion to

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<sup>2</sup> Department for Transport (2013), Passenger Forecasts

<sup>3</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/263208/surface-access-letter.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263208/surface-access-letter.pdf)

take place in a timely and cost-effective manner. The AOA is concerned that the current procedures, particularly around gaining planning permission, are not fit for purpose and are, as a result, costly and prone to delays. However, given the aforementioned wider economic benefits of improved surface access to airports, the AOA would suggest the Commission considers a fair funding model for surface access, including proportionate contributions from public sources.

11. The AOA is a member of the Sustainable Aviation (SA) coalition and believes sustainability is crucial to the future of the aviation sector (Q.7). SA has set out a number of roadmaps showing how the aviation industry can grow while reducing its environmental impact, including roadmaps on CO<sub>2</sub>, sustainable fuels and noise. Airports are playing their part in these roadmaps to ensure that our sector's growth is compatible with the UK's carbon and environmental commitments. However, a number of these roadmaps could be impacted by the outcome of the EU referendum, through changes to the existing legislative, funding and research mechanisms (e.g. Horizon 2020, the ACARE Flightpath 2050 initiative, the Renewable Energy Directive and the CleanSky initiative). We would ask the Commission to take this into consideration.

#### Methodology

12. The AOA agrees with the proposed methodological approach (Q.8), though we would caution that, as set out in §9 above, suggested strategies for capacity and efficiency enhancement are often available but not always acted upon.
13. The AOA also agrees with the Commission's assessment of the most important infrastructure drivers. We would note the importance of airports as transport hubs for a given area, driving both business and investments through improved connectivity. There are policy measures available to the Government to encourage the growth of such hubs that, while perhaps outside the formal remit of the Commission, it is important for the Commission to take into consideration. Examples include measures to encourage regional connectivity through the designation of Public Service Obligations on certain routes as well as the effects of fiscal policy. On the latter point, we are principally concerned about the impact of different levels of Air Passenger Duty in different parts of the UK could have on passenger behaviour.

#### Engagement

14. The AOA welcomes the Commission's intention to consult widely as it brings together the NIA (Q.13). We would welcome a series of industry roundtables to explore further the evidence base, the gaps that may exist in that evidence base and ways in which industry can support the Commission to plug those gaps.

#### Further information

[name redacted], [job title redacted], AOA – [email address redacted] or [telephone number redacted]

July 2016



# **Alderney Renewable Energy response to National Infrastructure Commission call for evidence on the National Infrastructure Assessment process and methodology, May 2016**

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## **About Alderney Renewable Energy (ARE)**

ARE is a leading tidal energy developer based on Alderney in the Channel Islands. ARE was founded in 2004 to maximise the powerful tidal resources in the seas around Alderney for effective, sustainable tidal energy generation. ARE's vision is to utilise the huge potential of tidal energy to deliver sustainable, reliable sources of green energy to the UK via a new 1400MW electricity interconnector between France and the UK – the FAB Link (France, Alderney, Britain Link).

### **Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

These are welcome aims and ARE supports them. We observe that all of these aims are predicated on a long-term and stable policy framework. It is important that the government takes clear and transparent decisions which are implemented in the spirit in which they were formulated and which give investors confidence in the UK. While it is understandable that the political cycle means that some degree of variance is inevitable, the role of the Commission will be key to ensuring that as much infrastructure policy as possible is locked down.

### **Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

We fully endorse these principles, especially a whole system approach. A whole system approach is particularly crucial in considering the future of our energy system. As more variable generation comes on the system through increased deployment of some renewable technologies, the problem of intermittency will increase. This means energy storage will play a major role, as will demand side response. Technologies such as that being deployed by the ARE tidal project will assist in mitigating this challenge and only through looking at the system as a whole can the true value of these technologies be fully comprehended. ARE's tidal project produces variable generation predictable decades ahead and will allow stakeholders in the energy system to plan with much greater accuracy when compared to intermittent variable technologies.

### **Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

There has been great attention given to wind and solar power in recent years, and using support mechanisms to reduce costs as well as stimulate investments. It is now time to focus on other

technologies as wind and solar near grid parity and the investment gap reduces. Marine energy is an obvious next area of focus, technology is already advancing and, particularly with the ARE tidal project, there is only a relatively small public investment required to bring costs down to competitive levels.

Marine technologies also have the benefit of being far less intermittent, with hourly generation predictable decades ahead in the case of the ARE tidal project. Britain is well-placed to harness tidal energy and a small amount of public investment could enable this to be exploited around the coastline on a cost competitive basis.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

Alternative forms of finance are a valuable way of delivering the diverse energy system needed for the changing demands it satisfies. We would encourage the Commission to review the current financing regime for low-carbon energy, and in particular progress work to develop a CFD for 'foreign' projects. ARE has been told that it will be classified as a foreign project, despite Alderney's status as a British Crown Dependency and previous indications from UK Government to the contrary. It is our view that this project brings a number of benefits to the UK and therefore a suitable financing mechanism should be developed. There are likely to be a number of projects which have similar frustrations in the future, particularly in marine energy, and where they are able to provide distinct benefits to the UK there should be provision to support their development.

## The National Infrastructure Assessment Consultation

Written evidence submitted by the Aldersgate Group  
August 2016

1. The Aldersgate Group is an alliance of major businesses, NGOs and cross-party politicians, which drives action for a sustainable economy. Our corporate members, who come from across the economy and have a collective global turnover of over £400bn, believe that clear and stable policies supporting low carbon growth and environmental protection make clear economic sense for the UK.
2. We welcome the creation of the National Infrastructure Commission (NIC) to help improve the delivery of infrastructure projects in the UK, and of the National Infrastructure Assessment (NIA) to identify long-term infrastructure needs and to highlight priority areas for action in the medium-term. Our members are driving investment in modern low carbon infrastructure – particularly more efficient buildings, ICT solutions and low carbon energy generation and transport infrastructure.
3. The Paris Agreement reached at COP21 last December has set an unprecedented global imperative for strong action on climate change and reinforced the need for the work of the NIC to be compatible with UK’s long-term climate change targets as set out in Climate Change Act 2008. One of the central functions of modern infrastructure must be the ability to meet the challenges posed by climate change (both in terms of mitigating climate change and adapting to it) and have resilience embedded at its heart.
4. Furthermore, major infrastructure projects should factor in at an early stage the need to protect and enhance the UK’s natural capital. Incorporating cost-effective opportunities for nature-based solutions and natural capital improvements into infrastructure developments will strengthen the UK’s resilience and wellbeing. We would suggest that the NIC works closely with the Natural Capital Committee (NCC) in this area.
5. The outcome of the national referendum on EU membership on 23 June 2016 has created significant uncertainty for businesses particularly regarding the UK’s future access to the EU’s single market, potential changes to the policy landscape, and the state of the British economy. This risks creating a hiatus in infrastructure investment which may particularly impact nascent industries such as in the low carbon sector.
6. The long term certainty and opportunities afforded by the NIC for improved planning, scrutiny and accountability of infrastructure decisions in the UK is welcome. It is essential that long-term infrastructure needs are identified with a clear plan to ensure the UK economy benefits from infrastructure that is increasingly efficient, future-proof, modern and low carbon.
  1. **The Government has given the National Infrastructure Commission objectives to:**
    - a. **foster long-term and sustainable economic growth across all regions of the UK**
    - b. **improve the UK’s international competitiveness**
    - c. **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

7. We believe that in order to deliver on the three objectives, the Commission must ensure that sustainability and the low carbon economy is embedded in all areas of work. Sustainability impacts the objectives in the following ways:
- a. The low carbon economy contributed £46bn in turnover to the UK economy in 2014,<sup>1</sup> including employing 136,000 jobs in the North of England<sup>2</sup> which is home to 10 of the 12 UK cities ranked highest for relative decline.<sup>3</sup> Many of these economic benefits come from long-term and wide-reaching investment through large infrastructure projects: for example, the new Siemens wind turbine manufacturing facility in Hull has brought £160m of inward investment to the local economy whilst generating low carbon infrastructure for a future-ready energy system, creating over 1,000 skilled jobs, training facilities and new supply chains. This new facility brings additional infrastructure solutions with it, such as the £150m port modernisation at Alexandra Dock by Associated British Ports (ABP). As the UK strives to ensure its infrastructure is future-ready, we urge the Commission to consider the multiple financial benefits that low carbon infrastructure can create.
  - b. The international market for low carbon goods and services was estimated at \$5.5tn in 2011-2012, growing at over 3% per year.<sup>4</sup> The UK's competitors are competing to seize a greater share of this burgeoning market. For example, China invested over \$100bn in renewable energy in 2015 alone and plans to double its wind energy capacity, treble its solar capacity and increase the deployment of electric vehicles by a factor of 10 by 2020,<sup>5</sup> while the US is committed nearly to treble its spending on low carbon generation by 2020.<sup>6</sup> Meanwhile the UK is losing ground and has slipped out of the top ten most attractive countries for renewables investments,<sup>7</sup> although there have been positive developments in less mature renewable industries such as offshore wind. This decline must be reversed if the UK is to remain a relevant and competitive player on the global stage.
  - c. The Committee on Climate Change Adaption Sub-Committee's *UK Climate Change Risk Assessment 2017* report demonstrates that climate change will increasingly have disruptive impacts on the UK's infrastructure, businesses and the state of its natural environment,<sup>8</sup> all of which will have a detrimental effect on quality of life. On the other hand, investing in green infrastructure can bring notable improvements to quality of life. Planting new woodland or improving woodland management in the Mersey Forest returned £940,000 per year in additional benefits in terms of quality of place, £122,000

<sup>1</sup> <https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/finalestimates/2014>

<sup>2</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/416240/bis-15-206-size-and-performance-of-uk-low-carbon-economy.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416240/bis-15-206-size-and-performance-of-uk-low-carbon-economy.pdf)

<sup>3</sup> <https://www.jrf.org.uk/report/uneven-growth-tackling-city-decline>

<sup>4</sup> <http://2015.newclimateeconomy.report>

<sup>5</sup> [https://www.e3g.org/docs/E3G\\_Report\\_on\\_Chinas\\_13th\\_5\\_Year\\_Plan.pdf](https://www.e3g.org/docs/E3G_Report_on_Chinas_13th_5_Year_Plan.pdf)

<sup>6</sup> [http://www.green-alliance.org.uk/UK\\_low\\_carbon.php](http://www.green-alliance.org.uk/UK_low_carbon.php)

<sup>7</sup> [http://www.ey.com/Publication/vwLUAssets/EY-RECAI-47-May-2016/\\$FILE/EY-RECAI-47-May-2016.pdf](http://www.ey.com/Publication/vwLUAssets/EY-RECAI-47-May-2016/$FILE/EY-RECAI-47-May-2016.pdf)

<sup>8</sup> <https://www.theccc.org.uk/publication/uk-climate-change-risk-assessment-2017/>

per year in health and well-being, through greater exercise benefits, and £116,000 per year through reduced air pollution.<sup>9</sup>

- 2. Do you agree that, in undertaking the NIA, the Commission should be:**
- a. Open, transparent and consultative**
  - b. Independent, objective and rigorous**
  - c. Forward looking, challenging established thinking**
  - d. Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

- 8.** The Aldersgate Group agrees that these principles should guide the work of the Commission; in particular, in taking a whole systems approach. Short-term policies and policy changes in the environmental arena have occurred during successive governments which have long-term implications. For example, the unexpected cancellation of the Zero Carbon Standard for new homes after nearly a decade of industry preparation and investment,<sup>10</sup> will lead to the construction of buildings that lock in carbon emissions and do not help address issues such as fuel poverty, therefore increasing long-term costs for the government and consumer. Taking a forward looking view of our future needs and taking into account long-term environmental challenges will be increasingly important if our infrastructure is to be fit for purpose, rather than building in response to the conditions of today.
- 9.** Similarly, the issue of low carbon heating has been widely acknowledged as one of the greatest challenges facing the Government in meeting its carbon targets. This is because it is a complex, whole system problem dependent on variation in geography, housing types and occupancy patterns as well as the characteristics of different means of heat provision which cannot be addressed by considering any part in isolation.<sup>11</sup> Decisions made on heating infrastructure can have a 20 to 50-year impact and touches on issues as diverse as consumer behaviour, fuel poverty, grid capacity, skills training amongst others. Taking a whole systems approach will be crucial to addressing this challenge. We encourage the Commission to set the standard for the Government in its approach to tackling infrastructure demands.
- 3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**
- 4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**
- 5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

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<sup>9</sup><http://www.merseyforest.org.uk/files/Economic%20Contribution%20of%20The%20Mersey%20Forest's%20Objective%20One-Funded%20Investments.pdf>

<sup>10</sup><http://www.ukgbc.org/press-centre/press-releases/over-200-businesses-urge-chancellor-reconsider-scrapping-zero-carbon>

<sup>11</sup><http://www.imperial.ac.uk/media/imperial-college/research-centres-and-groups/icept/Heat-infrastructure-paper.pdf>

10. We are pleased to see the Commission classifies natural assets as infrastructure assets, conscious of the significant services they provide both in terms of managing risks and the protection they afford more traditional ‘grey’ infrastructure, increasing resilience to events such as flooding. A helpful example is the economic value provided by natural capital in coastal habitats – particularly in relation to sea and flood defences. The value provided by coastal wetlands in terms of buffering the effects of storms and flood control has been estimated at £1.5bn annually.<sup>12</sup> If coastal developments were designed to enhance and not erode these benefits, the need for traditional engineered interventions would reduce. A further example is provided by Yorkshire Water’s peatland restoration programme, which has found that the speed at which water flows off degraded moors is an order of magnitude faster than a moor that is fully vegetated, allowing a healthy bog to act as a buffer to rainfall.<sup>13</sup> Green infrastructure can provide the functions delivered by traditional infrastructure and also produce many other benefits including air quality regulation, temperature regulation, biodiversity, and aesthetic values.<sup>14</sup> It must therefore form a key part of the NIA.
11. We are also supportive of the Commission’s approach to assessing infrastructure needs across sectors. We agree that it will be crucial to consider the impacts of greater electrification of transport on energy systems. The Committee on Climate Change (CCC) has found that it will be necessary for 60% of new cars and vans to be Electric Vehicles (EVs) by 2030 if we are to meet our 2050 targets.<sup>15</sup> However, at the same time this will evidently place a greater strain on the grid. Research funded by Ofgem found that 32% of Britain’s total electricity networks will “require intervention” if the nation reaches a point where between 40% and 70% of motorists own EVs.<sup>16</sup> Alongside the roll out of charging infrastructure, we recommend that the Commission considers other low carbon infrastructure that will be needed to support the increase in electric vehicles. This will include renewable electricity generation, but also the greater deployment of flexible solutions such as demand side response and electricity storage.
12. Similarly, we agree that it will be crucial to consider how information technology can deliver efficiencies in all areas: BT finds that by 2030, ICT could enable a 24% reduction in UK carbon emissions annually, whilst generating an additional £122 billion per year in sustainable economic benefits. This could be achieved through a range of measures, including using ICT to increase knowledge around manufacturing and agriculture efficiencies, process automation, decreased travel both for private travel and freight, and the use of cloud computing.<sup>17</sup> Moreover, better technology can use more accurate data to provide improved scenario planning and risk assessment, ensuring infrastructure is designed to be fit for purpose and resilient.<sup>18</sup>

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<sup>12</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/228842/8082.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228842/8082.pdf)

<sup>13</sup> <http://publications.naturalengland.org.uk/publication/30021>

<sup>14</sup> <http://www4.shu.ac.uk/research/cresr/sites/shu.ac.uk/files/green-infrastructure-contribution-growth.pdf>

<sup>15</sup> <https://documents.theccc.org.uk/wp-content/uploads/2015/11/Committee-on-Climate-Change-Fifth-Carbon-Budget-Report.pdf>

<sup>16</sup> <http://myelectricavenue.info/>

<sup>17</sup> <https://www.btplc.com/Purposefulbusiness/Ourapproach/Ourpolicies/UK-Carbon-targets-May-2016.pdf>

<sup>18</sup> <http://www.balfourbeatty.com/about-us/public-policy/balfour-beattys-paper-on-future-infrastructure-need/>

13. We urge the Commission to follow in the footsteps of the Scottish Government in designating building energy efficiency a national infrastructure priority. Domestic energy efficiency can reduce carbon emissions, improve health and wellbeing, increase energy security, reduce energy bills and fuel poverty, and drive economic growth.<sup>19</sup> The CCC notes that reducing the level of energy demand through improve efficiency can greatly reduce the cost of meeting the 2050 emissions reduction target.<sup>20</sup> Energy efficiency should therefore be the ‘first fuel’ in greater infrastructure transition challenges, such as the move towards to low carbon heating.<sup>21</sup>

**6. Do you agree that the NIA should focus on these cross-cutting issues?**

**7. Are there any other cross-cutting issues that you think are particularly important?**

14. We agree that the Commission should focus on the cross-cutting issues set out in the consultation document. We also emphasise that when considering the cross-cutting issue of cost, the Commission is in a prime position to focus on long-term cost, taking into account how investments made today will allow us to meet targets in the most cost-effective manner. For example, the National Audit Office estimated that the cancellation of the £1bn carbon capture and storage (CCS) competition following the 2015 Autumn Statement may increase the costs of meeting the UK’s Climate Change Act targets by £30 billion, with DECC estimating that we will simultaneously lose out on £4.3 billion of net social benefits.<sup>22</sup>

15. We welcome the Commission’s proposed analysis of how infrastructure interacts with sustainability in terms of our environmental commitments – both national, through the Climate Change Act 2008 and wildlife protection laws, and international, through the Paris Agreement 2015, mindful of the potential for increased international expectations in line with the Paris Agreement’s five-yearly mechanism for ratcheting ambition. We reiterate that the UK’s environmental commitments will require significant new infrastructure if they are to be met, be it through offshore wind farms or new flood plains.

16. Regarding financing, private sector finance will be necessary to fund a great deal of this new infrastructure – 69% of financing in planned infrastructure is from the private sector.<sup>23</sup> Investor confidence has been shaken in the wake of the referendum on the UK’s membership of the European Union. This loss of confidence is likely to dampen appetite and increase the cost of finance across all industries, at least in the short-term. A stable, long-term infrastructure plan delivered by the Commission will enhance certainty and go a long way to incentivising private investment. In addition, we welcome the examination of

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<http://www.ukgbc.org/sites/default/files/A%20housing%20stock%20fit%20for%20the%20future%20-%20Making%20home%20energy%20efficiency%20a%20national%20infrastructure%20priority.pdf>

<sup>20</sup> <https://www.theccc.org.uk/publication/the-fifth-carbon-budget-the-next-step-towards-a-low-carbon-economy/>

<sup>21</sup> <http://www.imperial.ac.uk/media/imperial-college/research-centres-and-groups/icept/Heat-infrastructure-paper.pdf>

<sup>22</sup> <https://www.nao.org.uk/wp-content/uploads/2016/07/Sustainability-in-the-Spending-Review.pdf>

<sup>23</sup> <https://www.gov.uk/government/publications/national-infrastructure-pipeline-july-2015>

new financing models. A useful starting point is the OECD's 2015 paper *Infrastructure Financing Instruments and Incentives*.<sup>24</sup>

17. It is also important to consider how skills and education will contribute to the delivery of 2050-ready infrastructure. Barriers to a skilled workforce include “the cost of higher education, the attractiveness of traditional industries in comparison to other, new industries, the perceived unattractiveness of the industry to women and people from minority backgrounds, as well as the previous trend of ‘boom and bust’ in the construction industry.”<sup>25</sup> In particular, greater sustainability training would be desirable to ensure that those entering the workforce consider the long-term impacts of their work.

**8. Do you agree with this methodological approach to determine the needs and priorities?**

18. We agree with the Commission's broad-reach approach to determining needs and priorities. The Aldersgate Group would caution against solely using narrow modelling approaches, such as the Computable General Equilibrium (CGE) model generally used by the UK's Government to analyse policy impacts. Limitations of this model have been highlighted by reports from Cambridge Econometrics and Synapse Energy Economics, Inc, in that it takes an overly narrow view of policy scenarios, and does not appear to regularly take into account the economic benefits, such as net job creation and net GDP impacts, nor broader benefits around health, the health of financial markets and resilience that certain policies can provide. This is because a CGE model assumes that an optimal equilibrium is reached in a pre-policy scenario and therefore any additional cost associated with a new policy will have a negative economic impact.<sup>26</sup> We therefore welcome the Commission's cross-cutting methodology and suggest that the Commission takes a pluralistic approach to modelling potential outcomes, using contrasting models to identify a range of outcomes.

19. We are glad to see the Commission's determination to engage widely with stakeholders and particularly recommend engaging with cross-sectoral organisations such as the Aldersgate Group. With many corporate members investing in the UK's large scale infrastructure and at the cutting edge of low carbon innovation such as Siemens, Thames Water, DONG Energy, BT, National Grid and Jaguar Land Rover, our members are well placed to give a cross-sectoral view of how to stimulate infrastructure investment for a low carbon future.

**10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

20. Yes. In particular, when determining how resilient infrastructure should be to potential future extreme events, flexibility must be a key consideration in order to ensure resilience is addressed in the most cost-effective manner. WSP | Parsons Brinckerhoff advises their staff to incorporate future-ready thinking into their design to prepare for future realities of uncertain energy prices, extreme weather events, increasing urbanisation, and other

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<sup>24</sup> <http://www.oecd.org/finance/private-pensions/Infrastructure-Financing-Instruments-and-Incentives.pdf>

<sup>25</sup> <http://www.balfourbeatty.com/about-us/public-policy/balfour-beattys-paper-on-future-infrastructure-need/>

<sup>26</sup> <http://www.synapse-energy.com/project/economic-modeling-uk-climate-policy>



potential factors.<sup>27</sup> For example, it would cost a great deal to build a new home which is resilient to 4°C temperature increase, an uncertain but possible scenario. However, designing to current building codes will also leave new infrastructure vulnerable in the likely event of a 1.5-2°C temperature increase. Therefore, WSP | PB are considering how to design for medium-term needs, but also to embed flexibility which will allow retrofits to take place at lower cost and with ease in the event of future temperature increases.

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<sup>27</sup> <http://www.wsp-pb.com/en/Who-we-are/Sustainability/future-ready/>

# National Infrastructure Commission

## Consultation: Process and Methodology

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### Response from Anglian Water – August 2016

#### *Overview*

1. Anglian Water welcomes the opportunity to respond to this consultation. We have been consistently supportive of the creation of the National Infrastructure Commission (NIC) and its consideration of water and waste water infrastructure needs. We look forward to continuing to work constructively with the Commission as it develops its National Infrastructure Assessment. Water and waste water infrastructure is fundamental to the growth agenda, particularly to enable sustainable housing and economic growth in the south and east of England.
2. We support the overall approach, processes and methodologies outlined in the consultation.
3. As noted in our response to the March 2016 consultation, Anglian Water has played a central role in the Water UK-led water resources long term planning project, which considered England and Wales' long term water needs and the practical steps required to meet them. We believe this project is a good example of collaborative and evidence-based work that embodies the Commission's principles of independent, objective rigorous analysis that is forward looking and challenges established thinking. We hope that it provides a useful base from which the Commissioners can draw conclusions.
4. We note the Commission's timetable for its key publications and its remit set by the Government, including the requirement to build on the work of other actors including government departments. Although not a matter for the Commission, we would welcome a National Policy Statement from Government on water supply. This would provide a helpful framework for the Commission's consideration of the sectoral issues that are critical for the UK's long term development.
5. We would be very happy to provide further information on any of these points, or the more detailed responses below.

## ***Response to selected consultation questions***

*Q2. Do you agree that, in undertaking the NIA, the Commission should be: Open, transparent and consultative; Independent, objective and rigorous; Forward looking, challenging established thinking; Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks? Are there any principles that should inform the way that the Commission produces the NIA that are missing?*

We agree with the principles that the Commission has outlined. We would also welcome the adoption of a precautionary “no regrets” principle that supports making infrastructure choices that are reliable in a wide range of plausible futures, including more challenging ones.

*Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?*

We note that the Commission includes geography and local growth as one of its cross-cutting themes, which we welcome. There are significant regional differences in the needs, challenges and options for water and waste water (and some other sectors) which should form an important part of the assessment with respect to those sectors.

*Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?*

We support the Commission’s “whole system” approach. Interdependencies are very important in our sector, both between different uses of water (public water supply, agriculture and industry) and with other aspects of infrastructure, particularly relating to energy, transport and housing.

*Q7. Are there any other cross-cutting issues that you think are particularly important?*

As with other sectors, skills and labour are an important factor in the delivery of infrastructure for water and waste water. We would encourage the Commission to include a consideration of the labour needs implied in its recommendations, including any potential impacts on the labour market linked to the EU referendum result.

Yours sincerely,

[name redacted]

[job title redacted], Anglian Water Services

# THE NATIONAL INFRASTRUCTURE ASSESSMENT **CONSULTATION RESPONSE**

Process and Methodology

August 2016





Arcadis is the leading global design and consultancy firm for natural and built assets. Applying our deep market sector insights and collective Design, Consultancy, Engineering, Project and Management services we work in partnership with our clients to deliver exceptional and sustainable outcomes throughout the lifecycle of their natural and built assets.

We are 28,000 people active in over 70 countries that generate more than €3 billion in revenues.

Arcadis' Vision is to improve the quality of life and be recognised as the best. This aligns with one of the National Infrastructure Commission's key objectives to "Improve the quality of life for those living in the UK" which is a value we feel passionate about.

## INTRODUCTION TO OUR RESPONSE

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Arcadis strongly supports the establishment of the National Infrastructure Commission (NIC) and its work to determine a long term vision to build the infrastructure projects the UK needs.

Arcadis welcome the opportunity to respond to The National Infrastructure Assessment — Process and Methodology Consultation. Arcadis have been following the work of the NIC very closely and commend your publications on 'Smart Power' and 'Transport for a World City' which have helped to push forward the agenda for these vitally important areas of UK infrastructure.

We see the founding of the NIC as an important step towards tackling the challenges and interdependencies which exist across infrastructure sectors over the medium to long term.

Investment in infrastructure is a prerequisite for achieving strong economic growth and boosting the UK's competitiveness against its international peers. Countries including Australia, have already established independent national infrastructure bodies and others are proposing something similar.

It has never been more important for the UK to have a long-term apolitical infrastructure vision which continues to attract strong inward investment and attract the best skills and talent to the UK.

We hope the ideas and points we have captured in this response will add value to developing the National Infrastructure Assessment (NIA) and we look forward to contributing towards the NIA "call for evidence" which is scheduled for the autumn this year.

Please note that Arcadis have responded to questions 1, 2, 3, 4, 5, 6, 7, 9, 10 and 13.

## Question 1

Arcadis welcomes the set of stretching, challenging and ambitious objectives the Government has set the NIC. The objectives reflect the key role infrastructure plays in the

The Government has given the National Infrastructure Commission objectives to:

- foster long term economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

What issues do you think are particularly important to consider as the Commission works to this objective?

everyday lives of citizens and can act as an enabler for increasing the UK's economic capacity and growth.

As the objectives appear broad, we are curious to understand how they will be defined, measured and tracked. For example, clarifying the objective between maximising net economic growth

and achieving balanced growth across all regions. We see the opportunity for the NIC to initiate a debate with respect to the long term goals for economic growth in the UK and how a national and regional balance will be achieved.

By stipulating that economic growth should be fostered across 'all regions' of the UK, it risks dragging the NIC into a political debate regarding the regionalisation of infrastructure spend. Arcadis propose that the strategic objective should be to foster economic growth across the UK, in its entirety, rather than across all regions and targeting infrastructure investment which will have the greatest effect on economic growth.

It would also be powerful to demonstrate the NIC's ability to impact against the defined objectives. For example, quantifying the impact of proposed schemes against the objectives (how could investment in a particular sector support economic growth). This would also help the NIC prioritise when considering the entire portfolio.

Arcadis believe that fostering and supporting sustainable economic growth for UK PLC must be viewed as the primary and principal objective. Arcadis believe that growth should be sustainable and smart, growing in such a way that integrates environmental considerations, addresses demand challenges and identifies the best opportunities for prosperity.

A key issue for the NIC to consider is the relationship between infrastructure investment (in the UK's asset base) and economic growth. The Arcadis Asset Wealth Index highlights the strong correlation between a nation's stock of built assets and economic output. We would be happy to share the findings with the NIC and discuss how this could be taken a step further through investigating what type of infrastructure investment has the greatest impact on unlocking economic growth.

The issue of boosting UK economic productivity should also be considered by the NIC. According to the Office for National Statistics (ONS) output per hour worked in the UK was 18 percentage points below the average for the remaining six members of the G7 group of industrial nations in 2014. Low productivity is also a contributing factor towards slow GDP growth. While there are many contributing factors towards productivity, the NIC should consider how the future infrastructure vision can help to address this. In a knowledge and service led economy, improving digital infrastructure as well as physical infrastructure should be a priority area.

International competitiveness is a pre-requisite for achieving strong economic growth. To increase economic output, the UK must continue attracting direct investment, the best world-class talent and boosting economic productivity. To meet this objective the NIC should consider the factors which influence foreign investment in the UK in both the public and private sector. In a post-Brexit environment this should not be taken for granted and initiatives to encourage greater investment in UK infrastructure should be considered by the NIC. The NIC will also need to agree the metrics to measure international competitiveness and

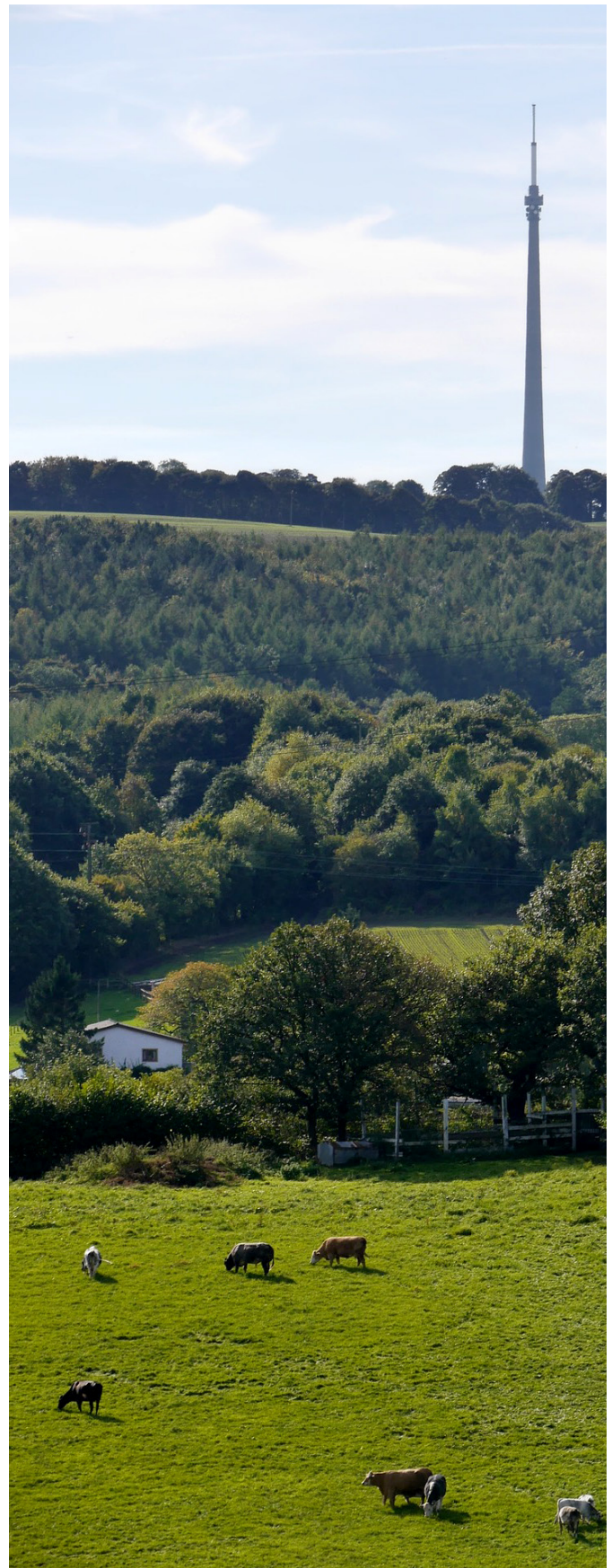
review the relevance of such metrics as the global economy evolves between now and 2050.

We strongly agree that infrastructure can improve a citizen's quality of life by opening up new opportunities both social and economic. However, quality of life is a term which can be interpreted a number of different ways. It can be interpreted as improving the quality of the environment (improving the environment — air and water quality). Alternatively, it can mean improving access to jobs, access to education, and the provision of social and green infrastructure. Arcadis feel it would be helpful if the NIC could be more explicit as to what quality of life constitutes and how it can be measured.

In the process of infrastructure delivery there is a risk of a decrease in quality of life especially for those individuals who are in close proximity to the delivery of construction works. The NIC should be cognisant of this through their work and where possible propose mitigation recommendations for the Government to consider.

When comparing sustainability to other cross cutting issues there is a risk it may be devalued. In our response we have mentioned the significance of sustainable economic infrastructure and Arcadis believe that there is a case for it to be included as a fourth objective or more expressly mentioned in the NIC's assessment and vision.

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## Question 2

Arcadis agree with these principles.

Being open, independent and transparent will be of paramount importance, along with the ability to bring a wide range of stakeholders together and propose a way forward which is based on

Do you agree that, in undertaking the NIA, the Commission should be:

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

objective evidence and reason. This should address the historical challenge of infrastructure planning which has tended to be inhibited by the political lifecycle.

To ensure the UK demonstrates international best practice, challenging existing ideas and ways of thinking will be vital. One area which could be challenged is the existing assumptions used to plan major infrastructure programmes. This

should be included in the NIC's forward looking and challenging established thinking principle.

We agree that the NIC should take a comprehensive, whole system approach, and understand the interdependencies and feedback from each sector. Arcadis think that the NIC should be aware of the possibility for revolutionary changes or seismic shifts within the infrastructure system, driven by a global economy, within this principles.

A principle not explicitly called out is outward looking, in particular having a strong international focus.

Long term infrastructure planning is a challenge for every country around the world. As part of

the NIA, the NIC should seek to learn lessons from other countries which have established independent bodies to undertake long term infrastructure planning.

We believe a benefits-led approach is a principle which should be considered by the NIC. Many of our clients are moving away from an infrastructure delivery approach which focuses on the traditional triangle of time, cost and quality. Instead, they are moving towards an approach which is benefits-led and focuses on whole life value, in contrast to whole life cost.



## Question 3

We believe that the sectors included and the descriptions provided are reflective of the remit, requirements and objectives of the NIC.

We are concerned that the NIA may be approaching an unmanageable number of sectors and issues. It may prove difficult to resolve the

Do you agree that the NIA should cover these sectors in the way in which they are each described?

intricate and complex problems within each sector or the cross cutting issues and interdependencies.

Given the intention to submit an assessment and recommendations each Parliament, it will be vital that the NIC seeks support from the public and private sector.

Arcadis believe it is right for the NIA to assess the infrastructure system as a whole and agree that historically complementary project planning has often been overlooked and rarely embraced in the UK.

In determining the vision for the UK's economic infrastructure, we believe it will be critical to first assess the current state and health of the physical assets within each sector and to understand where the risks and opportunities exist.

In the UK, we require a more thorough and deeper understanding of the capacity, potential and condition of our assets to ensure this information is weighed against any vision. There are examples within the UK of successful 'sweating assets', such as with our South East airports where for example Gatwick is the world's busiest single-use runway, with a maximum of 55 aircraft movements per hour. The principles and lessons learnt in this sector should be applied to other sectors.

Establishing a nationwide asset register, could be a solution to better understand the existing UK asset base.

In setting the vision, it will also be imperative that the NIC factors achievability into its recommendations. Appreciating the challenges

already known to developing economic infrastructure, such as the skills shortage within sectors, and anticipating those challenges that may arise in the future, will be critical to striking the right balance between aspirational goals and unrealistic targets.

### TRANSPORT

We agree that a multi-modal approach to the analysis of transport needs is the right approach. Considering the outcomes and how best to support the movement of people and freight into and across the country is the logical and appropriate outlook for the NIC to adopt.

It is also imperative that the NIC, in assessing the transport network, thinks about the movement of people or goods from their point of arrival in a region/city to across the regions and/or cities. New assets or the redevelopment of existing assets in the transport sector may only add pressure to existing infrastructure e.g. Railway terminals and airports. These concerns have been highlighted in the development of HS2 and its connection with Euston station. Within the transport sector, the NIC may wish to assess the developments of public transport within regions/cities such as buses and under/overground networks to aid the transition from point of arrival across the city/region.

The NIC should consider how best to balance the parts of the transport system to enable efficient movement from the point of departure, interchange and arrival at the final destination. The NIC should seek to address the pressures placed upon the transport sector by inefficient connections or inadequate resources. For example, we fully support the NIC's work in addressing the opportunities to better connect Milton Keynes, Cambridge and Oxford.

The NIC should also factor the impact and speed of technological change. New technology can transform transport — as we have seen already with Uber, and expect to see in the future with driverless cars. Developing technologies have the potential to significantly change the way in which people and goods are moved both into and across the country.

The NIC may also wish to seek advice on international best practice in areas such as cycling. Arcadis would be happy to share our experience and expertise from countries such as the Netherlands, where their model for transport and views of infrastructure differ from that of the UK.

All these considerations will need to be balanced against the national and the regional demands within our country and the different needs, desires and abilities within rural and urban areas.

## DIGITAL AND COMMUNICATIONS

The internet of things and the potential of digital/communications innovation and technology offers great possibility to drive growth within the UK and should rightly be incorporated in the vision of infrastructure. We have seen the possibilities of adopting best practice and digital technology in areas such as Building Information Modelling (BIM) and the opportunities they present.

We fully support the assertion that digital infrastructure has the potential to deliver more efficient use of infrastructure assets across different sectors. The development, for example, of smart motorways has unlocked a more efficient use of our highways. Further advancing live traffic information and improving information management and analysis will harness the efficient use of our physical assets in all sectors.

We hope that the NIC provides impetus and recommendations for investment in innovative and technology led solutions in the UK's physical assets.

In order to enable advancements within our infrastructure, we must address the known difficulties in deploying next generation digital communications that are preventing business and/or asset development.

The UK cannot afford to fall further behind in ambition and schedule of the deployment of ultrafast broadband and other next-generation solutions.

Without driving the physical assets required for these upgrades, such as optical fibre installation, we will be unable to harness future technology.

Arcadis wish to see the digital and communications sector cover a much wider remit than just broadband communications. Other points the NIC may wish to consider are the inclusion of innovation and security in this sector.

## ENERGY

As the NIC has noted, there is an importance in looking at the future of heating and the shift to low carbon solutions.

Energy will continue to do the 'heavy lifting' in decarbonising the economy and development in distribution networks but effective management of the nuclear legacy will be critical to build new confidence in the sector. The NIC should seek to steer this area of the sector and may wish to do so whilst considering the forecast growth of local heat networks in the UK, the increasing decentralisation of electricity generation and the proposed decarbonisation of the transport sector and uptake of electric vehicles.

The NIC should look to examine and propose recommendations for the energy system and outputs as a whole but it may wish to analyse and develop the detail divided by traditional and renewable energy sources.

For example, at present the traditional energy sector seeks and requires large capital investment. The appetite for such investment can be disrupted by political instability and decisions, or subjective opinion.

Finally, we hope to see the NIC continue to address not just energy production and consumption but the ability to transfer and connect stakeholders to energy through our existing infrastructure and grid and to consider the decommissioning of energy assets which carry enormous delivery risks and are financially burdensome.



## WATER AND DRAINAGE

The NIC has adequately covered water and drainage in the way it has been described.

Arcadis would also like to highlight a number of important factors, which are influencing how the traditional utilities market operates:

- A move to a TotEx environment.
- The emergence of Smart Networks and the development of smart cities which improve the links between water and energy usage, sludge reuse, and integrated utilities.
- The ability to cost effectively and apply analytics to large volumes of data.
- The wholesale/retail split opening the possibility of increased market consolidation as utilities seek to obtain economies of scale or merge with lower cost operators.

## FLOOD DEFENCES

Over recent years flooding has become a regular occurrence in parts of the UK. The immediate impact and continuing disruption on our people, businesses, goods and services is something that the NIC should rightly address.

The Government has previously stipulated that any project in this sector must save £8 for every £1 it costs, which sets a high bar when competing for available resources.

Arcadis have previously met with Members of Parliament to provide advice on the UK's flood defences and how they may be improved with examples from the Netherlands and elsewhere. Arcadis would be happy to provide similar information to the NIC and support them in their assessment and recommendations.

Arcadis believe that we should treat future investment in this sector as an opportunity rather than just a cost and look to combine natural capital with the need for economic infrastructure.

We believe in adopting a flood defence strategy that is cohesive with natural assets and resources and ensures a sustainable model for inhabitation and defence against the surrounding environments.

## WASTE

At this time, we have no additional comments on this sector.

We strongly support the assessing and determining of a vision based on all economic infrastructure sectors. We are aware of the opportunities of how cross cutting, multi-modal and interdependent thinking and planning has been implemented and the successful outcomes in other countries. We would be happy to share our experiences from the work we have completed in other regions.

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## Question 4

The NIC may wish to consider the following aspects across UK economic infrastructure as a whole, or applicable aspects in relevant sectors.

### ASSET LIFECYCLE

For the NIC to deliver the best possible outcomes on the recommended investment and expenditure on physical assets, it will need to take a view across the planning, creation, operation

Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

and redefinition of the existing, or newly proposed, assets in each sector.

Arcadis would propose a more long term and holistic view when it comes to expenditure across or within the sectors and the decisions around the management and delivery. Considering the asset lifecycle ensures assets consistently and continuously deliver value for money and optimum utilisation.

Different sectors propose different challenges and we would hope that the NIA would focus on how best to address these to deliver maximum efficiency and performance at every stage of the asset lifecycle in its long term vision.

### SOCIAL IMPACT

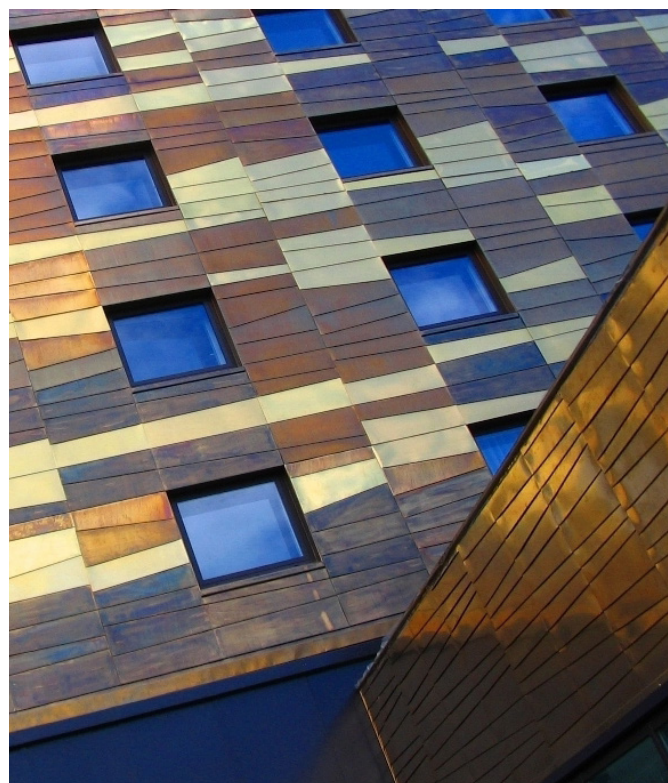
It will be important for the NIC to articulate its vision beyond numbers. Financial ratios and calculations, whilst of considerable importance, play only a part in achieving the three objectives set for the NIC. The NIC should seek to understand and develop ways in which sectors, in particular energy and transport, communicate the benefits of investment and development to local, regional and national communities. The NIC should develop social ratios to express the benefits and adopt a benefits management framework across their proposed projects. This will help the NIC and related parties when developing programmes, seeking consent orders,

and commencing engagement with stakeholders on the proposed economic infrastructure. A management framework will ensure that assets are used in a way that maximises their potential.

### POLITICAL INFLUENCE

In recent months, political events have been at the forefront for most sectors and have resulted in varying degrees of effect. Arcadis have been keen to share their insight and point of view on a number of these events and a recent article regarding the impact of Brexit was eager to point out that now, more than ever, is the time for investment in infrastructure. The benefit and long term returns from new projects should not be overlooked.

The NIC will need to be attuned to the likelihood of future political events disrupting or delaying its recommendations and/or delivery of projects in the transport sector, as well as other sectors such as energy, and water and drainage. The NIC may wish to assess the known political events as best they can on a cyclical basis.



## Question 5

We agree with the NIC pointing out the interdependencies of **transport and energy** in light of, for example, rail electrification. The NIC should also consider the interdependencies between **transport and energy** with a growing

demand and the supply of charging networks for transportation vehicles.

We have also detailed above the links and great potential between **digital and**

**communications and transport** in developments such as Smart Motorways and realtime traffic information and management.

**Digital and communications** will also be vital in the development and deployment of autonomous vehicles in the **transport sector** and smart networks in the **energy sector**.

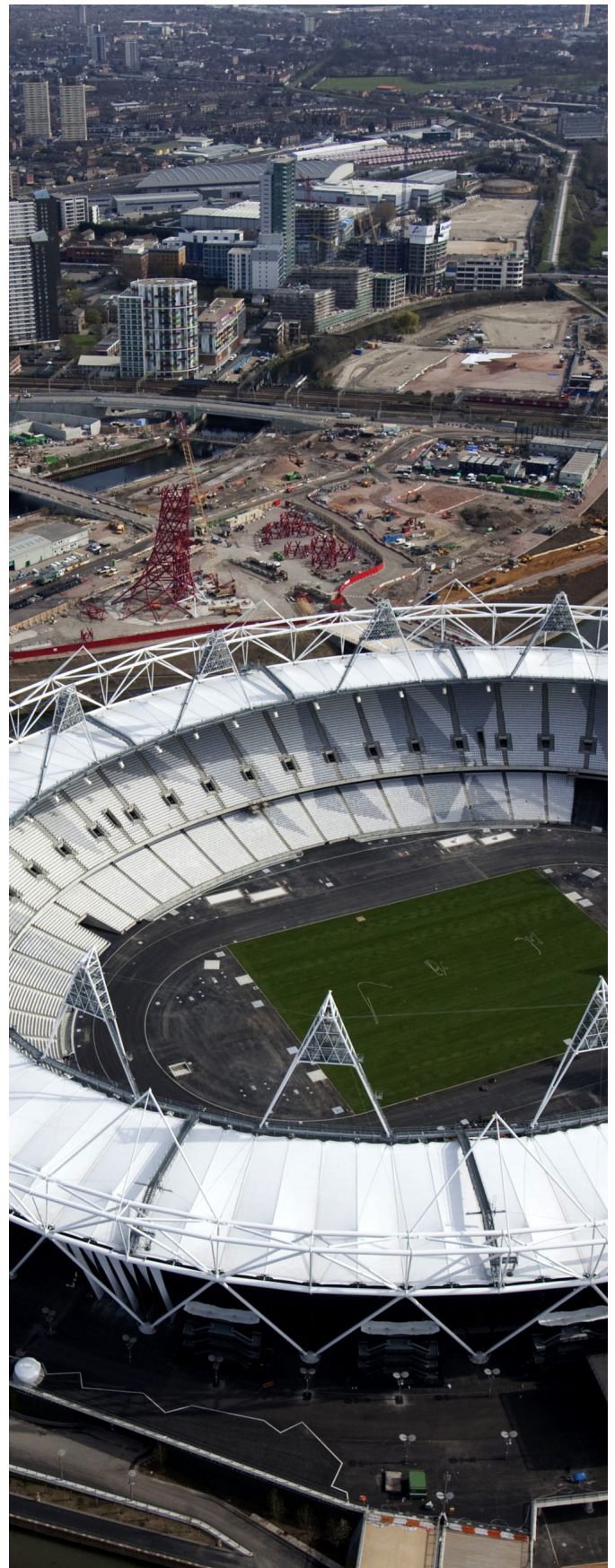
Arcadis believe **digital and communications** will have an impact across all sectors providing the ability to assess asset performance and improve security.

There is an obvious connection between future **flood defence and water and drainage** investment with both sectors often highly inter-dependent and future improvements or deterioration in one sector likely to impact the other. The NIC should seek to address the interdependencies between urban development and surface water flooding.

We also recommend that the NIC considers the constraints across the sectors when proposing new or redevelopments of existing physical assets.

Whilst we understand that this consultation concerns a needs assessment, we consider that the inter-dependency with the means to deliver

The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?



infrastructure should be considered not in terms of access to resource but also in terms of how resource will be developed over time.

The UK infrastructure industry has long voiced its concerns regarding a skills shortage. The timing of investment and infrastructure development within and across the sectors should be factored by the NIC in its assessment and recommendations. It will be important to ensure we best utilise, adequately resource, and retain the talent and skills required for any proposed projects and the NIC should seek to ensure that its recommendations are programmed accordingly.

Further constraints such as those placed upon projects from construction processes and programmes, materials, technology, human capital, standards and regulations, health and safety, research, and the economic, environment and social impact will all need to be measured.

The NIC should consider the interdependencies and impact placed upon sectors by carrying out construction works on live operational networks.

We also appreciate that the NIC's remit will not include housing supply directly but welcome the Government's remit envisaging that "the NIC will consider the potential interactions between its infrastructure recommendations and housing supply."

## Question 6

Arcadis agrees the NIC should highlight these important cross-cutting areas for the industry covering both enablers and challenges which impact infrastructure deliverability.

Do you agree that the NIA should focus on these cross-cutting issues?

A number of the cross-cutting areas are being

addressed by the work of other Government Departments and Bodies. Working collaboratively will be key, along with sharing any evidence or insight acquired. Establishing a framework which defines the boundaries of remit and responsibility could be helpful.

### GEOGRAPHY AND LOCAL GROWTH

Geography and local growth — as part of any scheme assessment process — understanding the impact of infrastructure on the economic growth and geography of that area is of vital importance. The NIA should also consider the environmental and social impacts, both quantifiable and non-quantifiable. Devolution can improve the efficiency and effectiveness of infrastructure delivery. Local/regional devolved bodies can have a better understanding of how investment schemes can maximise benefits and be integrated with existing infrastructure systems. Where a scheme has been proposed the NIA should make a recommendation regarding the delivery and accountability of that particular scheme. It will also be important to ensure the devolved regions work collaboratively together to manage the interdependencies which exist between them.

### FUNDING AND FINANCING

We recognise that finance and funding models have been the source of significant opportunity and a constraint upon the delivery of infrastructure for the UK. In our view, this means that it is essential that the NIC is not constrained by existing models of funding and finance when compiling the needs assessment.





We welcome the NIC's aim to consider alternative funding to improve the affordability of infrastructure and would emphasise that alternative funding models are needed simply to enable the delivery of projects. Consideration of alternatives should not be constrained only to those which improve affordability.

Promising steps have been made including the Pension Investment Platform to address long-term funding. However, in our view further innovation is required in initial project finance, such as the Infrastructure Partner delivery model developed for Thames Tideway Tunnel, in order to unlock the delivery of schemes.

We note that different sectors have very different ownership, funding and finance models and anticipate that the NIA will take these into account when considering the deliverability and priority of the options in the finalised NIA.

### COST, DELIVERY AND RESILIENCE

The NIA should draw on the evidence of organisations such as the Treasury, the Infrastructure and Projects Authority and the National Audit Office in understanding delivery drivers for infrastructure. There is already much work ongoing in this area from a combination of public and private sector bodies. Undertaking a detailed assessment within this area might risk duplicating existing work. Clearly, given the fiscal climate, major schemes need to demonstrate a high degree of capital efficiency and the NIA should highlight any initiatives or evidence which helps to support this. This could include scaling back the scope of certain projects/programmes if the benefits do not justify the additional investment.

### SUSTAINABILITY

The UK is signed up to international targets and obligations on sustainability. If new infrastructure schemes are likely to impact these targets, the NIA should highlight the risks and consider the action/mitigation required. Given the scale of planned infrastructure investment over the next 25 – 30 years, new approaches and innovations will need

to be adopted to ensure the UK complies with its targets. As we have already stated, we believe in the need for sustainable investment in long term infrastructure. Developing a national infrastructure vision would be counter-intuitive if the vision was not developed in a sustainable way for the benefit of future generations.

### GOVERNANCE AND DECISION MAKING

The governance, decision making and oversight of infrastructure planning and investment in the UK is divided amongst a number of Government departments and regulatory bodies. The NIA should consider the governance structure in place and assess whether it hinders progress and is fit for purpose. There are examples where strong cases for investment are overlooked due to abnormalities in the regulatory planning framework. This can be the case in the utilities sectors which follow 5 – 8 year regulatory cycles — there is a risk beneficial long-term investment, which is not a priority for the next regulatory period, might be excluded.

### EVALUATION AND APPRAISAL METHODOLOGY

Options and evaluation appraisal is of vital importance to ensuring government investment in infrastructure is informed and based on robust evidence. During compilation of the NIA, the NIC could highlight examples where valid infrastructure schemes have not proceeded because of idiosyncrasies in the appraisal methodology. It should also highlight where infrastructure investment has gone ahead based on weak policy appraisal or business case evaluation.

### PERFORMANCE MEASURES

Understanding and assessing performance and conducting evaluations are key enablers for better public policy decisions. The NIA should consider which performance measures are most appropriate for assessing the benefits of infrastructure schemes. It is also important that the NIC links back any performance measures to their objectives which will support future prioritisation.

The relationships between infrastructure and economic growth, and between infrastructure and UK economic productivity should also be considered.

## Question 7

The cross-cutting themes identified by the NIC are wide-ranging, comprehensive and well-thought through.

In addition to those issues already called out in our response, such as the asset lifecycle and the ability to ‘sweat’ assets, Arcadis believes the NIC should consider the additional following points.

**Innovation and new technology** is a cross-cutting issue which will have a significant cross-sector impact across infrastructure. It is widely acknowledged that the UK construction industry

Are there any other cross-cutting issues that you think are particularly important?

under-performs in terms of capacity to deliver value and demonstrate capital efficiency.

One area which contributes towards this is the historical lack of innovation within the construction sector in stark contrast to peer sectors, including manufacturing and aerospace. The increasing cost of construction combined with the inability to innovate risks halting or delaying vital infrastructure investment.

In recent years, there has been significant innovation in public sector construction particularly in the creation and use of data for construction and asset operation associated with BIM Level 2. With the Government’s continuing commitment to fund BIM Level 3 through the “Digital Built Britain” initiative, we are confident that the capability of digital construction will expand to support the full asset cycle. The NIC should take steps to understand the potential for digital technologies across the creation and operation of assets, in particular recognising that these technologies might increase asset utilisation — potentially with a positive outcome for the overall need for additional infrastructure investment.

**Security and resilience.** We are aware of the rapid growth in risks affecting the operation and performance of integrated infrastructure systems associated with network security and other aspects of cybercrime.



We also anticipate that as a result of the increasingly inter-connected nature of infrastructure and the increasing severity of risk events associated with climate change, system resilience will become an increasingly significant cross-cutting issue. We anticipate that these issues are already on the NIC agenda but recommend that they are addressed as a separate stand-alone work-stream and the NIC recognises the risks associated with a less stable operating environment over each NIA.

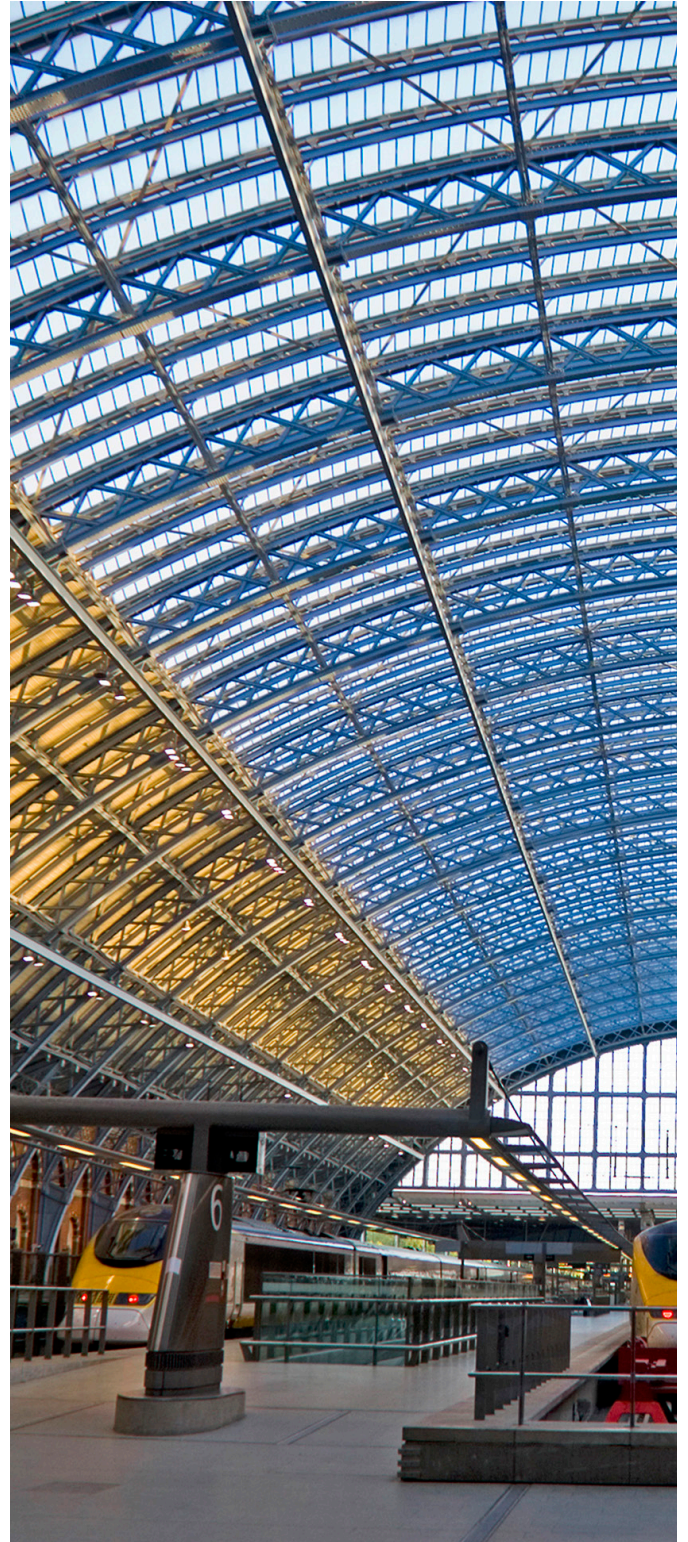
We also anticipate that as a result of the increasingly inter-connected nature of infrastructure and the increasing severity of risk events associated with climate change and other factors that system resilience will become an increasingly significant cross-cutting issue. We anticipate that both of these issues are already on the NIC agenda for the NIA but recommend that they are addressed as a separate stand-alone work-stream, recognising the risks associated with a less stable operating environment over the NIA period and consequent potential need for greater redundancy in infrastructure networks.

The topic of **asset management** is an important cross-cutting issue. Asset management is defined by ISO55000 as “coordinated activity of an organisation to realise value from assets”. Most asset-intensive organisations invest in their infrastructure asset base through a combination of CapEx and OpEx expenditure. The NIA should consider whether investment in infrastructure for particular sectors is best served by maintaining assets for longer ‘sweating the assets’ or by making capital interventions to renew the life of the asset.

Infrastructure investment takes place across the entire asset lifecycle — planning the asset, creating the asset, operating the asset and redefining the asset. In the UK utilities sector, there has been a move towards a TotEx (total expenditure) approach to the management and operation of infrastructure to drive improved outcomes.

## Question 8

Arcadis have no response to this question.



## Question 9

Developing the NIA will require a level of detailed and sophisticated modelling across each sector.

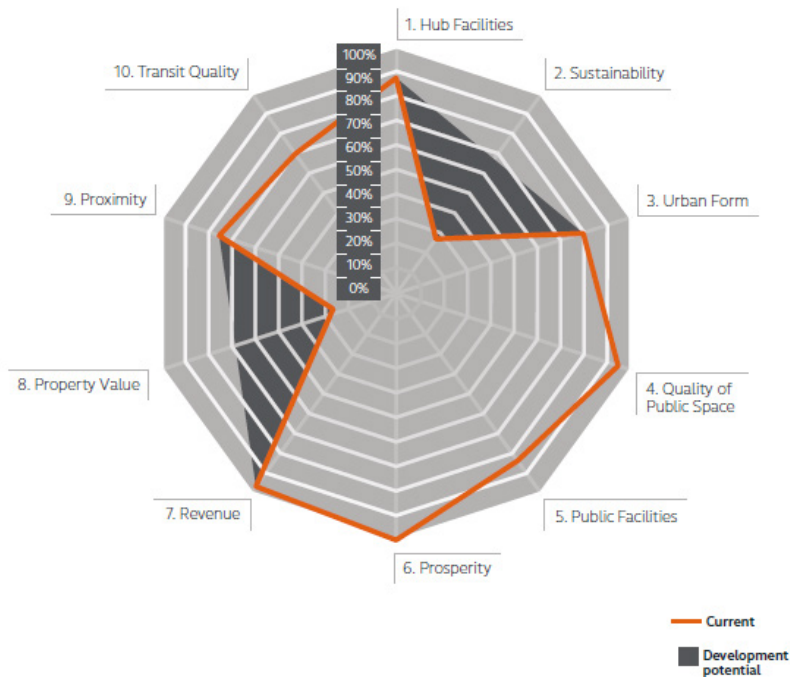
Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

Models can provide invaluable insight and help to assess the various possible scenarios, they are decision support tools and can assist the judgement and

expertise of the NIC which will be of paramount importance.

One model that Arcadis wishes to introduce to the NIC is MODE.

MODE — the rapid rate of urbanisation is having a significant impact on how global cities function. MODE, or Mobility Oriented Development, develops an understanding of the connection between transport and development so as to realise the highest socio-economic benefit from investments in transportation infrastructure. The paradigm today purports that transport and development/regeneration need to be targeted, measured and evaluated together in order to ensure that the transport investment returns the highest value, both in terms of value to the economy (GVA) and socioeconomic value through land development around the transit hubs.



Demonstration of a MODE output revealing unrealised potential.

## Question 10

The drivers which influence infrastructure demand are both dynamic and wide ranging. We welcome and agree with the four key drivers identified by the NIC.

**Population and demography** is the most widely discussed and recognised infrastructure driver. According to the ONS the UK population is expected to increase by 4.4 million in the next

Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?

decade. This will have a significant effect on demand for transport, energy, water and drainage and social infrastructure. It is vital that there is sufficient infrastructure

provision in UK cities which is resilient, efficient and contains sufficient capacity for growth. When considering new infrastructure, the NIC should consider what other provisions are required to make that area more attractive, liveable and improves the quality of life for citizens.

**Economic growth and productivity** is another key driver of infrastructure demand. The NIC should focus on proposing infrastructure schemes in areas where new infrastructure will unlock growth. These areas are likely to be in cities where the benefits of agglomeration can be realised and also through increased connectivity, which can create an enhanced multiplier effect.

**The introduction of new technologies** and innovations can radically impact the demand for infrastructure in both directions. Increasing the capacity of infrastructure is both costly and can take many years, so identifying new innovations which can moderate demand or make existing infrastructure more efficient should be considered by the NIC. The smart motorway programme is one such example. New technology and innovation could lead to paradigm shifts in the demand and supply within the sectors covered by the NIC.

The changing world and the impact of **climate change** continues to impact the demand for infrastructure investment to improve resiliency. Over a number of years, the UK has experienced acute challenges with flood prevention infrastructure caused by climate change. To protect economic growth and preserve the quality of life, infrastructure in this area will need to be expanded and enhanced.

Arcadis have attempted to identify further drivers below which the NIC should consider.

**Retaining and enhancing the UK's competitive advantage in a globalised economy.** The UK needs to continue investing in economic infrastructure to enhance the movement of goods, services and people. The Arcadis 2016 Global Infrastructure Index put the UK as the ninth most attractive country for long term infrastructure investment and enhancing this reputation should be included as an infrastructure driver.

**The age and condition of the UK's asset base.** The UK is one of the world's first industrialised countries and much of the infrastructure the UK relies upon predates back to Victorian times. The first London Underground lines opened up in the mid 19th century and the London Sewage System designed by Sir Joseph Bazalgette was completed by 1865 for a population of 4 million people. London now has a population of 8.6 million people and the Thames Tideway Tunnel is now being constructed to support this. Across the UK, investment is required in many classes of infrastructure as many assets near the end of their economic life.

Finally, as detailed elsewhere in our response, the **affordability and willingness of consumers to pay** will be a key driver in future economic infrastructure especially in those sectors with independent regulators.

## Question 11

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Arcadis have no response to this question.

## Question 12

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Arcadis have no response to this question.

## Question 13

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How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

Arcadis are pleased to see that the NIA have set out a wide ranging and comprehensive consultation process. A key success factor for

producing the NIA will be strong engagement from stakeholders from across both the public and private sector. The challenge will be to engage the right groups through the right channels.

Other key components for the NIC to consider are:

- The compilation of detailed technical knowledge and the views of subject matter experts who can provide deep sector and/or service knowledge.
- The use of social media to engage a wider group of stakeholders, particularly younger stakeholders who will be effected by the long-term decisions of the NIC
- The establishment and use of customer challenge groups, based on the model adopted In regulated industries

Arcadis look forward to further supporting the NIC throughout their process of engagement and contributing our knowledge, ideas and insight towards developing the NIA.

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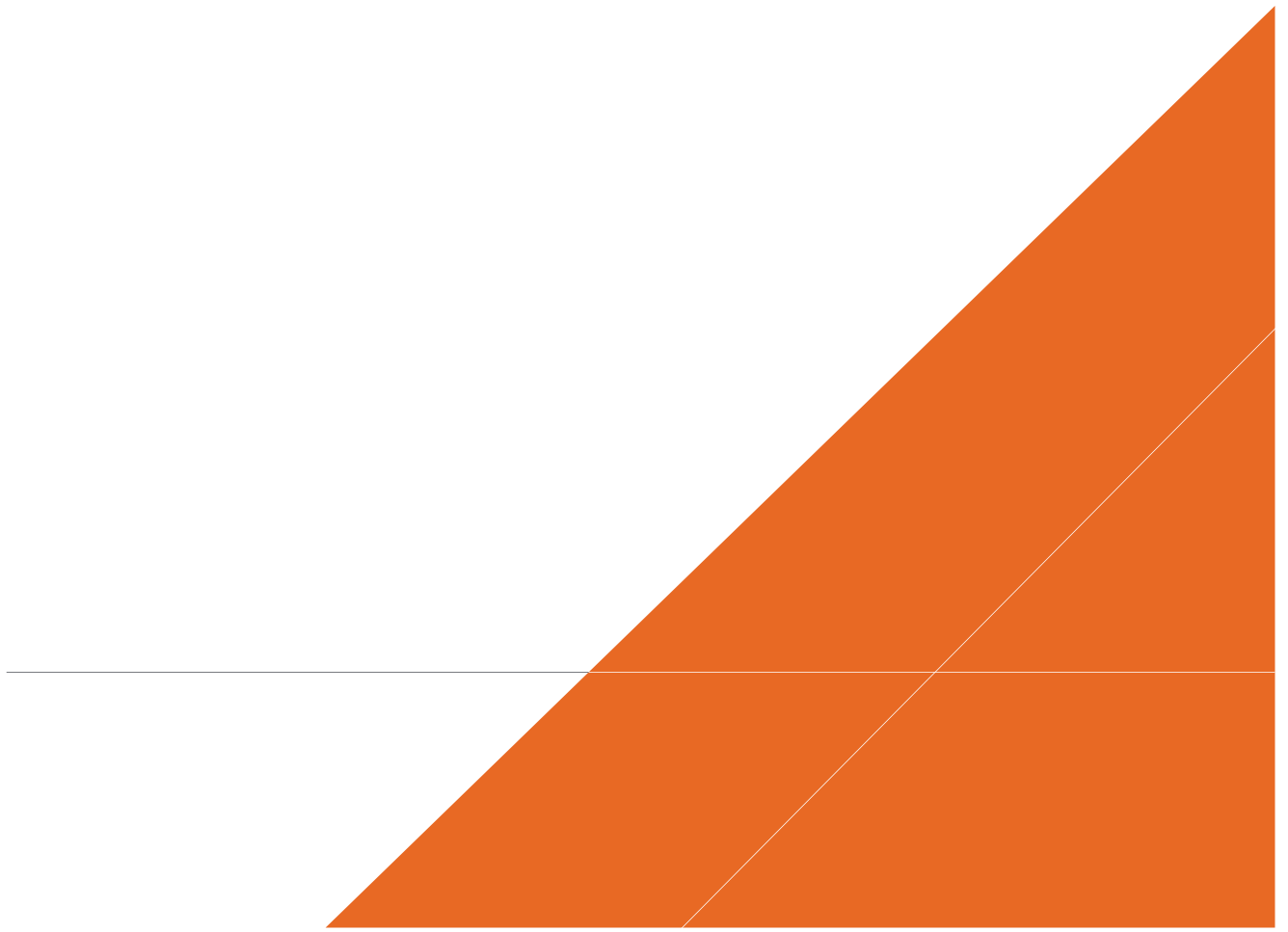
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5 August 2016

Dear Sir / Madam,

## National Infrastructure Assessment – Consultation

Some comments on the consultation below.

### *PRINCIPLES*

*Q1. The Government has given the National Infrastructure Commission objectives to:*

- *foster long-term and sustainable economic growth across all regions of the UK*
- *improve the UK's international competitiveness*
- *improve the quality of life for those living in the UK*

*What issues do you think are particularly important to consider as the Commission works to this objective?*

If handled well, the broad scope of the objectives is likely to be a particular strength of the Commission's work. Looking at the UK's infrastructure needs 'in the round' to secure long-term, sustainable growth that boosts global competitiveness while benefiting the nation as a whole will be a complex and extremely challenging task. However, this type of system-wide approach will be critical to delivering value for money, efficient and effective prioritisation of projects, and outcomes that help secure broad-based public support for consistent and sensible investment into the future.

There is a clear need for infrastructure to support a growth agenda that benefits the UK as a whole, rather than looking at favoured projects or initiatives based on simplistic and narrowly focused cost-benefit analyses. Full consideration of wider socio-economic objectives must be considered.

As such, Arup agrees it is absolutely imperative that the NIC takes the approach that it is planning in the interests of UK plc as a whole, working to boost productivity and support a balanced and competitive economy rather than falling prey to the influence of particular political, regional or sectoral interests.

To achieve this implies creating and managing broader, smarter models that can accommodate the long-term vision and critical thinking we will need to deal with critical issues such as connectivity or regeneration, synthesising the need for robust 'soft' social infrastructure alongside 'hard' infrastructure.

As we have witnessed in fast-growing economies around the globe, nation and cities at every stage of development are increasingly realising that they must compete on far more than tax breaks and cheap labour. Any future vision for infrastructure investment should therefore recognise that quality of life, the availability of skills and the ability to leverage R&D to drive technological innovation are all likely to be critical in creating a UK that is competitive against the other major economies in the decades ahead.

To that end, we would urge the Commission to leverage progress and address challenges in the following areas:

- develop a broad view of infrastructure that is integrated with a long-term vision for socio-economic development across the UK
- design framework models that can accommodate vision and strategy for regeneration and growth, rather than narrow cost-benefit analyses that may be fine for comparing two similar schemes, but relatively useless for understanding wider socio-economic gains
- establish and develop both the conceptual knowledge and applicable technologies needed to facilitate more sophisticated modelling, evaluation, scenario planning, and cost-benefit analysis for infrastructure investment
- develop approaches and models that allow existing infrastructure to be used more efficiently
- develop procurement models that deliver best long-term value as opposed to lowest short-term cost, including models that encourage collaborative innovation across the supply chain
- forge an integrated view of infrastructure investment and prioritisation that is inextricably tied to key issues such as housing, social and industrial policies, such as supporting the development of economic clusters; integrating investment with long-term skills and capacity building programmes; supporting a future digital economy; or addressing the challenges of dealing with an ageing demographic in the UK
- expand creative thinking on infrastructure development that helps position the UK as a hub for excellence in enhancing quality of life factors to ensure that the UK remains an attractive destination for the best and brightest, as well as an attractive destination for global investment

- develop mechanisms to coordinate the timing of activities between regions and sectors to limit overheating and build public confidence that infrastructure benefits will accrue to the UK as a whole
- drive innovation and new approaches to enhance the underlying resilience of the UK's infrastructure (e.g. in response to floods or energy outages)
- recognise the importance and value of social and natural capital.

*Q2. Do you agree that, in undertaking the NIA, the Commission should be:*

- *Open, transparent and consultative*
- *Independent, objective and rigorous*
- *Forward looking, challenging established thinking*
- *Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?*

*Are there any principles that should inform the way that the Commission produces the NIA that are missing?*

One of the NIC's challenges will be bridging political cycles, so a key principle will be to deliver a vision that can win political support over longer-wave infrastructure cycles, offering continuity and consistency for the supply chain.

In doing so, it is critical that all the aspects mentioned above – being open, transparent, consultative, independent, objective and rigorous – are characteristic of the approach to secure the confidence and support required across multiple stakeholder groups and the spectrum of political actors. As such, constraints and assumptions should be clearly signposted so that they might be refined and challenged.

Whole system thinking will also be critical to the success of the Commission. Not just in terms of prioritising schemes, avoiding conflicts and smoothing the procurement curve, but also in terms of maximising value. For example, decommissioning certain North Sea oil and gas assets could preclude opportunities for economic carbon sequestration, so optioneering models will have to take into account technological advances, environmental policy objectives and cost-benefit analyses. Equally, hydrogen is not practical in the medium term as a zero carbon vector without CCS (carbon capture and storage), while heat networks are not carbon viable if they do not switch to a low/zero primary energy sources such as hydrogen, so whole systems thinking will be important.

System thinking should be adopted as a principle as it is critical in terms a strategic roadmap for integrating energy (including electricity, natural gas, hydrogen, heat), water, transport, IT/Comms, and other infrastructure.

Given the inevitable complexity of this work, other principles you may wish to consider might include 'pragmatic' and 'flexible' to avoid the danger of 'analysis paralysis' or an inability to evolve and deploy new learning.

### *WHAT THE NIA WILL COVER: SECTORS*

*Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?*

In broad terms, the elements set out in the document are likely to capture the main elements required for consideration by the Commission, with the exception of the housing/urban environment element, which may be at risk of being under-appreciated in terms of its importance and impact.

The 2011 National Infrastructure Plan (NIP) defined Economic Infrastructure as the transport and communications systems, the energy, water and waste systems, plus of course flood management. These physical systems power our economy and support its growth. In tandem are the softer social infrastructure systems, such as education, healthcare, security and national governance that underpin our wellbeing. It says that these "safe, reliable and efficient infrastructure networks form the backbone of every modern economy".

This has proved to be a useful starting point, although it has created, through successive NIPs, a groaning 'order book' of prospective infrastructure projects that would take many years to bring to fruition.

While any number of these projects may well be justifiable, a lengthy 'wish list' of unfunded projects is certainly less helpful than a truly integrated approach to infrastructure investment underpinned by a recognition of policy challenges, an understanding of the importance of prioritization, and a plan with clear objectives focused on delivering a positive vision for the future.

As a result, we would agree the Commission should look very closely at all the interdependencies across the sectors. The consultation document suggests it does to a large degree, with the exception of the housing element. It is good to see this point addressed (to an extent) in the note on the built environment set out in the consultation document. However, we would argue that housing is too important to be separated too far from wider infrastructure considerations.

Take London, for example. Like many other areas in the UK, the city knows it must accommodate significant growth in population assuming the economy remains dynamic. (Interestingly, the Greater London Authority plans towards 2050 lumped housing into the physical infrastructure systems to derive the eye-wateringly large £1.3 trillion pound infrastructure bill to cover the next 35 years for growth of the capital.)

In terms of planning the infrastructure for this population growth, it is clear that housing and transport simply have to be considered together. Housing without transport leads to sink estates that no one wants to live in, while transport without the demand for trips generated by housing leads to white elephants that embarrass politicians for years to come. Together with corresponding investment in both economic and social infrastructure and coupled with accessible jobs, they lead to successful new places.

This example illustrates why this point is so important. Today, we talk about meeting demand for mobility rather than fixating over lists of new road or rail schemes. This approach enables us to concentrate on what matters for the consumers of our infrastructure services. In the same way, the provision of bulk housing drives overall land-use and the other infrastructure systems must dance to its tune.

The disposition and density of housing also needs careful consideration, because once created, it shapes society for generations and has major implications for transport and energy infrastructure, for example. Compare sprawling Atlanta and compact Barcelona. Both house around five million people, but Barcelona boasts an enhanced lifestyle, as well as vastly more carbon efficient existence. By contrast, it will be nigh on impossible to densify Atlanta and help it become more like Barcelona.

If one focuses on infrastructure as a main facilitator for economic growth and improved productivity, then the necessary pre-requisite is a skilled and mobile workforce, able to occupy the jobs and changing opportunities that growth brings. The elements of where people live and work simply must be considered together. Therefore in planning new settlements, the twin infrastructure systems of housing and transport – or shelter with mobility – provide an excellent start point for long-term, sustainable growth.

In the absence of any other national strategic plan for land-use on our densely occupied island, the National Infrastructure Commission and Infrastructure and Projects Authority must be encouraged to provide leadership in broader land-use and not just allow themselves to be restricted to considerations of particular projects and programmes.

*Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?*

One can make a solid argument for all aspects of the infrastructure provision quoted within the plan. The key challenge will be to provide a detailed assessment of the order and ensure key sub-sectors are well understood.

In its simplest form, the output from this assessment should be akin to a large-scale Asset Management Plan and its main driver should be to get the best out of our existing assets, while planning to new schemes that best help the UK adapt to how the world is changing. In doing so, it must deliver a maintenance and renewal programme that is constantly looking ahead. From the perspective of 'looking ahead', the assessment must also relate to the benefits and risks of the priorities agreed.

The approach should, at least initially, treat each sector on its own merits first, then coordinate between sectors, which should ultimately deliver a plan that delivers best overall value, while minimising risk. The measurement of this value and the eventual prioritization of the projects is obviously very sensitive. The assessment therefore has to be quite clear about how it sets about laying out those priorities to provide an auditable trail of decision-making through the process.

The Commission may also wish to consider how best to support developing technologies in the infrastructure space, e.g. tidal energy, unconventional gas or SMRs (Small Modular Reactors) in the energy sector. Without some sort of policy framework to drive innovation and a supportive investment climate, especially in the early conception stages, there is a risk that the Commission could overlook solutions that could deliver real long-term value.

The NIC should also examine the interfaces and interactions between the silos. Again, for example, it is extremely difficult to leave the housing programme on the periphery of this plan. We are seeing significant areas made available to allow houses to be built within our communities, but it is less clear we fully recognise the significant impacts these have on our infrastructure needs. This relates to both large and small projects. In smaller schemes, we have the potential to ruin the heart of a community because of population increase these developments bring and the fact that the established infrastructure is unable to cope. On the larger projects, we just may not have the appropriate infrastructure at the scale required.

This is all about sensible planning and I trust that the final assessment will deliver sufficient detail to be able to prioritise the work needed and provide the clarity required to drive broad stakeholder support.

*Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?*

There are a number of key dependencies that we would expect the Commission to be well aware of in each area and we would agree with many of the points set out in the document. Some of the key elements for consideration are highlighted below:

#### Transport

- the drive to examine mobility as an end-to-end journey concept that provides people with easily accessible options across multiple modes, including walking, cycling, public transport or shared ownership modes (Considering mobility as whole rather than individual transport modes in other words)
- reducing ‘friction’ at the interchange nodes between transport options
- the increasing importance of digital integration between and across the various transport channels, from road, rail, ports, airports and other transport arteries, both for people and freight
- the implications for energy distribution resulting from the introduction of automated vehicles.

#### Digital and communications

- the need for flexible evolution as technologies advance through ‘next generation’ systems
- data privacy and cyber-security
- the internet of things
- the potential for new data transmission technologies.

#### Energy

- the implications of meeting the UK’s carbon targets
- the link between heat and building / industrial efficiency
- the very pressing issue of energy security
- the potential for using hydrogen to heat and the issue of hydrogen’s link with CCS
- developments in transport and mobile energy (liquid/gaseous fuel) compared with dedicated energy delivery (overhead lines etc)
- recognition that a strategic decision in one infrastructure sector could have significant impacts or cause stranded assets to be created in another sector



- recognition that some energy infrastructure projects become much more attractive if they have a combined end-use, e.g. combining a tidal barrage with flood protection benefits or use as a transport link.

#### Water and drainage

- the potential for combining flood protection with enhanced habitat diversity
- understanding the potential for capture and re-use within more naturalistic systems.

#### Flood defences

- the importance of building resilience into the water and drainage systems and the potential for combining ‘natural’ flood protection measures with the provision of public amenities (such as parks that capture overspill)
- the future impact of rising sea water levels and climate change impacts
- the prospect of utilising tidal energy schemes as flood protection measures.

#### Waste

- enhanced strategies for building toward circular economy solutions
- options for enhancing waste-to-energy schemes at end of life.

### *CROSS-CUTTING ISSUES*

*Q6. Do you agree that the NIA should focus on these cross-cutting issues?*

The cross-cutting issues identified certainly appear to include most of the main areas we would expect to be addressed and the direction certainly seems to be along the right lines.

In terms of the key areas that will require particularly careful attention, one might note the feedback and phasing effects inherent in the geography and growth category, which will be an issue in larger-scale schemes.

Equally, funding and financing will demand a deep appreciation of the scale of complexity involved and a high degree of independence from the NIC. The topic demands an extremely nuanced understanding of the various models available across the sectors and an even deeper understanding of the politics involved – an issue that applies even more so to the planning piece.

Inevitably, it will require both discipline and vision to ensure that the value is delivered for all the stakeholders, but with the right governance the NIC has a tremendous opportunity to make a huge impact in driving the UK's infrastructure forward.

*Q7. Are there any other cross-cutting issues that you think are particularly important?*

The cross-cutting issues listed in the consultation document are already extensive, so there is probably not too much to add here that has not already been covered previously, although it may be appropriate to flag:

- some consideration of how infrastructure may be shaped to cope with evolving demographics and an aging population
- issues around using infrastructure as a tool to drive targeted regeneration in specific towns / regions
- health and social benefits are possible across many aspects of the infrastructure spectrum, from walking, cycling and shared ownership approaches through to improved air quality or reducing social exclusion
- data protection, privacy and cyber-security – now pertinent for many aspects of infrastructure
- the development of combined temporal and spatial mapping of the various infrastructure sectors would be useful for allowing the supply chain to invest in skills and capacity-building.
- the increasing importance of infrastructure investment as a means of driving jobs and growth at a time of economic uncertainty, particularly when borrowing is historically cheap and long-term competitiveness and growth can be enhanced.

## *METHODOLOGY*

*Q8. Do you agree with this methodological approach to determine the needs and priorities?*

Given the scope and complexity of the challenge, the approach outlined is certainly capable of capturing many of the key issues.

One issue that may be pertinent to consider in this area is ensuring that the process is not only transparent, but seen to be transparent, to ensure that the final programme has the confidence of the stakeholders involved, including those whose projects do not end up on the priority list, as well as those who are against a particular scheme.

This is no easy task, of course. For example, there is the challenge of trying to balance wider socio-economic benefits against the cost-benefit values derived from more narrowly focused models. At the same time, the nature of large-scale infrastructure schemes is that they attract opposition that may well be perfectly justified.

On that basis, it may be worthwhile including an element in the process where the likely degree of support or opposition may be gauged and considered as part of the assessment process. This point also underlines the need for an assessment where the objectives are defined and well understood, so that the progress, or otherwise, of any given scheme can be justified as part of an auditable decision-making process.

*Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?*

Prioritising long term, strategic infrastructure is challenging in a democratic country. Infrastructure is inherently political and it is unusual for cross-party agreement on the need and means of delivery over the long term. When a government changes then the strategy and often the projects change with cancellation of the previous administration's plans.

The most powerful examples of long term strategic prioritisation are often to be found in one-party states. China is a good example where, over the past 25 years, there has been a modernising strategy to introduce metros to all major cities and develop intensive inter-city high speed programmes, together with other transport, power, water, and communications infrastructure.

In a similar way, geographically smaller countries and regions such as Singapore and Hong Kong have also used strong central control to deliver long term, strategic plans.

Moving away from such entities, there are still some examples of limited long-term planning. For example, France has demonstrated the ability to roll out its autoroute and high speed rail network through successive administrations. A very strong technocratic administration does seem to overcome or mute the natural demands for change from successive governments. Japan, too, has managed to sustain its infrastructure development programme, maintaining dedicated transport corridors and also integrating all infrastructure adjacent to the corridor.

In all of the above examples, the psyche of the country is less prone to nimbyism and a there is a greater representation of technically competent people in the civil service and government. With both of these advantages, the civil service is better able to maintain a long term vision and focus on delivery – even when projects have gone hugely over budget or not delivered the anticipated benefits.

In terms of institutional arrangements, bodies such as the Climate Change Commission or the Bank of England provide good examples of the critical importance of independence to the credibility of evaluations and recommendations.

*Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?*

The infrastructure drivers identified are certainly broad enough to capture the vast majority of areas required for the assessment. The real task will be weighting the importance given to each of the elements and balancing that with clear objectives, but the Commission will be well aware of this complexities involved in meeting this challenge.

There is one particular point worth underlining here though. The UK has demonstrated through projects like CTRL/HS1, London 2012 Olympics, and the New Forth Crossing that it can achieve world-leading major infrastructure delivery. However, it is should be noted that all of these projects had detailed and highly structured inputs throughout their early phases.

This reinforces the point that major infrastructure projects become viable – and thus both more deliverable and bankable – if there is a credible mechanism for providing proper funding at the inception and early development phases. It is a crucial point, because there is a great deal of funding looking for bankable investments, but a consistent roadblock is the challenge in overcoming this early project funding gap.

#### *FINALISING THE NATIONAL INFRASTRUCTURE ASSESSMENT*

*Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?*

There is undoubtedly a major challenge involved in developing a whole system approach that can capture the full depth and breadth of the competing demands placed on the UK's infrastructure and the opportunities it offers for growth and the development of the nation's wellbeing.

One could envisage a sifting process whereby the Commission starts with a clear set of high-level objectives that provide an auditable benchmark against which individual schemes may be marked. Not only would this build confidence in the process, but it could provide the basis for a steadily advancing degree of quantitative analysis over the stages of the sifting process, while referral back to the overarching objectives at each stage.

The objectives themselves might cover areas such as impact on quality, cost, time, social impacts or contribution to broader industrial strategy, for example. The key point, however, is to offer a high-level process that can establish buy-in for (or opposition to) the projects from stakeholders at an early stage, while building up an information base on the schemes in each phase that ultimately creates a portfolio of projects that all align to a set of clear objectives as part of an auditable process.

*Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?*

We consider that the National Infrastructure Assessment (NIA) initiative is a tremendous step forward, but it may be further enhanced by considering the following seven additional aspects.

#### 1. Customer Needs and Relative Priorities

We welcome the fact that the Commission plans to consult widely on the Vision and Priorities report to inform its final conclusions on the UK's infrastructure needs and priorities to 2050. Understanding the needs and expectations of customers and wider stakeholders is a core principle of best practice asset management and in our view should drive decision making.

Infrastructure assets have a wide range of 'customers' ranging from societal (UK plc), to local, regional, national, or specific customer segment etc. We consider a key part of the initial methodology will be to consider relative priorities and importance of the views and needs of different customer types. This will provide a clear decision-making framework for later stages of the assessment. This framework would help communicate to various users the potential implications of their choices.

Whilst it is noted that the remit for the NIA does not include ‘social infrastructure’ – such as housing, schools and hospitals – these will inevitably be important to the delivery of economic growth in any particular geography. The methodology needs to explicitly address how the NIA will engage with elements such as these, which influence the infrastructure systems, but may be perceived to be outside the remit of the NIA.

## 2. Level of Service and Affordability

A key challenge with considering infrastructure ‘as a service’ is the lack of visible ‘on demand’ payment. This means that the actual cost of service provision is often opaque to the user. As a result, many users demand ‘better service’ with no information as to the associated cost implications. This is amplified by the semi-exponential relationship between improved reliability and cost of provision.

We believe that further definition of the methodology is required in this area to explore and communicate the implications of demanding different levels of service (e.g. system reliability, robustness and resilience).

The NIA methodology should distinguish between robustness (ability of the system or a system component to withstand a shock) and resilience (ability of the system to recover after a shock).

## 3. Interdependencies and Trade-Offs [Ref Item 68]

We fully support the recognised need to move from a silo approach to a system-wide view as expressed in the statement, “These drivers cannot be analysed in isolation, so the interdependencies across them and their interaction with infrastructure will be explicitly considered and examined”.

However, this is a complex area and a clear methodology needs to be developed at the outset, particularly for assessing existing and legacy infrastructure, which comprises the majority of UK assets.

We would suggest that a series of simple transparent ‘trade-off’ / decision making frameworks could usefully be developed at the outset. These would be at different levels of detail, for example:

- a high-level trade-off framework to explore the prioritisation of Departmental Budgets (Spending Review Level) so there is a robust logic to compare Infrastructure spend against Health, Education etc.
- then, within an ‘Infrastructure System’, a trade-off framework to support the selection of appropriate service levels that are effective, but also affordable. This would support the distribution of funding between the various infrastructure service aspects (transport, energy, water and sewerage, flood defences, digital and communications and waste).

The complexities inherent in system-wide assessments will mean that implementing the NIA on a system basis will take time and, almost inevitably, the methodology will evolve with time. The plan for delivery of the NIA should start with comprehensive assessment of existing methodologies, including those that have been developed by the ITRC. The plan

should also provide for the delivery of ‘business as usual’, alongside the evolution of the new systems thinking.

#### 4. Low Carbon

We consider that there the NIA presents an opportunity to more explicitly consider the role that infrastructure can play in “meeting the UK’s carbon commitments”. We would suggest that this is an area that would benefit from more definition in terms of methodology and the role that innovation can take in delivering a low carbon future.

#### 5. Climate

UK infrastructure is largely a mature network. In addition to considering the impact of climate change on new infrastructure (through climate scenarios), it will be important to consider retrofit for existing assets to provide appropriate service resilience.

#### 6. Data [Ref Item 64]

We fully support the intent to understand the infrastructure baseline through accurate data. However the challenge to achieve this should not be underestimated. Our experience is that across all infrastructure sectors there are issues with asset data availability, consistency and reliability. Looking ahead, systems will need to be implemented to ensure that any data is also future-proof.

#### 7. Robustness and Resilience

The methodology should consider robustness and resilience of the infrastructure system to a variety of extreme event shocks. Extreme weather events, cyber-attacks, pandemics, and terrorist activity should all be explicitly considered, alongside a range of other potential vulnerabilities.

### *ENGAGEMENT: GETTING YOUR VOICE HEARD*

*Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?*

To reiterate two points made earlier in this response:

- it is important to provide a high-level view on prospective schemes early in the process so that a judgement can be made on the degree of support or opposition a particular project may attract

- it is vital that the process is transparent, auditable and targeted towards a clear set of objectives to ensure that all stakeholders have confidence in the process and the wider public understands the potential benefits that will accrue, as well as how potential challenges might be met.

By clearly demonstrating that the Commission is both actively seeking a broad spectrum of views and responding in a timely and proactive manner to those views – both positive and negative – the Commission will gain vital credibility and minimise the time wasted on schemes that will ultimately prove undeliverable.

I hope this response proves helpful and of course if you have any further questions, please do not hesitate to get in touch.

Yours faithfully,

[name redacted]  
[job title redacted]



## **Overview**

ABP is the UK's leading ports operator, with a network of 21 ports around the country handling around 100 million tonnes of cargo every year. Our ports include Immingham, the UK's largest port by tonnage, and Southampton, the UK's principal port for automotive trade and home to the nation's second largest container terminal. Together with our customers, we contribute £5.6 billion to the UK economy every year and support 84,000 jobs. Our ports provide British businesses with access to international markets, they support industry and manufacturing across the country, and they help protect the nation's energy security. As a result our ports play an important part in helping to drive trade and economic growth in the towns and regions they are based, and across the country.

ABP is committed to providing our customers with world-class facilities to help drive growth in their businesses. We are currently in the midst of a £1 billion investment programme to across all our ports to achieve this aim. It is essential that the infrastructure leading to and from ports is also capable of facilitating this growth. Identifying where infrastructure weaknesses create blockages that restrict trade and growth has to be a priority for the Commission in its National Infrastructure Assessment.

The UK ports industry is a national success story, evidenced by the record investment in port infrastructure across the country in recent decades. The UK's maritime ports handle £511 billion worth of trade every year, of which ABP accounts for £150 billion. This success is premised on the fact that port infrastructure development is market led in response to demand from customers. It is this principle that should guide the Commission in its assessment of the UK's infrastructure needs, identifying where investment can support trade flows where demand and future demand exists. This is critical to supporting a robust industrial strategy capable of driving exports and new manufacturing by supporting the most efficient access to global markets.

## **Objectives and Principles**

ABP welcomes the Commission's consultation to assess the UK's long term economic infrastructure needs and develop a strategic vision over a 30 year time horizon ABP share the Commission's objectives to:

- Foster long-term and sustainable economic growth across all regions of the UK;
- Improve the UK's international competitiveness; and
- Improve the quality of life for those living in the UK.

In addition, we agree that the principles which have been identified by the Commission are pragmatic and robust. Dialogue with national infrastructure operators and asset managers will be imperative to achieve the stated principles. We hope that through constructive dialogue we can work collaboratively to effectively address the UK's infrastructure challenges.

The Commission should also seek to determine the UK's particular areas of competitive advantage, such as high-end manufacturing, and explore where investment in infrastructure can help promote these sectors.

## **National Infrastructure Assessment Remit and Plan**

### **Transport**

The Commission's objective to 'adopt a multi-modal approach to the analysis of transport need, looking at how key road, rail, ports, airports and other transport arteries support the movement of people and freight into and across the country' is supported by ABP. The success of our economy depends on an integrated approach to ensure that marine (including navigational approach channels), road and rail access arrangements are fit for purpose and do not pose a barrier to current or future predictions of economic performance and ability.

We would also emphasise the importance of facilitating the movement of goods out of the country in order to encourage export-led growth and support the Government's ambitions to rebalance the economy. ABP's ports handle £70 billion worth of exports, with £40 billion of that passing through the Port of Southampton alone. This makes Southampton the UK's number one export port. Ensuring the provision of infrastructure to support this export success should rank among the Commission's priorities.

### **Energy**

The intention for the NIA to cover 'the energy system as a whole', including 'the shift to low carbon solutions', is another area where ABP can support the Commission's ambitions.

This is particularly relevant to ABP's ports on the Humber, the UK's Energy Estuary. The Humber is home to the Port of Immingham, the UK's largest port by tonnage and a vital part of the energy supply chain. Biomass flows through the port to Drax power station which generates 7 to 8% of our electricity. This important trade is also supported by purpose-built facilities at the Port of Hull.

The Port of Hull is at the forefront of the renewable energy sector and the Green Port Hull project with Siemens will soon see a world class advanced manufacturing facility established at the port. At the Port of Grimsby, the world famous fish docks are now also home to global energy firms Dong and Centrica, and ABP is investing to ensure the port continues to serve these growing offshore industries in future.

Investment decisions should take into account the critical role of the Humber to national energy security and support the growing renewable energy sector already well established on the estuary.

### **Flood Defences**

ABP supports the Commission's intention to look at flood defences and 'how current plans allow the protection of key strategic pieces of infrastructure'. In particular we would encourage the Commission to consider where current funding formulas do not sufficiently recognise the benefits of protecting nationally critical assets and infrastructure such as ports.

Flooding poses a significant risk to port infrastructure, particularly on the Humber Estuary which has a tidal range of up to six metres near its mouth. Pressure on existing defences is likely to increase between now and 2050 and funding decisions should properly reflect the critical role of ports to trade, economic growth and energy security.

### **Cross Cutting Issues**

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

The cross-cutting issues identified in paragraphs 49-55 are considered pragmatic and ABP would be able to provide evidence in support of the NIA. See subsequent paragraphs.

### **Building the Evidence Base**

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

The Commission has identified the following elements that will help to inform the evidence plan of the NIA. These are:

- Understanding infrastructure baseline
- Studying key drivers of infrastructure
- Modelling and analysis
- Sector and geographical reviews
- Prioritisation

Decisions on national infrastructure priorities should be based and focussed on policy objectives to rebalance the economy and promote export led growth, while protecting national energy security. Investment in infrastructure linking ports should be customer led and founded on where there is evidenced customer demand already and in future.

Alternative approaches risk using limited government funding to invest in infrastructure that does not support trade flows to the maximum possible extent and consequently is not consistent with maximising value for money for the tax payer.

Recognising that ABP's ports operate within a free market sector and do not require central direction on how they should be run, the Government recommends that major ports produce Master Plans in order to help co-ordinate their future planning (Guidance on the Preparation of Port Master Plans, Department for Transport 2008). Port master plans can provide the Commission with an important indication of demand in the market, pointing to where infrastructure requirements may be most significant. As such, the process of master planning is underway across ABP with plans for Southampton and Newport already at an advanced stage.

## Case Study: Southampton Master Plan

The Port of Southampton’s Master Plan will set out ABP’s ‘Strategy for Growth’ for the Port to ensure that it continues to make a significant contribution to the economic success of its locality and the UK as a whole. It builds upon and replaces the previous Port of Southampton Master Plan 2009 – 2030.

Having regard to the nature of the Port and its operations, wider policy and guidance, the key objectives of the Port of Southampton Master Plan 2015–2035 are to:

- Clarify the Port’s strategic planning for the medium to long term and thereby assist government, planning bodies, transport network providers and other stakeholders in preparing development strategies and in the carrying out of their functions;
- Set out the future development and infrastructure requirements needed to both maintain and enhance the role of the Port as a major international deep-sea gateway and to meet the needs identified within Government policy; and
- Inform port users, employees and local communities as to how they can expect to see the Port develop over the coming years.

Although specific, these objectives are sufficiently flexible to allow evolution in tandem with emerging policy strategies and frameworks, of which this plan is intended to form a part. The Port’s Master Plan is designed to be used as a reference evidence document to inform the National Infrastructure Commission, relevant statutory spatial planning processes and the local community how the Port is expecting to develop.

Although the Master Plan may not have been released for wider consultation in the context of the timing of the NIC’s consultation period, it is clear following market and customer research that unconstrained annual throughput of cargo volumes are expected to increase over the next 20 year period.

By way of illustration, the table below illustrates the significant demand in a number of cargo sectors.

*ABP Port Master Plan Data: 2015 Annual Throughput and Forecasts to 2020, 2025, 2030*

Sector	2015	2020	2025	2035
<b>Cruise Passengers</b> (000s)	1,776	2,573	2,841	3,464
<b>Containers – Lower Growth</b> (000 TEU)	1,895	2,144	2,426	3,105
<b>Containers – Higher Growth</b> (000 TEU)	1,895	2,251	2,673	3,771
<b>Automotive</b> (000 units)	919	1,193	1,383	1,858
<b>Dry Bulks</b> (000 tonnes)	1,379	1,845	2,088	2,673

<b>General Cargo</b> (000 tonnes)	54	92	105	142
<b>Isle of Wight Ferry Vehicles</b> (000)	857	993	1,151	1,548
<b>Sector</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2035</b>

Today the Port of Southampton is reaching capacity and opportunities for significant investment is limited. Consequently, we believe that there is a significant future need for an increase in both the quantity of land and the number of berths at the Port. It is ABP’s view that the Port must expand in order to meet this demand. Whilst there is current uncertainty in the markets following the EU Referendum decision, ABP is of the view that, at worst, the uncertainty would only defer the figures set out above by a few years. This is inconsequential in the light of the timescales concerned with the planning and construction of key national infrastructure projects, such as major port expansion.

We are therefore undertaking feasibility studies to assess the potential for new port facilities for a range of cargoes at ABP owned land opposite the current Port of Southampton in order to meet this demand and safeguard existing volumes, employment and economic prosperity.

**Engagement**

We would be delighted to meet with you to discuss these matters further. You are of course always welcome to visit any of our facilities around the country where you can meet our people and experience our operations first hand.

We look forward to working with you during the call for evidence and expert roundtables during autumn 2016.

# ACE Evidence: The process and methodology of the National Infrastructure Assessment

**ACE Response to the:**

**National Infrastructure Assessment: consultation**

**4 August 2016**

## About ACE

As the leading business association in the sector, ACE represents the interests of professional consultancy and engineering companies large and small in the UK. Many of our member companies have gained international recognition and acclaim and employ over 250,000 staff worldwide.

ACE members are at the heart of delivering, maintaining and upgrading our buildings, structures and infrastructure. They provide specialist services to a diverse range of sectors including water, transportation, housing and energy.

The ACE membership acts as the bridge between consultants, engineers and the wider construction sector who make an estimated contribution of £15bn to the nation's economy with the wider construction market contributing a further £90bn.

ACE's powerful representation and lobbying to government, major clients, the media and other key stakeholders, enables it to promote the critical contribution that engineers and consultants make to the nation's developing infrastructure.

Through our publications, market intelligence, events and networking, business guidance and personal contact, we provide a cohesive approach and direction for our members and the wider industry. In recognising the dynamics of our industry, we support and encourage our members in all aspects of their business, helping them to optimise performance and embrace opportunity.

Our fundamental purposes are to promote the worth of our industry and to give voice to our members. We do so with passion and vision, support and commitment, integrity and professionalism.

## Further information

For further details about this publication please contact

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ACE Policy and External Affairs Group  
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[www.acenet.co.uk](http://www.acenet.co.uk)

## Note to reader

Thank you for the opportunity to respond to an important and timely consultation.

As noted above, ACE (Association for Consultancy and Engineering) is the premier engineering trade body. Our members are engaged with improving the UK's built environment across the full range of sectors discussed in this consultation.

The following response to the questions raised in the NIA consultation document was formulated in discussion with ACE's Large Consultancy Group (LCG). The group is made up of director/CEO-level individuals who represent the twenty largest engineering firms in the UK. These individuals collectively represent hundreds of years of experience in the sector and make business decisions critical to the improvement of quality of life, economic growth and sustainability in the UK.

ACE and its members broadly welcome the direction that the National Infrastructure Commission (NIC) seems to be taking with the National Infrastructure Assessment (NIA). ACE has attempted to support the NIC from its founding and the LCG met with the NIC to discuss the Commission's scoping consultation. The engagement programme that this consultation document alludes to particularly encourages us.

ACE's main focus is on the practical deliverability of the recommendations that the NIC will make to the government. These more technical, detailed aspects of infrastructure delivery are where success or failure is determined and only specialist engineers have the experience to advise fully on this matter. This expertise will be fundamental to furthering the credibility of any proposals that are made by the Commission. Therefore, we would strongly suggest that the Commission involves ACE and its members as early as possible, and regularly thereafter, in the assessment process that it is currently embarking upon.

Finally, ACE looks forward to working closely with the NIC to secure the infrastructure that the UK will need in the decades to come.



**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **Foster long-term and sustainable economic growth across all regions of the UK**
- **Improve the UK's international competitiveness**
- **Improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

Brexit's impacts on funding, including uncertainty over the UK's stake in the European Investment Bank may have impacts on our ability to deliver infrastructure. Indeed, Brexit in general was an issue that the consultation did not seem to be consider and now needs to be incorporated fully into any planning.

The conflict between the devolution agenda and a national infrastructure strategy continues to be a cause for some concern. Currently, there is no mechanism for pulling together the plans being developed by devolved nations or cities. There is therefore a need to give greater consideration to this when developing the NIA. ACE feels this is hugely important and there is some apprehension that as cities acquire more power, there could be more conflict between what is wanted nationally and regionally.

There is also a need to recognize that current capital investment plans, while they are incredibly important, can only ever make up a tiny percentage of the country's total infrastructure. When we talk about what the UK's infrastructure will be like in 30 years, we must remain mindful of the fact that we are mostly referring to *existing* assets. Maintenance of the existing stock is mission-critical.

Aware of current political uncertainties, ACE feels that the Commission would do well to assert itself strongly in the face of fluctuating administrations. The long-termism that the Commission is nobly attempting to deliver must be respected by governments of any and all colours.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**

**Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

## Are there any principles that should inform the way that the Commission produces the NIA that are missing?

These are sound principles. We would, however, add that although the consultation does seem to be sufficiently far-sighted and we appreciate that the overall objectives and vision should be insensitive to short term problems, any national infrastructure strategy does need to be flexible enough to deal with these problems. For example, in the case of energy policy, it would be of great value to set out a visionary timescale but if the lights go out (or a nuclear plant goes down), it must be flexible enough to deal with immediate risks. Although we understand that the NIC will be reporting annually on infrastructure, ACE members are convinced that this is a matter worthy of some consideration. Such risks could include recession, climate catastrophe, and terrorism, each requiring a level of resilience – each are issues that are not dealt with sufficiently enough in the consultation document.

### Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

The sectors discussed in the consultation are certainly wide-ranging and ACE is encouraged by the Commission's willingness to conduct a holistic analysis of economic infrastructure. The very clear attempt to see how changes to transport assets impact on energy, for example, is encouraging and is something that we have called for consistently.

Though the Commission's remit is economic infrastructure, it is important that housing issues are taken into full consideration when assessing the merits of any project. Housing without infrastructure is isolation – the two need to be thought of in parallel.

ACE is appreciative of the forward-looking sense given by this part of the consultation. The UK needs new investment in new projects – maintaining a stable and ambitious project pipeline should be the first order of the Commission's work, but ACE would again emphasise the need to also consider existing infrastructure. In Scandinavia, for example, the thinking is different than in the UK. The emphasis is on how to get the most out of an asset in its lifetime rather than just 'maintaining' it as many UK asset owners assume. One emerging issue is that most of the UK's motorways are reaching the end of their lifespan, we need to implement a strategy to maximise the performance and longevity of these resources. Most difficult of all, improvements to existing infrastructure must not compromise the service level and experience of current users as far as possible.

### Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

On the section on transport, we would suggest that there is no reference to pedestrians or other ways to use space and social amenities. As engineers, our members' focus is increasingly on a user-centric approach to transport infrastructure, which means truly understanding the full journey experience right from booking tickets, to walking to the bus stop, to catching an

international flight. Each part of that journey must be respected and considered valid for an integrated infrastructure system to be achieved. ACE's membership is central to the planning and design of each stage in this user experience and the interconnectivity of infrastructure is a challenge as complex as it is important.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

Energy, utilities and transport sit at the heart of most projects, the NIA is right to raise this issue.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

Yes – we are satisfied with this list.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

All covered.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

The methodological approach taken by the Commission seems appropriately thorough. ACE would express some concern over the scope of the project – for a newly founded body, this looks like a very ambitious programme of work. If that ambition can be realised without a trade-off with regards to granularity, ACE fully supports the methodological approach.

Indeed, granularity is an important factor. As engineers, ACE's members know that very large decisions can turn on the smallest details. Our members would welcome the opportunity to advise further in this regard.

There were some concerns about the quality of reporting from some asset owners. TfL are known to have a very good understanding of the status of their assets and are widely seen as best in their class in the UK in this regard. Rural authorities, however, may not have the expertise/resource to meet a truly robust assessment's needs. As responsibility is devolved, capability must also be shared across the country. TfL's experiences should be seen as the benchmark for this kind of asset audit going forward as they are the example of best practice in the UK.

ACE believes that a nationwide register of assets would provide a benchmark for existing and new infrastructure. Perhaps establishing such a register should be a long-term ambition for the Commission going forward. Particularly important is an asset age register – this would enable us to understand what is needed, where, and when it is needed by.

This kind of information is important because when the underlying state of an existing asset is not fully understood, it leads to significant cost and time implications. Politically this then becomes perilous for those sponsoring the project as the general public do not understand how and why overruns occur and cannot understand how engineers or developers have failed to foresee the problems. Committing to any sort of timeline without this understanding, or a sophisticated risk based model in the background would be setting the NIC up for potential failure.

**Q9. Do you agree with this methodological approach to determine the needs and priorities?**

The high-level ideas in the methodology are agreeable to ACE members. Our concern is over the technical understanding of infrastructure that engineers necessarily acquire through their occupation. ACE believes that our members' expertise in this area should be consulted as often as possible and at the earliest stage possible in the assessment process.

If it has not already, the Commission should consider secondments from engineering consultants to ensure this kind of knowledge plays a role in the assessment. ACE would be willing to assist in organising this if considered appropriate.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

It is technology that ACE members see as the overriding driver of change in the infrastructure sector. Technology changes at a much faster rate than demographics and climate and is far less predictable.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

Not specifically.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

We have found the Commission's plans as laid out in the consultation to be very well composed and fully back the spirit of the initiative as well as most of the detail.

There is, however, little mention of how other countries are conducting this kind of assessment. Members feel that Australia may be a good example from which the Commission should seek consultation. To us, this process of seeking best practice in other countries is a necessary benchmarking procedure before the start of any major project and should be carried out in this instance as a matter of necessity.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

ACE is satisfied that the consultative measures laid out are appropriate and would be very keen to participate as fully as possible.

Consulting 'experts' is one of the measures to which the consultation alludes. ACE would like further information on the proposed panel/board and would recommend that our staff and members would make an important contribution if invited to participate. ACE runs a series of Sector Interest Groups that directly map onto the sectors of interest to the Commission as laid out in the consultation document. They would be happy to supply representation to any committees that the NIC decides to establish.

Deliverability is a key focus here. The infrastructure pipeline must be upheld and given certainty if we are to ensure that we can formulate a workforce plan and sustainability safeguards that work for everyone. A solid pipeline will shape our ability to deliver and vice versa.



NIAEvidence@nic.gsi.gov.uk

Ref: **National Infrastructure Assessment consultation**

3 August 2016

Dear colleagues

Please find below a submission of evidence on behalf of the Association for Project Management (APM) in response to your recent consultation.

If any further information is required, or if we could be of further assistance, please do not hesitate to contact me.

Yours sincerely

[name redacted]

[job title redacted]

[email address redacted]



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## ***The National Infrastructure Assessment, Process and Methodology: A Consultation***

### **Response by Association for Project Management**

The Association for Project Management (APM) is a registered charity with over 22,000 individual and 550 corporate members making it the largest professional body its kind in Europe. APM is committed to developing and promoting project and programme management through a wide range of activities including membership, qualifications, events and enhancing standards and knowledge in the profession.

Our findings can largely be broken down to the five following answers:

#### **i) The principles set out by the National Infrastructure Commission (NIC)**

Respondents agreed with the principles:

- 84% either strongly agreed or agreed with the principle “comprehensive taking a whole system approach and understanding and studying the interdependencies”
- 77% either strongly agreed or agreed with being “open, transparent and consultative”
- 70% either strongly agreed or agreed with “forward looking, challenging established thinking.”

Participants proposed additional principles to consider:

- affordability and Return on Investment (ROI) were always taken into consideration
- also “diversification, participation and equality”
- ensuring links with industry and relevant professional bodies.

#### **ii) Cross-cutting issues**

Respondents ranked systemic or cross-cutting issues in order of importance to them:

- 67% placed ‘Geography and local growth’ as one of their top three most important factors, and this scored highest overall.
- 63% listed ‘Governance and decision making’ amongst their three least important issues scoring the lowest overall.

Respondents proposed additional important cross-cutting issues, including:

- Widening participation and engagement with stakeholders
- Greater focus on resources and technology, sustainability
- Ensuring that the legacy resulting from work does not negatively impact on the wider country
- Consideration around Local Area Partnerships (LAPs) who work with local people and partners to establish the issues, needs and priorities for their area. This information is used to produce Area Plans, focusing on issues that need multi-partner support.



### iii) Methodology and Building the evidence base: vision and priorities

Respondents ranked the methodological approaches which the NIA should use to determine needs and priorities:

- 69% said 'Understanding the infrastructure baseline' was the most important approach.
- 57% put 'Sector and geographical evidence reviews' in their bottom two scoring approaches.

Respondents proposed two examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments:

- a risk based approach to modelling coupled with portfolio management
- Value chain mapping such as Wardley (<http://www.wardleymaps.com>) to inform a strategic plan, especially where digital transformation is proposed.

Participants ranked infrastructure drivers in order of importance.

- 43% said 'economic growth and productivity' was the most important driver
- 64% said 'climate change and environment' was the least important driver.

### iv) Finalising the National Infrastructure Assessment

Most did not offer a response to the question: *"The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio or suite?"*

Among those that replied, it was suggested to set a clear and concise scope for projects that could be assessed against key success criteria using established value management techniques (that is, which schemes deliver the optimum benefits for least cost).

Respondents felt that projects offering low investment but high early returns should be prioritised.

Some respondents wanted:

- Consultation to be truly inclusive to widen participation
- Greater emphasis on technology and social trends
- Clear business cases being built for each project, based on sound evidence rather than projections.

### v) Any other considerations

We asked respondents whether there were any further considerations that needed to be taken into account. Largely it was felt that the National Infrastructure Assessment was an enormous task before the consideration of capacity and skills required were taken into consideration.





Note: APM held an online survey between 9 - 31 July 2016 which was open to members and the wider project management community. Responses came from a wide variety of business sectors most notably local government, manufacturing, consultancy and construction as well as a broad spectrum of roles including project managers, academics and company directors. This document presents an informal synthesis of responses received, rather than a formal statement of APM policy.

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# National Infrastructure Assessment consultation

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*Response from the Association for the Conservation of Energy*

## Introduction

This response is from the Association for the Conservation of Energy (ACE). ACE represents the energy efficiency sector in the UK. It works to enable the UK to become energy efficient, driving productivity and business competitiveness, providing warm and healthy homes, delivering a secure energy future and a vibrant low carbon economy. Working with its members and like-minded organisations, ACE delivers compelling research, policy thought leadership and effective campaigning in Westminster and devolved national and local administrations.

The views in this response are those of the ACE staff team. They have been informed by the expertise and experience of the organisations that support our work<sup>1</sup>, but they do not necessarily represent the views of those organisations.

ACE strongly agrees that energy efficiency should be included firmly within the remit of the National Infrastructure Commission as part of a whole energy system approach to meeting the UK's demand for energy services in a cost-effective way whilst meeting our climate change targets.

There is widespread agreement across the energy industry that energy efficiency has a crucially important role to play in the energy system<sup>2</sup> and there is ample evidence that it will help us to meet our carbon targets at lowest cost whilst delivering multiple other benefits.

The response below focuses on ensuring that energy efficiency is fully considered as part of our energy infrastructure, and begins to offer suggestions of evidence that may help the Commission to

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<sup>1</sup> A list of organisations that have supported our recent work can be found here: [www.ukace.org/about](http://www.ukace.org/about)

<sup>2</sup> See for example, the Energy Institute's 2016 Barometer report: [www.energyinst.org/information-centre/energy-barometer](http://www.energyinst.org/information-centre/energy-barometer)

achieve this. We would be delighted to discuss further with the Commission any issues raised here, or to offer further suggestions for evidence on specific points as the Commission's work progresses.

## Objectives of the NIA

The consultation refers to the need to identify solutions that are 'good value for money' for those who rely on, and ultimately pay for, infrastructure. There is a significant body of evidence demonstrating that energy efficiency delivers value for money.

For example, authoritative research by Frontier Economics in 2015<sup>3</sup> concluded that a national programme of investment in energy efficiency in buildings, over a period of 10 years, could deliver net economic and social benefits valued at around £8.7 billion. Analysis by Cambridge Econometrics and Verco in 2012<sup>4</sup> also demonstrated that every £1 invested in energy efficiency returned £3.20 to the economy. And our own use of DECC's 2050 calculator has demonstrated that high levels of energy efficiency enable carbon targets to be met at lower cost than in scenarios relying on more investment in energy supply<sup>5</sup>.

## Principles

The Commission wishes to produce recommendations that are 'robust to multiple future scenarios': investment in the demand side of the energy system has an inherent advantage here – it involves far less risk and is far less focused on large single investment decisions that are difficult, if not impossible, to vary once taken. It is focused more on aggregations of smaller decisions, the level of which can easily be adjusted upwards or downwards if trends in energy service demand or other factors do not evolve as expected when the original decision was taken.

In response to **Question 1** of the consultation: we think it will be very important for the Commission to frame the delivery of infrastructure services in the energy sector in terms of the energy services met (e.g. a need for comfort in buildings) rather than in terms of energy – or indeed heat – delivered by the supply side of the system. This will enable equal consideration of the role of supply and demand infrastructure in the delivery of these services, which results in more informed investment decisions and efficient resource allocation.

## What the NIA will cover: sectors

In response to **Question 3** of the consultation: we strongly support the statement in paragraph 44 on 'the importance of looking at the future of heating and the shift to low carbon solutions in the context of the UK's carbon targets, and the important role that increasing energy efficiency could potentially play'.

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<sup>3</sup> Frontier Economics, Energy Efficiency: An Infrastructure Priority, 2015. [www.frontier-economics.com/documents/2015/09/energy-efficiency-infrastructure-priority.pdf](http://www.frontier-economics.com/documents/2015/09/energy-efficiency-infrastructure-priority.pdf)

<sup>4</sup> Building the Future, the economic and fiscal impacts of making homes more energy efficient, 2014 [www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf](http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf)

<sup>5</sup> [2050-calculator-tool.decc.gov.uk/#/calculator/ace-example](http://2050-calculator-tool.decc.gov.uk/#/calculator/ace-example)

In response to **Question 4**: we believe that the NIA should have a particular focus on energy efficiency within the energy sector, because this has been neglected in the past and hence the system is too supply-biased at present. As a consequence of regulatory and market failure, there is significant untapped economic potential for energy efficiency and the NIA can help to address this. For example, ACE's work for the Energy Bill Revolution<sup>6</sup> highlights the low energy efficiency of the UK's housing stock and our recently published report on energy efficiency in London<sup>7</sup> demonstrates the potential in both homes and workplaces in the capital.

**Question 5** asks about interdependencies: we see the links between energy and communications becoming ever more important, as demand reduction and response increasingly contribute to more efficient use of existing energy supply infrastructure.

## Cross-cutting issues

The consultation refers to consideration of funding and financing models in place for *large scale* infrastructure. This may unduly restrict the options considered by the Commission: it may be that the best way to deliver infrastructure services in the future is through more distributed infrastructure resources and these may be funded using models more commonly used on a smaller scale. ACE produced a report for the World Energy Council on finance for energy efficiency in buildings<sup>8</sup> that may be of use here.

Governance and decision making is a particularly important issue for the energy system. The current regulatory system and the dominance of supply side companies tends to reinforce a paradigm where 'the system' seems to stop at the meter – i.e. the demand side is not included. It may be interesting for the Commission to look at the regulatory system in many US states, where utilities are required to justify their investment plans on the basis that they are taking the least-cost option to meeting energy services demands when all supply and demand side options are taken into account. The American Council for an Energy Efficient Economy produce useful information on this<sup>9</sup>. In addition, moves to devolve more powers to city-regions and municipalities – and the recent wave of local authorities establishing energy services companies – can, through new governance structures, open up opportunities for the demand side to be fully considered in energy infrastructure investment decisions. Emerging experience in Germany suggests that municipally-led energy utilities better serve the full range of national energy policy aims<sup>10</sup>.

When considering performance measures, it will be important to ensure that the multiple benefits of energy efficiency are taken into account. The employment benefits of energy efficiency investments have been well quantified for many years<sup>11</sup>. More recently, interest in multiple benefits has grown, and there is useful methodological work and quantification by the International Energy Agency and others<sup>12</sup>, encompassing health, wellbeing, productivity and macro-economic benefits.

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<sup>6</sup> [www.ukace.org/wp-content/uploads/2015/10/ACE-and-EBR-briefing-2015-10-Cold-man-of-Europe-update.pdf](http://www.ukace.org/wp-content/uploads/2015/10/ACE-and-EBR-briefing-2015-10-Cold-man-of-Europe-update.pdf)

<sup>7</sup> [www.ukace.org/wp-content/uploads/2016/07/Energy-Efficiency-in-London.pdf](http://www.ukace.org/wp-content/uploads/2016/07/Energy-Efficiency-in-London.pdf)

<sup>8</sup> [www.eceee.org/all-news/press/2013/2013-10-22/WEC-EEC-Final](http://www.eceee.org/all-news/press/2013/2013-10-22/WEC-EEC-Final)

<sup>9</sup> For example, see: [aceee.org/white-paper/policies-matter](http://aceee.org/white-paper/policies-matter)

<sup>10</sup> [epub.wupperinst.org/files/5920/5920\\_Wagner.pdf](http://epub.wupperinst.org/files/5920/5920_Wagner.pdf)

<sup>11</sup> A report for Greenpeace, written by ACE's CEO in a prior role, summarises many of the sources of these estimates: [www.greenpeace.org.uk/files/EE\\_fiscal\\_stimulus\\_Impetus\\_Report.pdf](http://www.greenpeace.org.uk/files/EE_fiscal_stimulus_Impetus_Report.pdf)

<sup>12</sup> The IEA's multiple benefits report can be found here:

[www.iea.org/topics/energyefficiency/energyefficiencyiea/multiplebenefitsofenergyefficiency](http://www.iea.org/topics/energyefficiency/energyefficiencyiea/multiplebenefitsofenergyefficiency); ACEEE have also produced a number of assessments of multiple benefits, including: [aceee.org/research-report/ie1502](http://aceee.org/research-report/ie1502)

We are currently producing a report on the contribution that energy efficiency can make to meeting the 5<sup>th</sup> Carbon Budget, and this will include a discussion of the multiple benefits of the investments required. The report is due for completion mid-September, and we would be delighted to meet with the Commission to discuss its findings in due course.

## Methodology

We welcome the Commission's desire to conduct an evidence-based assessment of our needs. The future is uncertain and hence a scenario-based analysis would seem a sensible option. Within this, it will be important to fully reflect the potential for energy demand reduction. Previous scenario analyses have tended to underestimate the progress that could be made.

For example, in 2000, the Royal Commission on Environmental Pollution report on Energy – the Changing Climate<sup>13</sup> included four scenarios for 2050. The most extreme of these, in terms of energy demand reduction, projected that by 2050 demand would be 47% lower than in 1998. Similarly, the Performance and Innovation Unit's 2002 Energy Review<sup>14</sup> worked on a set of scenarios that had demand in 2050 ranging from 40% higher than in 2000 to 40% lower. Government statistics show that since the late 1990s energy demand has fallen by around 1% per year: if this trend continues, then by 2050 demand will be at or lower than the extreme low end of the scenarios used in both these reports. Hence, recent history suggests that, with the correct policy framework in place, we can deliver very significant demand reductions. This should be reflected in the definition of scenarios for the energy sector.

## Building the evidence base: vision and priorities

Our work regularly includes developing an understanding of the current state of energy efficiency infrastructure in the UK, as illustrated by some of the reports referred to above. We would be very happy to talk further with the Commission about how our work can be of use.

In response to **question 9**: we would refer the Commission to the work of the UK Energy Research Centre on energy strategies under uncertainty<sup>15</sup>. We would also urge the Commission to seek out models that include the demand side within the energy system. Work at University College London<sup>16</sup> on the energy system as a whole, and at Imperial College London<sup>17</sup>, on the electricity system, may be relevant here.

Finalising the National Infrastructure Assessment

**Question 11** refers to a portfolio of investments: it is not clear whether this will include only investments supported by central Government infrastructure funds or whether it will include investments in infrastructure funded in other ways also. We believe that the Commission should identify all investments needed, and propose what the Government's role should be in making them happen.

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<sup>13</sup> [webarchive.nationalarchives.gov.uk/20110322143804/http://www.rcep.org.uk/reports/22-energy/22-energyreport.pdf](http://www.webarchive.nationalarchives.gov.uk/20110322143804/http://www.rcep.org.uk/reports/22-energy/22-energyreport.pdf)

<sup>14</sup> [www.gci.org.uk/Documents/TheEnergyReview.pdf](http://www.gci.org.uk/Documents/TheEnergyReview.pdf)

<sup>15</sup> [www.ukerc.ac.uk/programmes/flagship-projects/energy-strategies-under-uncertainty.html](http://www.ukerc.ac.uk/programmes/flagship-projects/energy-strategies-under-uncertainty.html)

<sup>16</sup> [www.ucl.ac.uk/energy-models](http://www.ucl.ac.uk/energy-models)

<sup>17</sup> [www.imperial.ac.uk/people/g.strbac/research.html](http://www.imperial.ac.uk/people/g.strbac/research.html)

## **Engagement: getting your voice heard**

We very much welcome the intention of the Commission to engage widely in the development of the NIA. We urge the Commission to ensure that the energy efficiency sector is well represented in the various expert groups it is setting up and that energy efficiency options are included in the proposals put to the public during the social research that is to be commissioned.

## Submission to the National Infrastructure Commission's consultation on the National Infrastructure Assessment

August 2016

### 1. Introduction

- Balfour Beatty is a leading international infrastructure group. With 16,000 employees across the UK, Balfour Beatty finances, develops, delivers and maintains the increasingly complex infrastructure that underpins the UK's daily life. Delivering projects across transportation, power and utility systems, social and commercial buildings: from Crossrail and the Channel Tunnel Rail link, Heathrow T2b to the M25, M60, M3 and M4/M5; Sellafield and soon Hinkley C nuclear facilities; to the Olympics Aquatic Centre and Olympic Stadium Transformation.
- We also have significant experience and understanding of the links between infrastructure investment and regeneration and economic growth.
- Balfour Beatty welcomes the National Infrastructure Commission's (NIC) work on developing the National Infrastructure Assessment and agrees that it will be a significant undertaking. However, in our view the assignment to: identify the UK's long-term economic infrastructure needs; outline a strategic vision over a 30-year time horizon; and set out recommendations for how identified needs should begin to be met, is of critical importance to the country and its long term prosperity.
- Decisions about infrastructure are, after all, significant and, in terms of major schemes such as High Speed 2 (HS2) and Crossrail 2, costly and reliant on large amounts of taxpayers' money. There have therefore been many calls from industry for a longer term and more strategic approach to infrastructure provision in the UK.
- The recent vote to leave the European Union (EU) makes the NIC's work even more important as political and economic uncertainty and instability following the vote will impact on investment and delivery of infrastructure. As the Brexit negotiations proceed and after the UK has left the EU, the NIA has a role to play in focussing on the crucial role of infrastructure in economic growth over the long-term.
- We hope our expertise and the responses provided in this document will add value to the development of the proposals set out in the consultation paper.

### 2. Responses to specific consultation questions

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

It is our view that the NIC should retain a level of independence from any individual projects or programmes. It is important the NIC avoids bias or a conflict of interest between a single region of the UK and their objective to benefit all regions. This independence would create the right environment from which to offer objective analysis of the benefits of each project.

We further believe that there is a need to preserve the availability of funding and an appropriate level of autonomy (from the Government or any other political agenda, for example) of the NIC to enable it to undertake its own independent research and analysis of the impact of potential schemes on economic growth and quality of life and on schemes proposed by the Government, third parties or of its own inception. Financial resources available to the Commission should be commensurate with its remit and scope. This would ensure funding certainty, considerably strengthen the Commission's independence and help it to formulate robust recommendations.

While Balfour Beatty sees the selected process of appointment to the Commission as suitable (appointment by the Chancellor for an initial term of up to 5 years, after which they may be reappointed for one more 5 year term), we would like to propose some alternatives for consideration. For example, the term of the Chair and the Commissioners could be extended to 7 years non-renewable. Given infrastructure development typically requires planning processes that exceed five-year parliamentary terms, this approach will help to mitigate the impact of the short term policy changes introduced by the newly elected governments on the Commission's work. Separately, a cross-party appointment of the Commissioners, who would elect the Chair of the Commission themselves (subject to the final Chancellor's approval) would, in our opinion, considerably increase the chances of successful delivery of the Commission's recommendations.

An additional issue is the prioritisation of the NIC's objectives. Balancing quality of life, sustainable growth and improving international competitiveness is a broad remit and represents a significant challenge. Given the impact of large infrastructure projects – such as HS2 or Hinkley Point – on local residents, quality of life can often be foregone in the pursuit of economic growth and international competitiveness. We believe therefore that it would be helpful for the NIC to set out guidelines or guiding principles outlining how it will balance the three objectives.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

We agree with the principles set out for the Commission in undertaking the NIA.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

1. **Transport**



2. **Digital and communications**
3. **Energy**
4. **Water and drainage**
5. **Flood defences**
6. **Waste**

Balfour Beatty agrees with the description of sectors 1 (Transport), 4 (Water and Drainage), 5 (Flood defences) and 6 (Waste). We broadly agree with sector 2 (Digital and communications) although would urge that consideration be given to interdependencies with the energy sector, as the internet of things will create further demand for energy – reliable and instantaneous. It will be important to ensure that the system is able to handle the resulting change in behaviour, for example load shifting.

We believe that the relationship between sectors 2 (Digital and communications), 3 (Energy) and 4 (Water and drainage) – broadly classifiable as utilities – needs to be covered in detail, as there are considerable synergies between the sectors. The relationship between the sectors is currently changing and the NIC will therefore need to review and understand what the future links between these sectors will look like. As an example, if the Water and drainage sector is able to become self-sufficient in terms of energy production and consumption, then the link with the Energy sector could change. The relationship with the Digital and Communications sector could then change as this self-sufficiency may require increased digital and communications infrastructure to operate.

Within the definition of sector 3 (Energy), we would highlight the importance of considering energy networks (transmission and distribution). We would also question the exclusion of upstream extraction and processing, due to the implications of activities such as fracking on the energy, water and drainage and waste sectors.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

Within the sector 2 (Energy), we believe that the NIA should look at the planning and coordination role of the electricity Transmission System Operator (TSO), particularly with respect to the development and integration of large privately financed infrastructure – such as offshore wind farms and interconnectors.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

Balfour Beatty believes that attention should be given to the interdependencies between the following sectors which are likely to have a significant impact on the NIC’s objectives:

- Energy – Digital and communications
- Water and drainage – Digital and communications
- Energy - Water and drainage
- Transport - Water and drainage
- Energy – Transport
- Transport - Digital and communications

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

Balfour Beatty supports the proposed cross-cutting issues. Please see below for specific comments.

## **1. Geography and local growth in relation to infrastructure provision and development and how infrastructure can shape economic geography.**

Investment most often flows to densely populated areas where the maximum numbers of people and businesses benefit from it. Less densely populated regions therefore miss out and attract disproportionately low levels of government investment in its transport infrastructure. We believe that there is a need to rebalance and regenerate regions beyond the south east and that infrastructure can play a key part in economic development and regeneration. We welcome the Government's plans for a 'devolution revolution' including the Northern Powerhouse and new structures such as Combined Authorities. We believe that, following the vote to leave the EU, devolution will become increasingly important and that some powers that are transferred from EU level should go to these bodies rather than back to Whitehall. Decisions over local infrastructure are best made by those that understand the local areas and local infrastructure need.

## **2. Existing funding and financing models in place for large scale infrastructure and consider whether there are alternatives**

Balfour Beatty believes that following the vote to leave the EU, a debate is needed on the financing of infrastructure given the inevitable political and economic uncertainty surround Brexit having a detrimental impact on both private and public investment in infrastructure. Alternative funding sources need to be considered to plug the gap, for example, at a time of record low interest rates it is a good time for government to borrow money to finance infrastructure projects. The Commission should consider various alternative routes of financing the capital requirements of the infrastructure projects and identify the likely funding sources which will ultimately pay for the asset (i.e. paid by the consumers, through public spending raised from taxation or a combination of the two).

## **3. Cost, delivery and resilience of infrastructure projects in the UK**

In terms of cost and delivery, there are clearly lessons that the UK can learn from other countries. For example, one of the most significant projects in France in recent years is a 302km line, built by VINCI, Balfour Beatty's joint venture partner. The line runs from Tours as far as Bordeaux in the south-west, and 38km of connecting lines to the existing rail network along the corridor. Tours-Bordeaux is one and a half times as long as HS2's London-Birmingham route, but has been delivered for around a fifth of the price and in half the time: it cost £20m per km, compared with a projected cost of around £105m per km for HS2.

Even taking into account the differences which include the following, this is a significant difference:

- the extensive tunnelling through Areas of Outstanding Natural Beauty such as the Chilterns involved in HS2, in order to minimise disruption to the landscape, which adds significant cost and time to a scheme;
- the fact that the Tour-Bordeaux route was largely unpopulated and flat, while the HS2 route impacts a large number of properties, the owners of which are being compensated at the UK's higher property prices;
- and the significant cost and complexities involved in building new stations (of which there were none with Tours-Bordeaux) and getting HS2 into London.

We believe that there are three key reasons for the difference in the time and cost of delivery:

- **Consistent investment in research and development (R&D)**

In the UK, the level of investment in R&D in construction and infrastructure by both industry and the Government has been steadily declining. On the industry-side, this is largely explained by the tight margins the industry operates within: consistently making around 2% profit, which does not incentivise investment in R&D.

On the Government side, there has been a decline in public funding of R&D in construction over the past two decades, and in 2003, the Government also stopped funding sector-specific R&D, making the UK the only advanced country in the world not to have a dedicated construction R&D funding stream. Up until this point it had invested £23m a year in the construction industry, money that now goes into the Technology Programme, where construction competes with other industries. According to the Building Research Establishment (BRE), the UK spends just £43 million on construction R&D, compared to £206 million in France, and £750 million in Japan<sup>1</sup>.

In comparison, France actively supports business investment in R&D activities, mainly through the R&D tax credit, which significantly decreases the cost of R&D activities in France. This is a key reason why it is becoming more important to UK businesses to be able to collaborate with international partners and to draw on resources around the world.

- **A longer planning cycle**

Construction practice in France involves rigorous planning. On Tours-Bordeaux, for example, over three years was spent on the planning stage alone before construction began in 2012. Although many in the UK would balk at taking such a long time over planning without anything to physically show for it, our experience is that this approach can deliver substantial savings in construction, both in terms of time and cost. Instead, where the design of some projects in the UK is finalised too early, others are characterised by incomplete design and a lack of clear scope, which adds significant cost and time delay later in the process. There are also many instances of costly over-specification, which is one of the reasons Infrastructure UK identified as causing additional cost. It also, in our view, stifles innovation.

This is a key area where many mega projects could innovate to save time and cost later in the process.

- **Public buy-in**

The Tours-Bordeaux scheme achieved tremendous public buy-in, due both to the visibility of the employment opportunities (8,500 people were employed on SEA Tours-Bordeaux at its peak) that were created along the line; and to the seriousness with which VINCI took environmental concerns. Protecting the environment is a headline issue in France and any controversy could have posed serious risks. However, intensive planning ensured that SEA Tours-Bordeaux had minimal impact on the environment, including all 220 protected species along the route. The project was the first to collaborate with and enlist the support of local environmental groups, a strategy which won widespread public support. As a consequence, there were no protests or negative press coverage during the project.

France, of course, also has a thirty year history of high speed rail, which means that the public has already seen the real economic boost that cities such as Lille, Lyon, Marseille, Nantes and Bordeaux have received by being connected to high speed rail

#### **4. Sustainability and whether the existing approach to infrastructure is compatible with the UK's carbon and environmental commitments**

Infrastructure needs to support the development of a sustainable, affordable and reliable energy system encompassing a largely decarbonised energy system before the middle of the century. To achieve this, today's grid infrastructure will have to be adapted to our new energy and transport needs. To ensure the investment that will bring this about, industry needs consistent policy signals and stability.

In our view, future infrastructure will need to be better planned and coordinated, relying on improved modelling of long-term weather and environmental changes, to enable it to become more climate resilient. We have a number of other thoughts on meeting the UK's carbon and environmental commitments:

- **More nuclear:** In order to provide a baseload of constant power and support the decarbonisation of the UK's electricity sector, the UK Government should continue to support the current 16GW nuclear new build programme. Hinkley Point C will generate 7% of the UK's electricity at a stable cost whilst avoiding 10 million tonnes of carbon dioxide emissions a year. We must also push ahead with plans for a Geological Disposal Facility to safely house our nuclear waste.

Furthermore, the UK has the opportunity to become a leader in the development of small modular nuclear reactors. The Government must ensure that the infrastructure and regulation is in place to support the development of this industry.

- **Energy Storage:** Energy storage is a growing market across the energy sector, which could unlock the full potential of renewable generation in order to deliver a low carbon electricity market. Storage will affect the traditional electricity transmission and distribution business models, creating a requirement for system operations to be managed at both national and local levels. Energy storage can be used to complement low carbon and renewable generation sources if utilised as a balancing mechanism and appropriately regulated, creating a multi-billion pound industry. However, if storage has to compete with other sources of generation then it could drive the price of electricity up rather than down. Together with interconnectors, smart grids and smart networks, energy storage could save the UK consumer £8bn a year<sup>1</sup>, but only if regulation removes barriers to the development of the markets.
- **Smart grid:** Smart grid technologies make it possible to modernise and adapt existing power grids to future demands. They can enable power operators to manage energy more efficiently, react with increased flexibility to changing demands and boost efficiency in the network, as well as incorporating electricity from distributed and renewable sources. The adoption of smart grid technologies could make the grid infrastructure more efficient in order to reduce fault and refurbishment work and reduce losses from the network; however this will require an increase in short term capital expenditure in order to retrofit existing infrastructure with smart grid technologies or include the equipment in new build assets.

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<sup>1</sup> Smart Power, National Infrastructure Commission, March 2016

**5. Governance and decision making: institutional frameworks for infrastructure investment and planning in both Government and in regulated utilities**

Clear leadership and governance is needed in infrastructure. Balfour Beatty believes that the Commission's duties should cover areas of infrastructure development that benefit the country as a whole including any devolved administrations. In addition, it is important that the Commission takes an active role in supporting the devolved administrations in the development of their own infrastructure planning capabilities. This will be increasingly important as Authorities based in city regions take on ever more ambitious infrastructure programmes. The Commission should not become another layer of governance for organisations such as Transport for London and Transport for the North.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

No.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

In our view, the methodological approach set out is sensible.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

No.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?**

We believe the key infrastructure drivers are included in the consultation paper.

However, the following additional areas should be examined within the drivers:

Within 'Technology':

- Digitisation
- Smart maintenance through technology embedded into assets
- Electric, hydrogen or driverless vehicles

Within 'Climate change and the environment':

- The need to implement initiatives to improve climate projections
- Future flood impact when designing and installing new infrastructure and resilience after a major flood event
- The need for an asset whole life approach on flood defences

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

No.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

Balfour Beatty welcomes the recognition of the importance of housing in the consultation paper and Government's decision to include housing in the Commission's remit, albeit indirectly. We believe that the development of social infrastructure in general fosters the long term economic growth and influences the UK's international competitiveness as well as the level of well-being of UK citizens. However, excluding social infrastructure from the remit may limit the viability of the Commission's recommendations because the long term planning for infrastructure renewal and expansion cannot be conducted in isolation from its social element adequately. The inclusion of social infrastructure into the Commission's remit would also ensure that the limited public sector resources and market capability are appropriately managed and with a sense of priority.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

We have considered the proposed engagement strategy and believe that it is a sensible approach, however, it should be kept under review and all possible means of communication ensuring as far a reach as possible with communities across the country should be considered. For a national strategy to work, there must be buy-in from all areas of the country and all parts of society.

## Contact

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Q1. The Government has given the National Infrastructure Commission objectives to:

- Foster long-term and sustainable economic growth across all regions of the UK
- Improve the UK's international competitiveness
- Improve the quality of life for those living in the UK

What issues do you think are particularly important to consider as the Commission works to this objective?

The most important issues to be considered by the NIC are:

**Integrated Solutions** - The NIC needs to look at all infrastructure, at integrating the solutions and to really consider how society will operate in the future. If we consider where we currently are, this might help with how we approach this. For a start, when dealing with transportation infrastructure the NIC must deal with integrated solutions that fully consider how people and goods travel. Historically our solutions are too focussed on a road, or a railway etc. The disconnected nature of all of the various bodies that deal with transportation only fuels this problem.

**Wider Issues** - The NIC also needs to consider much wider issues. For example, the current spend within the EA has to be justified spending on how many homes are protected. An alternative approach could consider how defences make infrastructure more resilient, or how new infrastructure can be used to add to or create defences.

**High Speed Broadband** - The provision of high speed broadband connectivity in the UK has been massively overlooked. This is an essential part of today's business and public needs. The current approach to this is wholly unsatisfactory and the NIC need to deal with how we correct and address this in the future.

**Agile Infrastructure** - Our demands and needs from all infrastructure are going to change in the future well beyond anything that we contemplate. Currently we develop all of our planning based on projections and behaviours from the past. Technology is already starting to impact on changing our behaviours and this is only going to increase in impact. The NIC need to have an approach of developing and embracing agile infrastructure that we can adapt and alter quickly as our needs or wants change. We are currently in danger of building infrastructure that will be redundant by the time we complete it.

**Devolution** – Do we have sufficient expertise amongst the LEPs and Local Authorities with the ability to handle the additional expenditure on infrastructure projects and provide value for money?  
Most LEP's tend to overlap with more than one Local Authority thus generating potential conflicts across Local Authority boundaries. Does this give the best result?

**High tender costs** – Current procurement strategy often leads to extremely high tender costs. Ultimately the customer (Government) indirectly pays for these costs. Continuous review of procurement routes would help to minimise these costs. Examples of high costing tenders include “zero value” frameworks (really a select list of tenderers). After tendering for a position on the framework, contractors are

required to undertake further tendering activities for individual projects on the same framework resulting in considerable additional cost.

**ECI and VECI** – ECI (Early Contractor Involvement) has been proved to be very cost effective. When a contractor is introduced to the project to provide buildability and value engineering advice at the detailed design stage of a project large financial benefits have been realised. At this stage, however many irreversible decisions have been made that affect the final cost of the project. VECI (very early contractor involvement) brings the contractor in to assist with Planning issues, DCO, Hybrid Bills etc. Decisions made at this stage can result in very significant savings for a project.

**Secondments from industry to public organisations** – In our view, Government could benefit by seconding personnel from industry to give an industry viewpoint on infrastructure planning, procurement models etc. Currently consultants are employed to assist with these issues, and to make up shortfalls in resources. A more balanced view with different ideas is likely to be gained by employing personnel from infrastructure delivery organisations.

Q2. Do you agree that, in undertaking the NIA, the Commission should be:

- **Open, transparent and consultative**  
Agreed, the commission needs to embrace as many stakeholders as possible.
- **Independent, objective and rigorous**  
Agreed.
- **Forward looking, challenging established thinking**  
Agreed.
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**  
Agreed, but in addition, the commission needs to understand the wider **value** of infrastructure projects and not just **cost**. Value may come from considering whole life costs, cross over effect to other sectors/infrastructure projects, job creation, SME opportunities, social value etc.

It is important to listen to feedback from industry and other stakeholders.

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

Please refer to the response to Q13 for suggestions on which organisations should be consulted.

Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

Agreed



**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

The current major issues for infrastructure are commuting around our conurbations and lack of high speed digital connectivity. Both of these items are currently costing our economy and businesses substantial amount of money and frustrate our population. These are the critical matters that need addressing now. However, all other aspects of our infrastructure are under a high degree of stress and need coherent plans.

Another area of focus is the current closure of power stations without a clear programme for their replacement. This, coupled with a potential increase in demand for power could lead to insufficient energy capacity. The energy sector should therefore be given focus as all sectors rely on a continuous, reliable energy supply.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

Almost all infrastructure cuts across sectors. Many of our current issues stem from the 'siloes' approach that we have adopted in the past, that also fuel our under investment. The NIC need to be unconstrained to consider the wider effects of all infrastructure. Those inputting to the NIC must have a thorough understanding of the potential impact of changing technology on our use of infrastructure. For example, should we be investing in upgrading the Victorian technology of railways or should we be building new mass transit systems. How should we interface these with autonomous vehicles? What will we do about storage of these? How will buses interface at hubs? How do we incorporate future demands for walking, cycling etc? The commission need to really consider the end user first and foremost. Currently, we do almost the opposite. Connectivity cuts across all transportation modes and should be addressed as part of this.

Other examples of where interdependencies occur and collaborative thinking will assist to reduce overall cost, include:

- Transport hubs. eg Heathrow, HS2, Gatwick.
- Power for other sectors eg rail power upgrades, power for autonomous cars.
- Marine works for new power plants and offshore wind.
- Interconnectors/offshore wind

It is important for the Commission to realise the financial interdependencies between separate schemes as well as the physical interdependencies.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

Agreed. The additional issues noted in the response to Q7 should also be considered.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

- Two stage procurement with an ECI (Early Contractor Involvement) and a Construction phase offers many potential advantages, including:
  - i. Identifying risk items at an early stage and allocating to the party most able to deal with them.
  - ii. Early collaboration between customer, designer and infrastructure delivery company to consider all alternatives and finding the best solution.
  - iii. First stage tender list kept as short as possible, reduced to one or two short listed delivery organisations for the second stage. The result is cheaper tender cost but with more opportunity for innovation and value engineering and the best engineering and cost solution.
- Even more advantageous is a VECI (Very Early Contractor Involvement) process. Here the infrastructure delivery organisation supports the customer's business case as early as possible, through planning, DCO etc. In this way, the most cost effective solutions are realised before the commitment to the final scheme is fixed or restricted by the planning system.
- Clearly defined programmes to provide continuity and certainty of work streams and thus more efficient resource planning. This also leads to better ability to train personnel and provide continuous employment. Ultimately this will provide employers the confidence needed to invest in long term training and bridge the skills gap.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

We agree with this approach but would stress that engagement with all sectors should be as wide and as varied as possible and included in the approach should be collaboration with infrastructure delivery organisations.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

All successful models must include long term collaboration.

From a project point of view, the Olympic Park Development was a prime example of a long-term, complex project which needed strategic prioritisation. The construction industry collaborated closely with Government throughout the whole process. This included support for the original bid to the IOC through to discussions on the best procurement routes. Close collaboration between all parties through the design and construction phases resulted in successfully achieving demanding cost and programme targets.

Borders Rail project was another of a successful model. Originally the Scottish Government promoted the scheme using a DBFM procurement model but two of the three potential bidders pulled out. Transport Scotland then decided that rather than awarding the scheme to a DBFM project vehicle which would have to raise its own project specific finance, it would be better to give the scheme to Network Rail to run. Network Rail's borrowing capabilities and funding arrangements made the project

better value for money. BAM Nuttall then undertook a two stage tendering process with Network Rail, building up a project price and design in a two stage process which gave certainty of programme and budget.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

Whilst we agree that the main drivers have been identified, these may be skewed by major events such as terms agreed with the EU, following Brexit and a possible second referendum for Scotland on remaining in the EU.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

Close collaboration with all interested parties will be essential, including infrastructure deliverers.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

The Commission needs to ensure close collaboration across all sectors of industry to gain wide ranging views .

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

Building the confidence of the public is paramount. Public consultations are very challenging to effect well, but the commission needs to do this. It also needs to seed thoughts that will influence the future, so it educates the public, to inform decision making.

Infrastructure is a global issue, and the NIC should be informed by looking at what is working and not working in other cities. Most importantly the NIC should not be constrained by what we already have. Investing in 'tinkering' with our Victorian heritage is one of our greatest constraints.

Other ways to engage and obtain support is with large bodies of society through representative organisations with significant memberships, examples include:

- Civil Engineering Contractors Association
- Institution of Civil Engineers
- Association for Consulting and Engineering
- Royal Institute of British Architects
- Chartered Institute of Building
- Institute of Highways and Transport
- Institution of Mechanical Engineers
- Trade associations
- Local Enterprise Partnerships
- Institute of Collaborative Working
- Local government association

**The National Infrastructure Assessment  
Process and Methodology:  
A Consultation Representation from Barton Willmore LLP**

Barton Willmore is the UK's largest independent planning and design consultancy. We work with a wide range of clients to provide planning and design advice for major infrastructure projects, including for major urban developments, energy, utilities, waste and transport. The Practice is a member of the National Infrastructure Planning Association, and we are promoting a number of Development Consent Orders for Nationally Significant Infrastructure Projects.

We set out below our responses to the questions posed in the consultation document.

**Q1 The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

We consider that the following key issues are particularly important in working to the three objectives:

- Comprehensive and decisive action is required on the UK's infrastructure requirements over the next 30 years. A national framework underpinned by clear evidence and informed timescales for delivery is critical to achieving energy security, maintaining economic growth in key locations, for opening up new locations for growth and for attracting critical investment. The NIA should major on the requirements for installing confidence in all forms of investment.
- Key blockers to effective infrastructure delivery include piecemeal and reactive infrastructure planning. Being able to plan for the growth of 200,000 – 300,000 homes a year is fraught with uncertainty and deliverability issues that impacts investor confidence and prevents planning permissions being determined or implemented. Fully understanding the scope of the infrastructure required set against housing and economic growth profiles for the UK is essential to enable faster planning of communities, jobs and infrastructure. Set alongside this is the need to enable access to and proactive cooperation from public sector/statutory infrastructure providers to ensure infrastructure requirements and their delivery is established and committed to early on.

- The UK planning system must be able to deliver the economic growth and the key infrastructure required over the next 30 years. Once an investment decision has been made, it is essential that the infrastructure identified by the NIC is not delayed by the planning process. Maintaining but streamlining the Development Consent Order process and using Secretary of State recovery powers promptly where necessary will be key. Adequate investment in the relevant consenting authorities and independent inspectors is essential.
- The NIA should recognise that smaller infrastructure, which may fall below Nationally Significant Infrastructure thresholds, may be sufficiently significant to unlocking nationally important opportunities for growth to warrant special attention i.e. new motorway junctions.
- A recognition that the need to improve the quality of life in the UK and improving the UK's competitiveness are particularly important in securing sustainable long term and competitive energy supplies. The UK has significant indigenous supplies of gas, a low carbon fossil fuel, which will help to reduce the rising quantities and costs of importing the energy supplies from overseas. A secure supply of sustainable energy will help to ensure that supplies are not subject to irregular spikes in price.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

- We agree that the four principles are appropriate. We recommend the NIA is also "bold" in its forward thinking approach and it should seek immediate priorities that must be expedited so that short term critical infrastructure is not held up with a longer term strategy, which is proposed to be published in 2018. Planning National Infrastructure for 30 years is a significant undertaking. It will be important that this document is suitably flexible and capable of focusing on delivery of immediate short to medium term objectives whilst planning and building confidence in a longer term vision.
- NIC should be pragmatic and realistic. A prioritised list of infrastructure projects should be tested in terms of funding, political will, social and environmental constraints to install confidence for investors and users. The NIC needs to adopt a practical approach that clearly identifies the obstacles and sets out in broad terms how and when these can be overcome.

This will help to ensure that the NIC's recommendations are given significant weight in Government and serve to demonstrate that the infrastructure projects have been adequately appraised.

**Q3 Do you agree that the NIA should cover these sectors in the way in which they are each described?**

- We would emphasise the importance of assessing new housing requirements and their infrastructure needs proactively and expeditiously so that new homes and jobs can be realised when they are required. Consideration should be given to broader sub-regional planning for new homes and jobs that enables more effective planning of key infrastructure.
- We consider that more emphasis should be given to measures to bridge the gap between achieving the development of renewable technologies for heat and electricity generation and providing the flexibility to help reduce the use of high-carbon fuel. For this to be happen, the NIA will need to focus on the role of indigenous gas supplies. 84% of homes in the UK are heated by gas and this is unlikely to change in the medium term as new technologies are transitioned into play. Gas is the cleanest of all fossil fuels and will be expected to play a significant role in the short to medium term.
- The NIA should take a whole river catchment approach to mitigating flood risk, identifying areas at risk and seeking opportunities to invest in upstream flood risk management thereby reducing flood risk at source, alongside traditional "hard-engineering" techniques.

**Q4 Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

**Water and Drainage**

- A common constraint to development viability and deliverability is insufficient waste water (foul water) infrastructure and capacity. This often relates to either the connection to a main treatment works, the capacity of the treatment works being insufficient or the level of contaminants discharged exceeding European protection levels. There appears to be a lack of forward planning and link to emerging Local Plan housing and employment land requirements. Waste water disposal capacity should be monitored and new capacity planned and implemented proactively aligned with strategic development planning. The time required to identify a capacity issue, gain access to and receive the required level of co-operation from the statutory undertaker, to then developing and implementing the new required infrastructure is well in excess of the timescales for delivering new homes and jobs that are urgently required, thereby exacerbating the housing crisis and impacting on economic growth.

## Energy

- As a priority, the UK national grid infrastructure must be reviewed and key upgrades made to enable the connection of new power generating stations at their full capacity, rather than reactive upgrades in response to individual planning applications or Development Consent Orders.
- We would suggest that the NIA should focus on the need for additional energy storage. The UK has around 4bcm of storage capacity but this can deliver only around one quarter of national gas demand. By far the largest gas storage facility is Rough, operated by Centrica Storage, which makes up 40% of the UK's total storage capacity. However, it was recently announced that Centrica has had to close it down for maintenance and essential repairs until 2017. It is reported that this essential piece of UK energy infrastructure has suffered maintenance problems for the past 12 months as its ageing wells have become weakened from intensive use. This unexpected shutdown has reinforced concerns about the UK's relative shortage of gas storage capacity.
- There are limited alternative gas storage facilities in the UK. Planning permission was granted in 2010 by the Secretary of State for Energy and Climate Change for the largest underground gas storage at Saltfleetby in Lincolnshire which would have provided around 700 mcm of additional gas storage capacity. However, the permission has now lapsed, as there is no commercial viability in implementing this key piece of infrastructure. At the current time, Halite is seeking overseas investors to develop its Preesall Underground Gas Storage facility with a total storage capacity of up to 900 mcm in a number of salt caverns in Lancashire. These two projects appear to demonstrate that whilst there is a recognised national need for further gas storage to meet future demands, the economic case for constructing and delivering these key pieces of infrastructure is weak.
- Reliable and efficient electricity storage, decentralised or strategic, needs to be addressed for renewables such as wind and solar which can only supply power intermittently.
- We consider that carbon capture and storage (CCS) could play an important part of the future energy mix by providing a long term future for the role of coal and gas in the UK's electricity generation mix and reducing our carbon emissions. However, CCS has proved to be very expensive and requires significant investment in transportation infrastructure (i.e. pipelines).

## **Transport**

- Alongside high speed rail connecting London with major cities, vital infrastructure is required traversing the country east – west. A lack of rail connectivity and congested roads are constraining the growth of key towns and cities, which could make a significant contribution to the UK's economy.
- A decision on the future of aviation in the UK is urgently required including the decision on runway capacity in the south of England. Allied to this, a strategy is urgently required setting out the role regional airports can play in domestic (in the short to medium term) and European travel, freeing up critical landing slots at major airports.

**Q5 The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

- The important interdependencies are identified in the responses above.

**Q6 Do you agree that the NIA should focus on these cross-cutting issues?**

- We agree that the NIA should focus upon the identified cross-cutting issues.

**Q7 Are there any other cross cutting issues that you think are particularly important?**

- A key role of the NIA should be to break down the silo culture of government departments, driving a common agenda with cross departmental buy-in, commitment and resourcing.

**We would welcome the opportunity to discuss our comments in more detail. Please do not hesitate to contact either [name redacted] (t. [phone number redacted] / e. [e-mail address redacted]) or [name redacted] (t. [phone number] /e. [e-mail address redacted]) at Barton Willmore.**

**Barton Willmore**

**28 July 2016**



## **The National Infrastructure Assessment – Process and methodology May 2016**

### **National infrastructure Commission – Consultation**

**Bath & North East Somerset Council** is one of four West of England local authorities working in partnership on economic, spatial, transport and infrastructure planning to deliver sustainable economic growth. The West of England Strategic Green Infrastructure Framework (2010) identifies strategic green infrastructure assets that have significance across the West of England, providing multiple functions and benefits.

The protection, maintenance and enhancement of all green infrastructure assets is addressed within the authorities emerging Joint Spatial Plan and Transport Study, Local Plans and other Development Plans and strategies including Neighbourhood Plans and Green Infrastructure Strategies.

Bath & North East Somerset Council's Green Infrastructure (GI) strategy 'Valuing people, place and nature (March 2013) emphasises the need to put GI at the heart of decision making and take an integrated approach to its management, enhancement, extension and promotion.

Bath & North East Somerset Council whilst welcoming the objective of the National Infrastructure Assessment to secure better infrastructure offers the following in response to Questions 1-4 regarding the process and methodology:

#### **Response to questions**

##### **Q1 What issues do you think are particularly important to consider as the Commission works to this objective**

Recognition that green infrastructure is fundamental to achieve the objective: 'to foster long term sustainable growth, improve the UKs international competitiveness and improve the quality of life for those living in the UK'.

Green infrastructure is the network of green spaces, rivers and lakes that intersperse and connect villages, towns and cities. In rural areas it can include fields, woodlands, hedgerows, country parks, rivers and lakes and in urban areas it can include domestic gardens, street trees, sports pitches, civic spaces, green roofs and walls.

All these elements are service-providing infrastructure and when done well can deliver multifunctional benefits for people, place and nature.

Key outcomes include enhanced biodiversity, adaptation to climate change, landscape and heritage conservation, healthy living, flood mitigation and sustainable urban drainage systems, sustainable transport and fuel/food production.

Recognition should be given to the fact that Green Infrastructure investments are generally characterized by a high level of return over time, provide job opportunities,

and can be a cost-effective alternative or be complementary to 'grey' infrastructure and intensive land use change.

**Q2 Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

It is not apparent in this document that the development of the vision and identifying priorities will give due recognition to the role that green infrastructure can play in delivering sustainable economic development and quality of life as well as providing mitigation for climate change, thriving communities and improved biodiversity. For example, green infrastructure is one of the most effective tools available to us in managing environmental risks such as flooding and heat waves.

We would seek clarification that the principle of undertaking the NIA that the Commission is being 'Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedback' intends to include all elements of green infrastructure as part of the 'whole system approach'.

**Q3 Do you agree that the NIA should cover these sectors in the way in which they are described?**

Only limited reference is made to natural assets (paragraph 39 - 41). It is not evident that the Commission acknowledges the contribution GI makes to infrastructure services that enable economic and social activities to take place.

Transport (paragraph 42) – as the Commission's recommendations may include 'Specific projects eg new bridge ...' – transport should also consider provision of pedestrian infrastructure eg Green Bridge London.

Also need to recognise opportunities for transport infrastructure providing GI multiple benefits eg wildlife corridors, improved connectivity between public spaces.

Digital and communications (paragraph 43) - recognising advances in and use of GIS- assume assessment will include use of GIS to calculate optimised layout for variety of land uses – best travel routes, ecological potential.

By 2050 a generation of adults who will have grown up with smart devices presents opportunities for more efficient use of resources and planning use of public space eg heat and light – being triggered when people present rather than being on all the time. The NIA presents an opportunity for the Commission to recommend innovative approaches using evidence from case studies well documented in Cities Alive – rethinking green infrastructure (2014) Arup.

Energy, Water and drainage and Flood defences – to ensure that when planning infrastructure for these that consideration is given to maintaining and enhancing GI and that quality of design contributes to climate change resilience, sustainable drainage, biodiversity and reducing urban pollution.

**Q4 Are there any particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

To consider GI from the outset and ensure that a GI design led approach is taken to be able to understand and unlock complex interactions and deliver multiple

secondary benefits. In planning infrastructure provision recognise the value of the natural environment and its role in underpinning economic prosperity, health and wellbeing.

## **Birmingham Airport's response to the National Infrastructure Commission (NIC) consultation on the National Infrastructure Assessment (NIA): Process and Methodology**

Response emailed to [NIAEvidence@nic.gsi.gov.uk](mailto:NIAEvidence@nic.gsi.gov.uk) by [name redacted], [job title redacted] at Birmingham Airport. [name redacted] can be contacted at [email address redacted] and on [telephone number redacted].

Date of submission: 5<sup>th</sup> August 2016

### **About Birmingham Airport**

Birmingham Airport is the UK's third largest airport outside London, and the UK's seventh largest overall, handling over 10m passengers a year. In June 2016 we announced 16 months of consecutive growth, a period in which we launched 13 new airlines.

Birmingham serves more than 140 direct scheduled & charter routes and offers an additional 280 possible connections worldwide. This gives passengers a choice of over 400 direct or one-stop flights.

Over the last 10 years, Birmingham Airport has invested more than £300m to develop its Infrastructure, including an extended runway for longer haul flights.

Independent analysis shows that the connectivity provided by Birmingham Airport in 2014 boosted the West Midlands economy by £1.1 billion in GVA and supported 21,000 full-time equivalent jobs. Across the UK, where more of the Airport's economic impact is captured, the Airport's total impact in 2014 was around £1.7 billion in GVA and around 33,000 full-time equivalent jobs.

Birmingham Airport's vision for UK aviation is a network of Great Airports for Great Cities: long-haul airports, each supporting the comparative economic advantage of their region to boost trade, foreign direct investment and tourism.

### **Proposed goals of the National Infrastructure Commission**

Birmingham Airport welcomes the opportunity to respond to this consultation. The consultation sets out that the NIC's conclusions will seek to foster long-term and sustainable economic growth across all regions of the UK; improve the UK's international competitiveness; and improve the quality of life for those living in the UK.

Birmingham Airport agrees with these goals. As a vital piece of national infrastructure, the Airport is integral to the economy, prosperity and international connectivity of the Midlands Engine for Growth. The Airport is focused on increasing the connectivity of the region, owing to the benefits that this delivers. In 2014, according to independent analysis, this amounted to boosts to a wide range of sectors, including £331m for transport services, £299m for manufacturing and £200m for the accommodation and food sectors.

According to this analysis, if Birmingham Airport can secure routes to the destinations that there is demand for in its catchment area, it could immediately boost the regional economy by a further £248m GVA per year and 5,100 jobs, and the national economy by a further £425m GVA per year and 8,000 jobs.

Birmingham Airport would therefore welcome any NIC recommendations that connect Birmingham Airport with additional towns and cities in the region and beyond, so that it can deliver further benefits to the economy and continue to grow its route network.

## **Proposed sector focus for the NIA**

### **Breaking down silos in transport policy making**

The consultation sets out that the NIA will look across transport, energy, water and sewerage, flood defences, digital and communications and waste. It also acknowledges that past UK infrastructure policy has often lacked long-term planning and been incomplete.

Birmingham Airport welcomes the inclusion of transport given that it is a key driver of growth, and given the existing unhelpful separation between different modes of transport that currently hampers policy planning. For example, the way in which the Department for Transport is organised, means that classic rail, HS2, road and aviation are considered in silos. In reality, these modes of mobility work in tandem and, if their benefits are to be realised, need to be planned together.

Silos in transport policy-making has also been evident in the flawed Airports Commission process. Despite the Commission making recommendations on new runway capacity for the South East for the mid-2020s, and HS2 Phase 1 also due to be complete on this same timescale, the Commission did not explore the effect that HS2 will have on travel patterns, or how it will allow the UK to make greater use of airport capacity along the HS2 route. The Commission also failed to make recommendations on how the UK can make best use of existing airport capacity in the interim.

In addition, in airports, we have seen an artificial separation between large South East airports and regional airports. It is wrongly assumed in policy making that the primary role of airports other than Heathrow and, to a lesser degree, Gatwick, is to provide connecting flights or short haul services. Birmingham Airport plays a significant role in its region's long haul market, and experienced a 21.4 per cent growth in long haul in 2015 compared to 2014. It will therefore be important for the NIC to consider the national role that Birmingham Airport can play, particularly when aligned with HS2.

### **Importance of regional stakeholders for removing policy silos**

Birmingham Airport welcomes the February 2016 conclusion of the Transport Select Committee in its inquiry on *Surface Transport to Airports* that the NIC should "work with local organisations to optimise connectivity between regional transport hubs across the country." The Committee added that "This will provide much needed national coherence on transport planning matters."

Birmingham Airport is working closely with Midlands Connect, the Midlands Engine for Growth, Transport for the West Midlands and the region's LEPs and Combined Authority to support a joined-up transport strategy for the region that delivers for the whole economy. Midlands Connect has said

that the region currently generates almost £200 billion in GVA per year but, if its transport links were improved along the strategic routes it has identified, the region would see its economy boosted by £1.1 billion GVA per year. In addition, independent research shows that if journey times across the Midlands to Birmingham Airport were improved by 15 per cent, this would enable the Airport to capture back a proportion of passengers that are currently leaking away to congested airports in the South East. This journey time improvement could enable Birmingham Airport to boost the region's economy by a further £41 million per year, and the UK economy by a further £63 million per year.

### **Maximising the benefits of HS2**

Following the Airports Commission process, it is important that national aviation policy now focuses on supporting the network of long-haul airports across the UK to help rebalance the economy. This includes ensuring that the new Aviation Policy Framework focuses on catering for increased demand across the country, and maximising the benefits of existing and planned surface access, including HS2.

Birmingham Airport is working closely with the region and HS2 Ltd to ensure that the benefits of HS2 are maximised. HS2 will be a game changer for the region and it is vital that policy supports a truly integrated rail and aviation hub in the centre of the country. Under Phase 1 of HS2 due to be completed in 10 years, Birmingham Airport will become the UK's first and only high-speed rail connected airport, making it central to the country's long-haul aviation network. It will dramatically enlarge the Airport's catchment area, enabling it to plug more businesses across the UK into international opportunities.

HS2 will bring Birmingham Airport 'closer' to London, relieving pressure on congested airports in the South East. Journey times for people travelling between London and Birmingham Airport will be faster than journey times from London to Luton and Stansted, approximately the same as Gatwick, and only 15 minutes longer than Heathrow Terminal 5. According to independent research by York Aviation, HS2 could enable Birmingham to capture around 750,000 additional passengers by enlarging its catchment area. The economic impact of this growth in the region could be around £34 million in GVA and 950 jobs. Across the UK, this impact increases to around £52 million in GVA and 1300 jobs.

To capitalise on this opportunity, Birmingham Airport is embarking on a process to explore future possibilities for maximising the benefits that the Airport delivers, including redeveloping the site. Options being considered include expanding Birmingham Airport to the North East, including new terminal facilities close to or co-located with the HS2 station and, at a later point building a second full-length runway. This would allow Birmingham Airport to serve more than 60 million passengers per year. It would also increase the Airport's freight capacity, shorten the distance between the Airport and HS2, allow a more efficient road layout, increase rail journeys and reduce road journeys.

The work being undertaken by Birmingham Airport will feed into the Airport's next Master Plan, enabling businesses and communities to consider how to best boost the economy at the centre of the country and maximise the benefits of HS2. This will feed into the region's plans for its Strategic Economic Plan, which seeks to grow the economy by £86bn GVA per year. Birmingham Airport will formally launch the consultation on the new Master Plan in Spring 2017.

This work is being undertaken now as Birmingham Airport will reach a point of constraint at around 27-30 million passengers per year on its existing site. Not redeveloping ahead of reaching a point of constraint will curtail the value of the region's aviation connectivity, jobs and economy, and reduce the value that HS2 can deliver.

## **NIC methodology**

The consultation asks whether its proposed methodology, including engagement with stakeholders and expert roundtables, is the correct approach. Birmingham Airport would welcome further information on this. It is important that these roundtables and panels do not strengthen existing silos and the UK's bias for investing in the South East. When considering the role of regional airports and HS2 for rebalancing the economy, it is vital that the NIC engages with businesses and representatives from regions with HS2 stations, rather than, for example, forming panels based around either solely rail or aviation.

Birmingham Airport would welcome the opportunity to contribute to the NIA as part of consideration of the infrastructure needs of the Midlands Engine; how to maximise the benefits delivered by HS2; and how to leverage the UK's network of long haul airports to plug every region into international opportunities.

## **NIC principles**

Birmingham Airport welcomes the principles set out in the consultation. It is particularly important that the NIC brings fresh and joined-up thinking to UK infrastructure planning. This was not evident in the Airports Commission process. Birmingham Airport welcomes that HS2 is now open to conversation about how to maximise the benefits it delivers through integrated station design.

Birmingham Airport sees NIC engagement with regional policy bodies as critical to the empowerment of UK regions and the success of the NIA.

## NATIONAL INFRASTRUCTURE COMMISSION CONSULTATION ON THE NATIONAL INFRASTRUCTURE ASSESSMENT

### BRITISH CHAMBERS OF COMMERCE SUBMISSION

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The British Chambers of Commerce (BCC) sits at the heart of a network of 52 accredited Chambers of Commerce across the UK and a fast-growing Global Business Network.

In the UK, our network brings together over 70,000 member businesses, and engages with a further 200,000 non-member companies each year. Overseas, our Global Business Network offers practical, on-the-ground help to UK exporters, and supports two-way trade.

#### INTRODUCTION

The BCC welcomes the opportunity to respond to the *National Infrastructure Commission consultation on The National Infrastructure Assessment Process and Methodology*. The following key issues that must be considered include:

- The NIA needs to be strategic, proactive, coherent, ambitious and deliverable to enable the UK to be a world leading economy.
- Infrastructure connections to global markets – including surface access links - must be prioritised.
- The NIA needs to provide certainty to business in order to attract private sector finance.
- To be effective, the NIA recommendations will need to result in planning consents that can be implemented speedily and economically.
- Blockers in the planning system which drive up infrastructure cost need to be identified and removed.
- Businesses need to be involved throughout the development of the NIA to help shape priorities and future opportunities.

#### 1) The government has given the NIC objectives to:

- **Foster long-term and sustainable economic growth across the whole of the UK**
- **Improve the UK's international competitiveness**
- **Improve quality of life for those living in UK**

#### **What issues are important to consider as the NIC moves towards that assessment?**

- The Commission, through the NIA, must provide a strategic, coherent and proactive approach to infrastructure investment in the UK. The NIA needs to bring together national, sub-regional and local aspirations for economic growth, and other social and environmental objectives. The multiple layers of economic geography, funding and strategic boundaries covered by local plans, LEAs, combined authorities, pan-regional bodies, DfT, BEIS and the Industrial Strategy, all need to be aligned. Only then can the NIA determine and plan for the infrastructure investments that will enable us to achieve these long-term goals.



- The NIC should move away from the fragmented, dysfunctional and reactive approach which currently characterises infrastructure planning, funding cycles and the criteria for prioritisation, in sectors such as rail and road. The investment schemes included in the NIA should be those which best enable the UK to meet its goals. The priority should not be determined simply by the best Benefit-Cost ratio, which can result in investment reinforcing existing patterns of economic geography, rather than shaping, and making the most of future opportunities.
- The assessment of infrastructure should not be driven by current financial and funding models. It should be designed to attract private sector investment and have a balanced approach to public and private sector funding across, and within, all sectors.
- Business needs the NIA to be ambitious and deliverable. The importance of infrastructure to the UK economy cannot be underestimated. Energy supply networks, digital communications and transport infrastructure underpin the country's UK vitality and well-being. We have some of the most congested and problematic infrastructure in the developed world and much is in need of urgent upgrading or renewal. A 'make-do and patch-up' approach to infrastructure investment results in reduced quality and increased costs to business and the economy. Failure to properly plan and invest will have serious impacts upon the UK's long-term economic future and the quality of life for people living in the UK.
- In an increasingly globalised world, the ability of UK companies to compete will depend upon the quality of the nation's infrastructure. Our competitors are not standing still. They are investing in their infrastructure to gain economic advantage. We need a step-change in the quality of transport and communications infrastructure across the whole of the UK to connect businesses to labour markets, their customer base and to international gateways in the most efficient way.
- Infrastructure investment needs to be carefully targeted and sustained to underpin long-term economic growth and maintaining and refurbishing existing infrastructure is an important factor. The NIC should not focus entirely on the delivery of new projects but should ensure that existing infrastructure, such as flood defences and coastal protection, is fit for purpose. Infrastructure needs to be well-maintained over the long-term to maintain quality and efficiency, reduce asset and operational failures, reduce compensation claims and extend the life of assets. In the case of flood defences, it may be more appropriate to consider flood risk beyond the period of the assessment, as infrastructure developed up to 2050 will be expected to have a design life well beyond that date. The current planning horizon for flood and coastal management is 80-100 years and the NIA should work to this too.
- Investment needs to occur in a fast and predictable manner, and must maintain the backing of government, to give stability, certainty and confidence to businesses and private sector investors. Businesses will believe we are a world leader in infrastructure when they see real pace and delivery on the ground and therefore the Commission needs to deliver some quick wins.

- The NIA needs to have strong representation from business and industry. It should identify priorities within the new emerging economic geographies as well as within cities and between cities.

**2) Do you agree that in undertaking the NIA, the NIC should be:-**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward thinking, challenging established thinking**
- **Comprehensive, taking a whole-system approach, understanding interdependencies and feedbacks.**

**Are there any principles that should inform how the NIC produces the NIA that are missing?**

- While the above aims are fully supported, BCC believes the Commission should also influence infrastructure policy more generally and drive the integration of planning and funding cycles. There is a need to align and define national planning cycles, for example on road and rail infrastructure investment, in a way that enables local planning cycles to be aligned to create a coherent strategy. At present, this tends to happen in an ad-hoc way, and on a project-by-project basis. Multiple bodies are involved in planning for infrastructure investment and this can result in fragmented and misaligned funding cycles. The NIA needs to bring these together with common goals and standards.
- Business welcomes an open, transparent and consultative approach as this helps to build trust and business/investor confidence. It enables infrastructure providers to establish their investment plans and procure the necessary skills and resources to deliver them. The future growth plans of business, and their needs and priorities, need to be heard and included in any long-term plan. It is vital to identify and remove barriers, and mobilise public and private sector resources, to meet the UK's economic infrastructure needs.
- The independence of the NIC is paramount. The BCC called for the establishment of an independent Infrastructure Commission in its 2011 report *Tackling the Infrastructure Puzzle*. Infrastructure planning has too often been directed by political need rather than a true business need. One example is the delay in making a decision to increase aviation capacity in the South East. Businesses have been left dismayed at the way aviation strategy has become a political plaything. The Commission's work will be worthwhile only if it remains independent and is not undermined by political short-termism.

**3/4/5) Should the NIA cover these sectors in the way they are each described? Are there any particular aspects of infrastructure provision in these sectors that the NIA should focus on? Are there any areas where sector interdependencies are important?**

- 42. Transport: A multi-modal approach to the analysis of transport need is supported. Transport infrastructure and services are economic enablers, providing access to markets, employment and opportunities at home and abroad.
- Businesses need the NIA to provide a clear, strong, flexible and competitive vision and investment strategy. It needs to embrace the most up-to-date technologies available to increase capacity in our road, rail, ports and aviation infrastructure, both for passenger and freight users.

- A reliable and properly functioning roads network remains critical to a successful economy and a long-term strategy for maintenance and upgrading is required.
- The NIA also needs to facilitate the rebalancing of the economy, connecting regions to overseas markets, connecting cities in the North, and developing east-west transport connectivity.
- By maximising the potential of transport infrastructure, (for example rail, electrification of key routes, and coastal shipping, the NIA can balance the requirement for additional transport capacity in the economy with the need to reduce the impact of transport on the environment.
- Ports and airports, together with properly integrated surface access, are critical enablers of exports and economic growth. Investing in infrastructure connections to international gateways will demonstrate significant economic returns and value for money. The NIA needs to ensure that businesses are connected – with direct routes - to the existing and emerging overseas markets that are likely to drive future global growth.
- The changing nature of container shipping, and the increasing use of mega-ships, will reinforce the position of ports in the London Gateway, Felixstowe and Southampton as focal points for deep-sea container shipping. Port investment in the UK is private-sector led and the private sector has delivered capacity where it is needed and ahead of demand. The NIA needs to give confidence and certainty to such investors. Contributions from the private sector towards the cost of developing infrastructure connections to ports will only ever be minimal. If sought, any such contributions need to be applied consistently and in a way that does not distort competition or discourage development.
- 43. Digital and Communications: To remain internationally competitive, businesses need access to advanced digital communications, and so the BCC welcomes the NIC's emphasis on this sector. The NIA needs to plan for the needs of SMEs whose future growth will help to achieve long-term and sustainable economic growth across the whole of the UK. Currently, the superfast broadband speeds advertised to SMEs are not achievable and that there has been a lack of prioritisation of access for business parks and premises. The BCC has also called for the full roll-out of Fibre to Cabinet and for the USO to be much higher than the proposed 10 Mbps. To grow our economy, the NIA must set ambitious and realistic investment targets for the development and roll-out of 5G.
- 44. Energy: Businesses need access to a predictable, competitively priced, reliable and uninterrupted supply of energy. The NIA needs to plan for the generation and storage of energy, using all available sources and technologies, to meet the needs of growing businesses.
- The NIA must identify and plan for substantial investment to upgrade the UK's electricity infrastructure to enable businesses to make the transition to a low carbon economy and to meet the UK's heating and transportation needs.
- The BCC supports the development of low carbon solutions for business space and water heating, such as district heat networks, for which chambers across the country are ideally placed to facilitate.

- The need for long-term energy storage is critical for many businesses, particularly intensive energy users in the manufacturing and engineering sectors who rely on an uninterrupted supply of energy (especially gas) for their production processes. This is an area where the UK currently falls behind its international competitors. At times of energy shortage industrial users are particularly vulnerable, both in terms of the exposure to higher and more volatile energy costs, and to the damage that can be sustained if supplies suddenly cease. Successive Governments have concluded that the market will deliver the UK's gas security. However, with no significant new gas storage capacity constructed in recent years, supporting new and existing gas storage facilities should be a priority of the NIA. The NIA needs to underpin the long-term future of such firms in the UK.
- 45.-46 Water, drainage and flood defences: The NIA needs to factor in the likely impacts of climate change on the UK's water and flood defence infrastructure to ensure continuity of movement, trade and employment. However, it is also important that forecasts and impacts are realistic and proportionate. Over-inflated costs and inertia can result in much needed infrastructure upgrades becoming unaffordable.

**6/7) Cross -cutting Issues: Should the NIA concentrate on these cross-cutting issues? Are there any other cross cutting issues which are particularly important?**

- The NIA needs to devise and enforce consistent assessment criteria used to prioritise schemes across areas and infrastructure types, both for fundraising and consent.
- The reform of business rates raises the question of where the financial benefits of infrastructure investments are to be realised, especially for regulated 'networks' which currently sit on the national rating list. The NIA needs to advise as to which rating list network infrastructure will be allocated.
- 53. The BCC agrees that the NIA should consider the planning system and how this interacts with decision making to facilitate delivery. The planning system can significantly delay the progress of major infrastructure schemes as process, politics and accountability issues can often take priority. It has become a key driver of infrastructure cost.
- The UK is competing at a global level for private infrastructure finance and the NIA need to make the UK an attractive and competitive investment opportunity. To give certainty and confidence to businesses, private sector investors and financiers, it is vital that blockers in the planning system are identified and removed.
- To speed up the process we need an effective decision-making process at a national and pan-regional and local level. While further devolution is welcomed, greater clarity is needed over the respective responsibilities of government, local authorities and LEPs.
- Measures to curtail the length of time that projects can be delayed in judicial review are required. BCC is concerned that the planning system has lost the ability to 'weigh the balance' and that an increasing number of investment and development opportunities are being held back by objectors using localism, democracy and the judicial review process. It is vital that the voice of business is better heard within the planning system and that planning authorities have the necessary skills and resources to be effective. More guidance on the

subserviency of plans is needed to ensure that critical projects that can bring jobs, services and wealth are not stymied.

- To be effective, the NIA recommendations will need to result in planning consents that can be implemented speedily and economically.

**8) Do you agree with this methodological approach to determine the needs and priorities?**

68. The BCC agrees with the methodological approach for the developing the NIA as set out in the consultation document. Key to success will be the prioritisation of infrastructure investment that promotes and enables economic growth and UK job/wealth creation. It is essential that all results and conclusions are tested with businesses and private sector investors before making any judgement.

**10) Has the Commission identified the most important infrastructure drivers. Are there further areas to examine in each of these drivers?**

The BCC agrees with the 4 infrastructure drivers identified.

- Population and demography: it is important to maintain the correct balance of employment and residential land and infrastructure to minimise the need for mass commuting.
- Economic growth and productivity: The clustering of business sectors, combined with effective and affordable transport infrastructure to enable people to move quickly within a wide geographic are, can boost skills development, skills retention and productivity gains.
- Technology: The NIA needs to retain flexibility to respond to fast moving technological change. The NIC needs to engage fully with businesses in this sector.
- Climate Change: The long-term resilience of technology must be balanced with the need for affordability and pace of delivery.

**13) How can the Commission best engage with different parts of society to help build its evidence base and test its conclusions?**

- It is vital that the voice of business is heard in developing the NIA. The Commission should engage within the infrastructure industry and businesses who utilise and benefit from infrastructure in order to share research and information on the UK's needs and gain input into its analysis. Through the BCC network, the Commission can consult with tens of thousands of businesses across the UK. BCC is now identifying and prioritising key transport projects and other infrastructure investments that are critical for economic growth within cities and regions throughout the UK. We welcome the opportunity to work with you in developing the NIA.
- It is also vital that the benefits of infrastructure investment are properly communicated to, and understood by, the general public to minimise delay and cost inflation.

The BCC remain keen to engage further as this consultation progresses. If you require any further information, please contact [name redacted] in the first instance ([email address redacted] / [telephone number redacted]).



Email to: [NIAEvidence@nic.gsi.gov.uk](mailto:NIAEvidence@nic.gsi.gov.uk)

## The National Infrastructure Assessment Consultation

### Submission by the British Ports Association

This response is made on behalf of the British Ports Association which represents a diverse range of ports throughout England. Our response builds on some of the points we made to the consultation on the NIC which took place earlier this year.

Our responses to the questions raised are:-

*Q1. The Government has given the National Infrastructure Commission objectives to:*

- *foster long-term and sustainable economic growth across all regions of the UK*
- *improve the UK's international competitiveness*
- *improve the quality of life for those living in the UK What issues do you think are particularly important to consider as the Commission works to this objective?*

We agree with these objectives although we would say in relation to the second bullet point referring to the UK's competitiveness that in terms of road and rail infrastructure we do not see this so much as an issue of competing with other countries as drawing useful comparisons with them about the amount and kind of investment that creating the transport network require. For example, the record of motorway construction in the UK compares unfavourably since 2000 with construction in both France and Germany. We believe that indicators of this type comparing performance with countries with similar economies and demands, could be used beneficially by the NIC.

*Q2. Do you agree that, in undertaking the NIA, the Commission should be:*

- *Open, transparent and consultative*
- *Independent, objective and rigorous*
- *Forward looking, challenging established thinking*
- *Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?*

*Are there any principles that should inform the way that the Commission produces the NIA that are missing?*

We agree with these principles.

*Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?*

We agree with the approach set out in para 42.

*Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?*

Ports constitute a privately funded sector which nevertheless depend on publicly funded transport infrastructure. This is expanded on in our answer to Q5 below.

*Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?*

We believe that “interdependencies” are absolutely crucial where ports are concerned. Ports depend on the quality of their transport network connections, especially road connections. Road transport in and out of ports is still responsible for 85% of all goods. In terms of roads, the UK has a mature network. The trunk road network in particular, which is the responsibility of Highways England, has a healthy long term investment programme with funding set to double over the next 5 years. As regards those roads not on the strategic network, we are particularly concerned about the impact of reduced local authority funding. Local government funding has been cut year on year since 2010 and this trend looks as if it will continue. It is “last mile” issues which are important to us and the references in para 42 to the need to “support the movement of people and freight into and across the country” will require that the entire journey is supported by infrastructure which is of a consistent standard, whether it is a trunk road or a local road. We believe that NIC should also be very aware of the problems of resilience for both road and rail and the need to factor in extra provision to deal with often unpredictable situations, for example, the current closure of the rail link between Folkestone and Dover, Europe’s busiest passenger port, and the closure of the A591 in Cumbria earlier this year which cost £1m a day to local businesses. So we also have a strong interest in the NIC’s responsibilities in respect of flood defences and water and drainage, all of which could impact on transport.

*Q6. Do you agree that the NIA should focus on these cross-cutting issues?*

We agree with all these cross-cutting issues, particularly paras 51, 53 and 55. As regards para 53 (governance and decision making) we do look to the NIC to act as a focal point bearing in mind the fragmentation of responsibility for the funding and delivery of transport projects since the demise of RDAs. We are involved with LEPs where possible, but their resources are constrained and there is strong competition between LEPs for these resources. There is then the impact of the Northern Powerhouse as well as other initiatives such as Transport for the North, both of which appear very dependent on the completion of HS2. Although all these initiatives should have a positive outcome for transport and the economy in their regions, there is nevertheless potential for considerable overlap, conflicting objectives and wide distribution of limited resources unless there is a clear co-ordinating steer from the NIC.

*Q7. Are there any other cross-cutting issues that you think are particularly important?*

No.

*Q8. Do you agree with this methodological approach to determine the needs and priorities?*

Yes. We note and support in para 67 an undertaking to “speak to industry” about their projects and plans. We would of course be keen to speak to the NIC and we would support, for



example, the setting up of a freight specific transport forum which could cover all freight sectors and establish priorities for the movement of freight. We would certainly be interested at this early stage in discussing with the NIC how it will liaise with the freight transport sectors.

*Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?*

Ports will have their own forecasting models, but we are aware that the DfT has been working on a UK national port forecasting model and this could be an important part of the NIC's strategic approach.

*Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?*

We agree with the content of the boxed sections as far as it goes, particularly in accommodating growth. However, we would hope that the NIC's attention is also directed to the quality of existing infrastructure, and the consistency of that quality throughout an entire A to B journey.

*Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?*

We do not have views on the appropriate methodology, but clearly decisions on a portfolio of investments will have a profound influence on transport for the foreseeable future. As will have been seen from earlier comments, we are concerned about the quality of infrastructure covering the whole of a journey from or to a port. The Eddington study published in 2006 made the point that investment should not be directed necessarily on very large scale projects, but could be carried out on a more targeted basis, looking at congestion and pinch points. Whilst we appreciate that the NIC is tasked to take a strategic view, nevertheless we are concerned that this could result in further large scale schemes but which ignore the need for comprehensive investment in the network so that pinch points can be reduced.

*Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?*

No.

*Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?*

We do not have views on the wider engagement referred to in this question, but as you will have seen from our response to Q8, we are very interested in the ways in which NIC engages with the freight transport sector.

[name redacted]  
[job title redacted]

4 August 2016



**The National Infrastructure Assessment  
Process and Methodology consultation  
BT's response  
August 2016**

# National Infrastructure Assessment, Process and Methodology

## Background

BT welcomes the chance to comment on the National Infrastructure Assessment, Process and Methodology consultation.

We are broadly in agreement with the remit and scope of the National Infrastructure Commission, as well as the methodology and engagement of the National Infrastructure Assessment.

We are therefore responding generally to the consultation, as opposed to answering specific questions.

We are pleased to see that the consultation recognises the impact of digital communications across all sectors in delivering more efficient use of assets. It is particularly welcome that the NIA intends to recognise interdependencies across sectors; this demonstrates a joined-up strategy that recognises the cross-cutting role that 'digital' plays. We therefore agree that 'Digital and communications' is treated in the way it has been described.

## Digital and communications

With respect to the Digital and communications sector specifically, and how it affects other sectors, BT supports the development of a long-term (2025 – 2030) digital communications infrastructure strategy for the UK with the aim of ensuring that the UK builds on its strong digital foundations to continue to benefit from world-class communication networks, supporting further economic growth, other sectors and wider social benefits, ensuring the UK has the right infrastructure to meet the needs of users and ensure that the UK is competitive on a global scale.

Any infrastructure assessment should inform sound policy decisions supporting the following outcomes:

- growth in the communications sector and broader UK economy, boosting innovation and creativity, maintaining global competitiveness and ensuring the UK realises the benefits of a world class infrastructure
- facilitation and encouragement of efficient private sector investment in infrastructure
- evolution of a fair, consistent and equitable converged regulatory framework
- clarity in the role of Government, including coordination of policies, programmes and investment.

The following BT vision for a Digital Britain, 2025 – 2030, offers an overview of a desirable potential future UK infrastructure scenario, the necessary policy and regulatory steps to help achieve this, as well as the potential risks of alternative approaches, which any assessment of the current situation should consider.

BT envisages a future scenario for digital and communications infrastructure that is world-leading and achievable, where the UK extends its current strong position compared to key economies, realising outcomes in 2025-2030 as summarised below.

- There will be a pervasive need for connectivity driven by an explosion of personal smart devices, wearables, connected (and increasingly driverless) cars, smart homes, sensors, mobile payments and remote and mobile working.
- Underpinned by the Internet of Things (IoT), individuals, businesses and society will have automated and intelligent access, insight and control of their environment providing, time-saving, resource utilisation and cost-reduction across all sectors.

- Residential bandwidth demand and time online will have increased, driven by increased video and TV viewing on-line and the migration to ultra-high-definition. The range of demand will reflect the different compositions of households as well as different individual interests. It is difficult to predict accurately 2025 demand, particularly because a meaningful prediction must reflect a willingness of consumers to pay. That said we feel it is reasonable to expect that even low demand households will require a 10Mbps in 2025.
- The Broadband Stakeholder Group (BSG) recently estimated that for the median household download demand for 2023 would be roughly 19Mb/s, but believe that a figure of 35Mb/s (representative of the 99th percentile of BSG's analysis) is a more cautiously appropriate estimate for what could potentially be desired by most families. Upload demand is also expected to increase for some users owing to the increased adoption of home-based working/video conferencing, cloud-type services, etc.
- Overall, demand will remain highly asymmetric for most. We are confident that should actual user demand increase further than this prediction, it will be met by the fibre investments being made now and over the next decade. For example, recent trials of G.Fast technology highlight the still unrealised potential of copper access with speeds of 700Mb/s.
- The needs of business users, including SMEs, are expected to continue to increase. However, increasing business demand will be more clearly linked to business benefit and willingness to pay; demand will in turn be met by commercial investment in ever deeper fibre deployment.
- Significantly increased user expectation for ubiquitous, perpetual and resilient connectivity will be satisfied by effectively universal coverage, with appropriate funding where necessary, where speed of connection will no longer be an issue across 99% of UK premises and geography, delivered by a mix of fixed, Wi-Fi and 4G/5G wireless technologies. Investment will continue to be driven primarily by commercial investors across both fixed and mobile with strong and effective competition at the service layer.
- Converged and complementary network access layers in fixed, Wi-Fi and mobile, providing users with a seamless experience with devices automatically selecting the network, providing optimal cost/service combinations for voice and data. All of the integrated network should be accessible to service providers on equivalent terms to enable truly competitive offers to consumers in nationally consistent services.
- In fixed networks, the current "mixed economy" approach, driven primarily by fibre to the cabinet (FTTC) and G.Fast can extend superfast coverage to C99% of UK, and Ultrafast offering speeds that continue to exceed the needs of the vast majority. Where needed, users with extremely high demand will be served by commercial solutions (eg, G.Fast, fibre to the premises (FTTP), fibre on demand (FoD) or business connectivity/Ethernet services).
- However, delivering FTTC coverage to 99% of the UK will by no means herald the end of investment in fibre deployment and innovation in the UK. Ongoing investment will be made in our Ultrafast deployments with our stated aim to deliver Ultrafast services to some 12 million UK premises by 2020, using a mixture of FTTP and G.Fast, and to make this available to the majority by 2025, to meet growing commercial demand from consumers and business, to drive fibre deployment deeper into the network to support faster services. This investment will support the continued development and investment in new technologies such as G. Fast and increasing volumes of FTTP.

- Through efficient sharing of, and access to, mobile infrastructure underpinned by regulated wholesale access, national roaming and economically rational consolidation, mobile network coverage will cost-effectively blanket the whole geography of the UK. This will be supported by innovative architectures enabling greater spectrum efficiency combining Wi-Fi and 4G core and small cell technology.
- Large parts of the UK will continue to have a choice of fixed and mobile infrastructure providers. Where there is a single provider of infrastructure, service-level competition through wholesale access at fixed and mobile level irrespective of the provider will ensure that all consumers enjoy the benefits of service-level competition.
- An 'all-IP' world where voice and video are delivered over IP networks in place of DTT (complementary to satellite and cable distribution), providing a step-change in user experience through more personalised and immersive experience, greater choice, access to ultra-high resolution programming and enhanced services. As a result public service broadcasters (PSBs) are better able to reach and serve their audiences while better monetising them, thus ensuring a greater investment in world-class UK content. Mobile operators benefit through greater coverage at lower cost, and the release of spectrum.
- The UK will continue to stay at the forefront of major OECD nations in take-up, utilisation and economic exploitation of superfast services owing to universal coverage, robust market-based competition, 'all-IP' services and applications, enhanced QoS, and fundamental trust in online applications. Consumers will continue to benefit from world-leading competition, pricing and innovation and UK businesses will be better able to compete and win in increasingly global markets.

This vision of a truly digital Britain is achievable if the Government and regulators implement the right policy and regulatory actions, based on appropriate assessment of where we are now and what we will need in the future.

These actions should build on the positive current UK position, as a leading digital economy, enhancing existing approaches with sensible extensions of successful policy in fixed infrastructure to other sectors of the converging ICT landscape. It is critical that we avoid radical swings in the approach that has enabled the UK to be a leading digital economy today; misguided policy will deny the potential of further development and risk undermining the UK's current strong performance in fixed coverage, innovation, competition, take-up and pricing.

We consider that the following key policy features need to be recognised and addressed if the UK is to build on its current position. We have also identified not only long-term strategic issues but also short-term actions and recommendations that will enable the UK to achieve the scenario described.

### ***Key recommendations***

- Promotion of effective, consistent access regulation across all converging ICT sectors. To drive continued investment and innovation in fixed and mobile access infrastructure, policy should be aimed at:
  - aligning regulatory approaches including the competition and investment benefits of functional separation across the converged fixed, mobile and content service markets at UK and EU level

- focusing regulation on bottlenecks at the access level, and across all networks where the bottleneck occurs, irrespective of the owner of the bottleneck resource, be it content or connectivity
  - ensuring effective wholesale access is possible and consistent for many competing service suppliers (driving healthy market competition)
  - providing long-term regulatory certainty in these markets by, for example ensuring market review periods more closely match infrastructure investment return periods
  - avoiding depriving the sector of economic value (eg, through punitive charge controls and spectrum auctions) that is essential to make sufficient investments in infrastructure and service levels
  - promoting and expanding the benefits of open access networks currently available on the Openreach fixed network to other bottleneck areas. Such open access increases retail level competition bringing benefits of lower prices, greater take-up and more innovation. It is important that such open access principles should be embedded in new regulatory frameworks as they are developed and apply across all platforms and geographies.
- Support universal network coverage across UK:
    - ensure that returns to infrastructure are sufficient to support the necessary investment in fixed and mobile coverage commensurate with quality of service expectations. The solution will need to enable the most cost effective means of delivering universal superfast premise coverage to circa 99% of the UK.
  - Ensure BDUK phase II and III are implemented with adequate funding and a technology-neutral approach.
  - Address inconsistencies in state-aid which deny superfast infrastructure deployment in urban white spaces that suffer from the same issues as BDUK intervention areas.
  - Ensure near universal geographic coverage at lower, “base level” speeds to support out of home and IoT/M2M demands delivered by a mix of fixed, Wi-Fi and 4G/5G wireless technologies.
  - Enable effective withdrawal of redundant and inefficient products and regulation to promote cost saving and investment. A number of regulated products are reliant on elements of the traditional copper/PSTN access network, eg, Local Loop Unbundling, Wholesale line rental, etc. As customers migrate to application-based services over an IP network the viability of maintaining historic networks for regulated services will become increasingly difficult.
  - Develop initiatives for cyber-security, online crime-prevention, and online safety by working in partnership with ISPs from the outset and seek to find balance between natural tensions between privacy and security.
  - Ensure government policy promotes an online environment that enables children and vulnerable individuals to exploit the full potential of the internet with minimal risk.
  - Promote trust in the collection and use of customer data by government and service providers by ensuring that customers are able to control and manage their personal information for their benefit not the benefit of third parties, although this is not directly an

infrastructure issue, trust (or lack of trust) in the infrastructure and services on it could significantly impact the usage and investment case.

- Ensure use of international benchmarks and performance targets underpinning policy ambitions and investment are evidence-based and contextually relevant. Targets, benchmarks and performance data sets that track and compare UK performance with key competitors drive investment, policy and regulatory behaviour. It is therefore important that benchmarks are appropriate, relevant and fact-based, focused on relevant countries in an objectively comparable manner. For example, comparisons with comparatively small countries, and/or where most people live in apartments, or where one type of technology, eg, FTTP, is used as a comparison, do not effectively assess UK infrastructure.

### **Policy risks**

In addition to the positive actions outlined above there are areas where action may need to be taken to prevent obstacles to this scenario being achieved. In particular we would highlight:

- **Avoid distraction from “Gigabits for all” lobby**
  - resource and investment pursuing a “Gigabit access for all” approach, when there is no evidence to justify these speeds means that the very significant costs of appeasing such calls would be wasted. The “mixed economy” technology approach has been shown by research in the UK and elsewhere to offer significant economic and societal benefits, and deliver those benefits earlier than an FTTP-only approach.
  - Ensuring such a mixed economy delivery and enabling further commercial investment in driving fibre ever deeper into the access network as commercial demand materialises will ensure maximum benefits without wasted government investment. Government should therefore ensure that the mixed economy approach is fully enabled and not distracted.
- **Reject structural separation of access providers**
  - The current “functional separation” model approach of the UK fixed-access market through Openreach has delivered arguably the most competitive broadband market in the world, with hundreds of service providers operating across the UK delivering high quality low cost services to UK consumers and businesses.
  - Where the Openreach functional separation model does not operate or if it were to be discontinued we have or risk, the development of ‘islands’ of vertically integrated monopolies with a lack of varied ISP support that may lock customers in to a limited range of service providers and lead to higher prices and reduced innovation.
  - The integration of Openreach with BT Group, enabled by this approach has also led to massive investment in the wholesale fibre access network, currently in excess of £3Bn of BT Group commercial funds as well as a committed scale service provider.
- **Avoid diluting the standard of review for regulatory decision making, resist a move away from merits based appeals**
  - Given the economics of building, maintaining and improving broadband access networks across the UK some form of regulatory oversight is expected to continue over these timescales. It is therefore important that appropriate redress in the form of an effective merits-based appeals process against regulatory decision is maintained. Any weakening of the appeals basis increases risk of investment in these vital assets running counter to the governments wish to encourage investment.

- **Avoid discriminatory and regressive taxes increases that discourage investment and usage of general purpose technologies that improve overall UK competitiveness/productivity.**
  - Any taxes introduced at this time must take into consideration potential knock-on effects of higher retail charges and diversion of investment

***We would be happy to discuss these issues further. Further enquiries can be directed to [name redacted], [job title redacted], BT Group plc  
Tel: [telephone number redacted]/email: [email address redacted]***



## **NATIONAL INFRASTRUCTURE ASSESSMENT**

### **Response to the National Infrastructure Commission's consultation by the Campaign to Protect Rural England**

**August 2016**

#### **Introduction**

1. The Campaign to Protect Rural England (CPRE) welcomes this opportunity for early engagement with the National Infrastructure Commission ('the Commission') and its scoping of the National Infrastructure Assessment ('the Assessment'). CPRE fights for a better future for the English countryside. We work locally and nationally to protect, shape and enhance a beautiful, thriving countryside for everyone to value and enjoy.

2. As a charity with about 60,000 members, a branch in every county, over 200 district groups and more than 2,000 parish council members, we have long had an interest in infrastructure proposals, whether of local or national scales.

3. Transport and energy will clearly be two priority areas for the Commission. In our [2015 election manifesto](#), we called for 'the right infrastructure for the right reasons', stating that '[w]e need to make better use of existing transport and energy infrastructure and smarter decisions on new investment - to reduce demand rather than drive it.' To address challenges such as climate change and minimising land take for development, we recognise the importance of investing in new infrastructure, for example to deliver a major shift towards rail and electricity, away from private motor transport and fossil fuels.

4. This needs to be part of a transition - a restructuring of infrastructure systems and the way they work, rather than more of the same infrastructure we have now. In this context, we acknowledge the benefits of establishing the commission and its central task of producing a National Infrastructure Assessment. It will be important that it delivers innovative policies as much as innovative infrastructure.

#### **Consultation questions**

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

**What issues do you think are particularly important to consider as the Commission works to this objective?**

5. The first fundamental challenge is how to assess these objectives. Despite many years of trying, academic research still has no clear conclusions as to the ingredients of economic growth and competitiveness. The second and related challenge is how to make trade-offs, whether between the short and the long-term, incommensurable factors, such as soil quality and skills, or spatial allocation of costs and benefits of infrastructure. These choices involve political not simply technical factors.

6. A cross-cutting issue is mitigation and adaptation to climate change. There may be short-term savings from failing to do so - though the growth of clean tech might suggest otherwise - but the long-term costs would be devastating.

#### *Economic growth*

7. In relation to rebalancing economic growth, it is important to consider intra-regional differences not simply inter-regional ones. In terms of the north west, for example, Manchester performs relatively well compared to south east cities but its hinterland performs far less well than the rest of the south east. It will therefore be important to look beyond the so-called core cities<sup>1</sup> by adopting more detailed spatial scales than regions. In our evidence to the commission's study on northern connectivity, we highlighted the need to consider the potential conflicts and synergies between the needs of local and long-distance travel when considering transport infrastructure.

#### *International competitiveness*

8. It will be critical that a holistic and credible approach is taken to this factor. The ranking of the competitiveness of UK's road network by the World Economic Forum was based on the views of 93 high-ranking businessmen, for example. There is increasing evidence that environmental not simply economic factors are relevant to resilient long-term competitiveness<sup>2</sup>.

#### *Quality of life*

9. We are very pleased that quality of life has been added as an objective, having argued for this in an earlier consultation response. Impacts such as transport noise have a very serious impact for large sections of the population. While there is increasing consensus on how to monetise costs of some impacts like noise, for others like visual impact it remains very challenging, which raises issues about commensurability. We note that only UK residents are considered for this factor, perhaps as it could be argued that the quality of the visitor experience for foreign tourists, who spent £19 billion in England in 2015<sup>3</sup>, should be assessed within the context of international competitiveness. It should certainly be assessed as there is significant potential to increase tourism beyond London, which is currently the primary beneficiary, and this would have infrastructure requirements.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

10. These are a good set of principles but there is need for the Commission to be clear, one might say honest even, about the limits of its work and its capabilities. As noted above, there will be some clearly political choices inherent in the Assessment. The Commission will need in some instances to spell out choices rather than always attempt to make them. Even in relation to some infrastructure schemes the planning inspectorate is, such as the [examination into the Hinkley Point C Connection](#), setting out options for politicians to make decisions between.

11. The Commission can and should certainly consult widely to seek the best evidence. If public as well as political consensus are to be generated - and these can be separate as the Brexit referendum result demonstrated - a broader process of engagement will be required, however. We provide further suggestions relating to this in our answer to the final question.

12. We are very strongly supportive of adopting a whole systems approach to tackle silos. This has been lacking in the past and will become particularly important with technological changes. In light of the decision to include quality of life within the Commission's scope, greater clarity would

<sup>1</sup> IPPR North (2016). [City Systems: The role of small and medium-sized towns in growing the northern powerhouse](#).

<sup>2</sup> Haines-Young, R., Kretsch, C. and M. Potschin (2015). [Competitiveness](#). In: [Potschin, M. and K. Jax \(eds\): OpenNESS Ecosystem Services Reference Book](#).

<sup>3</sup> [Visit Britain](#) (2016)

be helpful regarding how holistic it will be: the description of comprehensiveness related to infrastructure systems, in other words suggesting that only interactions between them rather than wider interactions would be considered.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

13. While we welcome the emphasis suggested on smart power and efficiency in relation to energy, we are concerned a similar approach is not set out in this section in relation to transport. Relying on electrification of transport, rather than transport efficiency - reducing the need to travel, particularly by private motorised modes - will not tackle carbon or congestion issues.

14. In any event, adopting a simple multi-modal approach seems rather dated, considering the likely disruption from the opportunities that new technologies, such as Mobility as a Service (MaaS), will offer and how they may blur or blend existing modes. Just as the combination of big data and storage is key to considering energy demand, it offers great potential to revolutionise the efficiency of freight transport, whether through autonomous inland ports, urban consolidation hubs or parcel lockers.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

15. We would welcome more of a focus on restructuring infrastructure systems rather than infrastructure provision. We support the NIA considering all potential solutions, including challenging ones. Recent research<sup>4</sup> suggests that Capacity Enhancement infrastructure strategies are likely to perform less well in the long term than System Restructuring strategies.

16. In addition, the Assessment should seek out opportunities for combining infrastructure, whether multi-utility trenching at the local scale or combining grid upgrades with new rail routes.

17. Performance measurement in relation to environmental and quality of life issues is challenging. In relation to Highways England, a suite of performance metrics are being developed during the currency of the first Road Investment Strategy, which runs to 2020. These challenges are not unique to environmental impacts: there is still a lack of means to measure real world economic impact (e.g. GVA) of the performance of road schemes and the 2015 meta-Post Opening Project Evaluation of Highways England major schemes struggled to find anything more than anecdotal evidence.

18. While some aspects of green infrastructure are currently within scope of the Assessment in relation to flooding, it is valuable to consider the degree to which this could be extended. After all, the government has given great weight to the number of trees that will be planted as part of construction of High Speed 2. There are three potential strategies:

- maximum: green infrastructure is included in the Assessment in the same way that economic infrastructure is, in NIA, by assessing the need for reforestation, enhanced ecosystems and rewilding
- smart medium: the assessment not only minimises conflicts but supports synergies, promoting policies that maximise green infrastructure, such as requirements for Sustainable Urban Drainage Systems in new housing and industrial buildings to have solar or green roofs.
- minimum: simply ensuring recommendations do not conflict, such as by minimising overall land area needed for development and avoiding industrialisation of natural habitats. This could mean not recommending port or energy infrastructure in sensitive areas and considering cumulative impact on coast overall, for example<sup>5</sup>.

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<sup>4</sup> See Hall, Tran, Hickford and Nichols (2016). *The Future of National Infrastructure*

<sup>5</sup> See paragraph 2.2.4 in [Natural Capital Committee 3rd annual report](#)

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

19. We agree that electrification of heat and transport will be the most important.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

20. Yes but we disagree on binary approach to compatibility with Climate Change Act 2008. The 2050 target is for at least an 80% cut, in other words the target for 2050 could increase. The Assessment should treat the targets and carbon budgets set by the Act as an absolute minimum but it should also set out scenarios and means to comfortably exceed them, in case the targets need to be tightened. This is particularly important given recent evidence that the pace of climate change is quickening.

21. Financing and funding may reduce the need for infrastructure, making the system as a whole more affordable, rather than simply making additional infrastructure more affordable. This should be reflected in the way that issue is framed.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

22. Not at this stage.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

23. Yes as a starting point. But there also needs to be a backcasting approach, asking where do we want to be. If we are to address the Prime Minister's ambition to rebalance the economy, we may need to refocus infrastructure investment to where there are opportunities rather than simply constraints. The suggestion in paragraph 68 of the consultation that the methodology would simply assess 'how the identified demand for infrastructure can be met most cost-effectively' would confound this principle.

24. There is a fundamental challenge for the sub-national level, particularly where no or no established body such as the Greater London Assembly, that has already produced the *Infrastructure 2050* strategy for London.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

25. There has been significant research into models, the challenge is prioritisation, in particular securing public acceptance.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

26. As noted above, academic research relating to economic growth and productivity has no clear answers: spatial economics is, for example, still in its infancy. The Commission is unlikely to be able to make further progress given its time and resource constraints, so may need to be cautious.

27. Environmental limits are particularly important as they are constraints. Soil is an especially critical factor and it is one environmental area upon which there has not been the benefit of EU directives. A precautionary approach will be required.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

28. The use of scenarios is a good start and a good tool for wider engagement given the uncertainties inherent in the timescale. Network Rail and National Grid have both set out different future scenarios as part of their long term planning processes. But there should also be a role for backcasting. We have long-term objectives for cutting Greenhouse Gas Emissions but should set out more objectives, such as for rebalancing the economy, land use etc. and then work backwards from them. As noted in an earlier answer, political choices will need to be set out.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

29. Nothing to add beyond above points.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

30. Some suggest that a 'duty to consult', along the lines of that contained in the Planning Act 2008 for National Planning Statements (NPS), would be adequate. CPRE secured a record number of any objections to an NPS, regarding the road building ambitions in the National Networks NPS.

31. In law, consultation is simply an opportunity for public comment. In practice, consultation does little if anything to build consensus. Indeed it can help destroy it, such as in relation to major infrastructure projects where typically most consultees object then turn to disbelief when the majority view is overruled.

32. The recent referendum result shows the risk of politicians failing to secure consensus and the difficulty of experts engaging with values-based discourse. With social media helping drive greater retrenchment by aiding cognitive dissonance, the challenges are set to increase. There is much to learn from the French National Commission on Public Debate, which could much more effectively engage the public, business and civil society, on particularly controversial aspects, such as new transport and energy infrastructure, demand management etc.

CPRE

August 2016

3<sup>rd</sup> August 2016

## **The National Infrastructure Assessment: Process and Methodology**

Written Response from the Carbon Capture and Storage Association

### **Introduction**

The Carbon Capture and Storage Association (CCSA) welcomes the opportunity to respond to the National Infrastructure Commission consultation on the National Infrastructure Assessment. The National Infrastructure Assessment provides a critical and timely opportunity to consider the long-term infrastructure needs of the UK as it transitions to a low-carbon economy compatible with the Climate Change Act 2008 and the recent Paris Agreement to aspire to limit global temperature rises to well below 2 degrees.

As the Committee on Climate Change recently concluded in a letter to the Secretary of State for Energy and Climate Change, “CCS is of critical importance to meet the UK’s carbon targets at least cost”<sup>1</sup>. The Energy Technologies Institute (ETI) has shown that the cost of meeting our carbon emissions targets without CCS could more than double, i.e. an increase of around 1% of GDP<sup>2</sup>, equivalent to approximately £1,000 per household per annum by 2050. CCS is a highly flexible, widely-applicable process, which offers a means to retain our existing industrial activity, retain a role for fossil fuels in our energy system, ensure we take advantage of our natural resource in the North Sea and utilise our existing energy infrastructure effectively. Its ability to decarbonise such a wide array of sectors – including power, heating, transport, steel, cement, refining, chemicals, and others – using common CO<sub>2</sub> transport and storage infrastructure warrants a longer-term, strategic approach that the Commission is able to provide.

The CCSA’s response to this consultation focuses on the benefits of a whole-systems approach to infrastructure and seeks to highlight the interdependencies between sectors, which justifies intervention from the Commission on CO<sub>2</sub> transport and storage infrastructure. The response is structured around a sub-set of the questions put forward in the consultation document.

### **About the CCSA**

The CCSA brings together a wide range of specialist companies across the spectrum of CCS technology, as well as a variety of support services to the energy sector. The CCSA exists to represent the interests of its members in promoting the business of Carbon Capture and Storage (CCS) and to assist policy developments in the UK, EU and internationally towards a long-term regulatory framework for CCS as a means of abating carbon dioxide (CO<sub>2</sub>) emissions.

In developing this response, the CCSA has consulted with its members, a full list of which can be found online at: <http://www.ccsassociation.org/about-us/our-members/>

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<sup>1</sup> A strategic approach to CCS: Letter to the Rt. Hon Amber Rudd, MP from Lord Deben, Chairman of the Committee on Climate Change (July 2016)

<sup>2</sup> Carbon capture and storage - Building the UK carbon capture and storage sector by 2030 - Scenarios and actions (ETI, 2015)

For any further information about CCS or the CCSA, please contact;

[name redacted] – [job title redacted]

t. [phone number redacted]

e. [\[email address redacted\]](#)

## **Response to Consultation Questions**

### ***1. The Commission has given the National Infrastructure Commission objectives to foster long-term and sustainable economic growth across all regions of the UK, improve the UK's international competitiveness and improve the quality of life for those living in the UK. What issues do you think are particularly important to consider as the Commission works to this objective?***

#### **Key points:**

- *CCS offers cost-effective emissions reductions to multiple sectors, helping to sustain high skilled jobs and enabling synergies between power, industry and heating. Evidence shows that CCS could reduce domestic electricity bills by around £82 per household in 2030<sup>3</sup>.*
- *CCS is most effective when developed on a 'cluster' basis, unlocking low carbon regions in traditionally high-emitting parts of the UK such as Teesside, Yorkshire and Humber, Merseyside, Grangemouth and south Wales<sup>4</sup>.*
- *CCS is the only process capable of achieving large-scale emissions reductions from many energy intensive industries, including steel and cement<sup>5</sup>.*
- *Bulk Hydrogen production from natural gas with CCS offers a cost-effective way to fully decarbonise domestic gas use whilst utilising existing gas infrastructure<sup>6</sup>.*
- *Existing gas storage infrastructure, e.g. salt caverns, can be used to store Hydrogen produced using natural gas and CCS, adding significant flexibility to the low carbon energy system capable of managing inter-seasonal swing and meeting peak energy demand<sup>7</sup>.*

The CCSA supports the objective of the Commission and the inherent focus on sustainability that it implies. In working towards the objective, the Commission should consider the role of CCS to the future UK energy system, which evidence suggests could save the UK the equivalent of 1% of GDP annually by 2050<sup>8</sup>. Not only can CCS decarbonise flexible electricity generation from fossil fuels, it is also expected to play an important role in decarbonising energy intensive industrial activity – such as steel, cement, refining and chemicals production – and domestic heating and transport through bulk production of decarbonised hydrogen. Given the breadth of sectors that CCS can be applied to, the CCSA welcomes the whole economy approach being adopted by the Commission and the focus on identifying the interdependencies between different sectors.

The National Infrastructure Assessment presents a timely opportunity to reconsider the role of CCS in achieving the UK's legally-binding CO<sub>2</sub> emissions reduction targets. To date, UK

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<sup>3</sup> The economic benefits of CCS to the UK (CCSA and the TUC, 2014)

<sup>4</sup> Optimising the location of CCS in the UK (ETI, 2016)

<sup>5</sup> Industrial Decarbonisation and Energy Efficiency Roadmaps (DECC and BIS, 2015)

<sup>6</sup> Leeds City Gate: H21 (Northern Gas Networks, 2016)

<sup>7</sup> Hydrogen - The role of hydrogen storage in a clean responsive power system (ETI, 2015)

<sup>8</sup> Carbon capture and storage - Building the UK carbon capture and storage sector by 2030 - Scenarios and actions (ETI, 2015)

CCS policy has focused on trying to deliver commercial scale CCS projects in the power sector. The recent CCS Commercialisation Programme aimed to commercialise the UK CCS industry to the point that CCS projects in the power sector could compete against other forms of low carbon electricity generation by the mid-2020s. Not only did this approach present particular commercial challenges<sup>9</sup>, it also neglected to recognise the wider value of CCS infrastructure to sectors beyond electricity. The National Audit Office (NAO) recently confirmed, for example, that the potential benefits of CCS infrastructure to heating were not taken into account in the decision to withdraw funding for the CCS Commercialisation Programme in November 2015<sup>10</sup>.

Clustering of emitters and developing shared CO<sub>2</sub> transport and storage infrastructure can reduce costs<sup>11</sup>, improve value for money and deliver significant economic benefits to the UK economy<sup>12</sup>. In the previously cited ETI report<sup>13</sup> analysis showed that *“a relatively simple but integrated network of around 3000 km of pipeline and fewer than 20 key stores is capable of handling UK demand to 2050. The cost of the required offshore infrastructure is estimated to be less than £5 billion (for context, this compares to investment of over £12 billion this year in North Sea oil and gas)”*. For this reason, the CCSA is highly supportive of a strategic approach being taken to the development of CCS infrastructure and believes that such an approach can unlock regional decarbonisation in many of the UK’s most emitting regions, e.g. Teesside, Humber, Grangemouth, Merseyside, and also create international opportunities, e.g. through CO<sub>2</sub> infrastructure connection with countries such as Norway, the Netherlands and Germany.

The dual challenges of maintaining the benefits of natural gas in the energy system and ensuring that existing energy infrastructure is managed in a way so as to minimise the risk of investing in stranded assets add further weight to the need for the Commission to consider the importance of CCS infrastructure in the NIA. The UK Energy Research Centre (UKERC) has shown through analysis of various energy systems models that natural gas use in the UK would have to decline from 2025 onwards in the absence of CCS, with dramatic impacts on domestic consumers, including physical disruption as appliances and infrastructure are replaced and significant additional costs on energy bills<sup>14</sup>. Decarbonising natural gas use through the production of low carbon hydrogen (via a process known as Steam Methane Reforming, fitted with CO<sub>2</sub> capture) offers a major opportunity to retain the existing gas infrastructure and decarbonise domestic gas emissions by up to 100%. The Leeds City Gate H21 project has recently demonstrated the technical and economic viability of switching to hydrogen for domestic gas, incorporating the inherent flexibility in existing regional gas storage infrastructure from salt caverns and the existing downstream natural gas distribution network<sup>15</sup>. The flexibility offered by hydrogen and gas storage infrastructure is further explained by the ETI, which demonstrates how hydrogen is able to provide much-needed flexibility for both heat and power, helping to manage inter-seasonal swing in a way that battery technologies are unable to do<sup>16</sup>.

To date, decision making on CCS within Government has neglected the broader whole-system impacts of CCS on the economy and suffered from many of the short-comings identified in paragraph 22 of the consultation document: policy uncertainty, reversals and

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<sup>9</sup> Lessons Learned: Lessons and Evidence Derived from UK CCS Programmes, 2008-2015 (CCSA, 2016)

<sup>10</sup> Sustainability in the Spending Review: CCS Case Study (National Audit Office, 2016)

<sup>11</sup> Optimising the location of CCS in the UK (ETI, 2016)

<sup>12</sup> The economic benefits of CCS to the UK (CCSA and the TUC, 2014)

<sup>13</sup> Optimising the location of CCS in the UK (ETI, 2016)

<sup>14</sup> The future of natural gas in the UK (UKERC, 2016)

<sup>15</sup> Leeds City Gate: H21 (Northern Gas Networks, 2016)

<sup>16</sup> Hydrogen - The role of hydrogen storage in a clean responsive power system (ETI, 2015)



'silo thinking'. The CCSA believes the Commission, through the NIA, is well-suited to addressing these issues and challenging the established thinking on the merits and role of CCS infrastructure to the UK.

**2. Do you agree that, in undertaking the NIA, the Commission should be:**

- ***Open, transparent and consultative***
- ***Independent, objective and rigorous***
- ***Forward-looking, challenging established thinking***
- ***Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?***

The CCSA agrees with the characteristics identified by the Commission in question 2, in particular the need for a comprehensive, whole system approach based on a forward look to 2050.

As made clear in the response to question 1, the economy-wide benefits of CCS have been made clear by numerous independent organisations including the Committee on Climate Change and the ETI. Analysis at both a UK level and internationally demonstrates the significant cost savings and economic benefits that could accrue from commercial scale CCS deployment at both a regional and national level and yet, to date, the UK is yet to deliver a single large scale project.

In withdrawing funding for the CCS Commercialisation Programme in November 2015, the Government at the time cited the high costs of CCS projects, both in terms of the initial capital costs of the Competition (up to £1 billion was made available by the Government) and the potential CfD Strike Prices that the projects would have required – cited by the Government (without evidence) as being in the region of £170/MWh<sup>17</sup>. This analysis not only misrepresented the costs of the two Competition projects – as the Strike Price figure cited included the full costs of developing over-sized CO<sub>2</sub> transport and storage infrastructure – but it also failed to recognise the value of the resultant infrastructure that the two projects would have developed. Combined, the two Competition projects would have developed infrastructure capable of handling up to 24 million tonnes of CO<sub>2</sub> a year, 21 million tonnes more than the initial 3 million tonnes associated with the two Competition project power stations. This infrastructure alone could have led to considerable cost reductions for follow-on projects, with the White Rose project infrastructure potentially reducing the unit CO<sub>2</sub> transport and storage costs by as much as 60-80% for the second project using that infrastructure<sup>18</sup>.

Recent analysis by the National Audit Office has confirmed that in reaching its decision the Government failed to recognise the whole systems value of the CCS infrastructure that would have been developed by the Competition projects. The NAO found that DECC's Spending Review bid showed that the benefits of the Competition projects would not have been realised until the 2030s and that the impact of the projects on Carbon Budgets beyond 2030, e.g. in supporting decarbonisation of heating, were not considered<sup>19</sup>. Both of these discrepancies would have been recognised via a whole systems approach that focused on infrastructure needs for 2050.

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<sup>17</sup> Evidence given by Rt. Hon. David Cameron, MP, to the House of Commons Liaison Committee, January 2016

<sup>18</sup> Lessons Learned: Lessons and Evidence Derived from UK CCS Programmes, 2008-2015 (CCSA, 2016)

<sup>19</sup> Sustainability in the Spending Review: CCS Case Study (National Audit Office, 2016)

**3. Do you agree that the NIA should cover these sectors in the way in which they are described?**

The CCSA agrees with the Commission on the way in which sectors will be covered, with two notable exceptions;

1. With regards to transport; the Commission rightly identifies the interdependencies between future transport infrastructure and the electrification of vehicles, which would lead to a significant increase in demand for electricity. An alternative scenario however may see the mass deployment of Hydrogen fuel-cell vehicles or hydrogen mostly replacing diesel in internal combustion engines for vans, trucks and buses, or indeed, there may well be large-scale deployment of both. There are numerous advantages associated with Hydrogen vehicles, particularly from an infrastructure perspective. With bulk Hydrogen production through gasification of fossil fuels with CCS – which is highly-proven and widely-deployed technology – much of the existing transport refuelling infrastructure could remain in place, with petrol stations simply offering competitively-priced Hydrogen fuel for cars, buses and HGVs in addition to existing transport fuels. The CCSA would encourage the Commission to therefore also consider the interdependencies between transport, energy (Hydrogen for heating and peak power generation) and industry (with Hydrogen as a feedstock for energy intensive industries) that may occur as a result of the decarbonisation of transport via Hydrogen.
2. With regards to energy; the CCSA is concerned about the seemingly-abrupt cut off between the upstream and processing aspects of energy from the downstream supply market. Whilst the Oil and Gas Authority (OGA) will clearly have the primary role in considering upstream oil and gas infrastructure, there are numerous important synergies that exist between upstream and downstream energy infrastructure that risk being lost through such an explicit divide of responsibilities. The CCSA believes that both the OGA and NIC will have important roles to play in ensuring the cost-effective and strategic deployment of CCS infrastructure and, as such, believe that – at a minimum – the NIC should ensure that it is able to recognise, value and act on potential synergies between the upstream and downstream (a good example is the re-use of oil and gas infrastructure for transport and storage of CO<sub>2</sub>). Furthermore, the explicit exclusion of processing industries (e.g. refining) from the NIC remit yields concerns around the potential interdependencies that could be lost between energy, heavy industry and transport. CO<sub>2</sub> transport and storage infrastructure is sector-neutral and, as we have made clear, offers significant value to energy, industrial, heat and transport sectors. This includes refining, which currently has no large scale emissions reduction option other than CCS.

**4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

The CCSA believes that the Commission should pay particular attention to CCS infrastructure, i.e. CO<sub>2</sub> transportation and storage infrastructure, as a cross-cutting area important for a number of different sectors.

The Committee on Climate Change recently wrote to the Secretary of State for Energy and Climate Change, highlighting that CO<sub>2</sub> transport and storage infrastructure is essential for

decarbonising the UK economy at the least cost to consumers<sup>20</sup>. This infrastructure would sector-neutral, no-regrets infrastructure capable of reducing emissions from a wide variety of sectors including those identified by the Commission: transport and energy. Additionally, given the potential for clustering of emitters to reduce the costs and risks of CCS infrastructure development, CCS lends itself to support the Commission's wider objective to support sustainable economic growth at a regional level.

There are many reasons why the Commission should include a focus on CCS infrastructure within the NIA. Based on the evidence cited in response to previous questions in this consultation, CCS can;

- Decarbonise electricity generation from fossil fuels, enabling a firm and flexible source of low carbon electricity to support generation from intermittent renewables and less-flexible nuclear,
- Achieve negative emissions when applied to electricity generation from biomass, unlocking additional 'space' in carbon budgets for hard to abate sectors and emissions,
- Create substantial flexibility within the UK energy system through the production of low carbon Hydrogen, incorporating flexibility from existing gas storage and through the use of salt caverns to store hydrogen and manage inter-seasonal swing,
- Enable large-scale and cost-effective emissions reductions from a wide range of UK energy intensive industries, helping to sustain existing high-skilled jobs and encouraging inward investment as UK regions are able to present a low-carbon solution to companies looking to decarbonise, and
- Help maximise value from existing infrastructure in transport and heating sectors and reducing the risk of stranded assets.

In addition, the provision of CO<sub>2</sub> transport and storage infrastructure could, in-turn, help to unlock CO<sub>2</sub>-enhanced oil recovery (CO<sub>2</sub>-EOR) in the North Sea, potentially leading to additional 5,700 million stock tank barrels of oil being recovered from the UK Continental Shelf (UKCS)<sup>21</sup>. Although globally CO<sub>2</sub>-EOR is widely practised, in the UKCS uncertainty over the quantity and reliability of CO<sub>2</sub> is a major deterring factor for investment. The provision of CO<sub>2</sub> transport and storage infrastructure, and the CCS projects which use that infrastructure, would help to reduce uncertainty and encourage investment in EOR.

The benefits outlined above have, to date, been deemed insufficient in themselves to justify an initial outlay on early CCS projects and infrastructure. The CCSA believes that the NIA provides a much-needed opportunity for taking a wider, whole-economy approach to decarbonisation and, in doing so, the value of CCS to the UK energy system in the medium and longer term will become significantly more apparent.

***5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?***

There are major interdependencies between the electricity, heating, transport and industrial sectors that will benefit from a strategic approach being taken to UK CO<sub>2</sub> transport and storage infrastructure.

As demonstrated in our responses to other questions in this consultation, CCS can be applied to a variety of industries and processes, including power and energy intensive industries. But the value of CCS also goes beyond its direct application. In a letter written to

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<sup>20</sup> A strategic approach to CCS: Letter to the Rt. Hon Amber Rudd, MP from Lord Deben, Chairman of the Committee on Climate Change (July 2016)

<sup>21</sup> Enhanced Oil Recovery (EOR) Strategy (Oil and Gas Authority, 2016)

the Secretary of State for Energy and Climate Change about the implications of the Paris Agreement on UK carbon budgets, the Committee on Climate Change demonstrate that the absence of CCS would require extra emissions savings of at least 35 MtCO<sub>2</sub> in order to meet the 2050 target established in the Climate Change Act 2008. In the letter, the CCC says that “this is likely to require almost full decarbonisation of buildings and surface transport by the middle of the century” and that “a reduced role for CCS ... closes down a range of options that could compensate for this shortfall [in direct emissions reductions from CCS]”<sup>22</sup>. This is exactly the sort of interdependency that the CCSA believes the Commission will be well-placed to consider and respond to.

Another consideration for the Commission should be locational interdependencies. Recognising current initiatives to reform the Capacity Market and deliver new gas-fired power generation capacity, and given the previously identified benefits of clustering industrial and power emitters to develop shared CO<sub>2</sub> transport and storage infrastructure, the Commission should consider the case for co-locating any new fossil fuel power generation capacity in regions with existing or planned industrial emitters. Although this will ultimately be a decision not taken by the Commission, recommendations in the context of locational interdependency could help to enable Government to support lower cost low-carbon power and low-carbon industry in the future.

### ***13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?***

The CCSA agrees with the approach outlined by the Commission for engaging with different parts of society to help build its evidence base. In recognising interdependencies and accurately reflecting the value of infrastructure to multiple sectors it will be important to ensure that energy systems and economic models can be integrated by the Commission and feedbacks created between the two. At present, many energy policy decisions are based on models that fail to account for the wider economic impact of investments in different power sector technologies<sup>23</sup>.

In addition, given the multiple applications of CCS technology to different processes and industries – and given the significant interdependencies between direct application of CCS and implications for emissions reductions in other sectors (see response to question 5) – the CCSA believes that CCS warrants particular consideration by the Commission on an economy wide basis. Expert groups within sectors will be an important part of building the Commission’s evidence base, but there is no one sector capable of considering the full implications of CCS deployment on the economy; for this reason, the CCSA would encourage the Commission to establish an expert group specifically tasked with looking at the role of CCS.

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<sup>22</sup> Implications of the Paris Agreement for the fifth carbon budget: Letter from the Committee on Climate Change to the Rt. Hon. Amber Rudd, MP (28 January 2016)

<sup>23</sup> Presentation from Professor Karen Turner, Director of the Centre for Energy Policy, University of Strathclyde, to the CCSA Technical Working Group, July 2016

5<sup>th</sup> August 2016.

NIAEvidence@nic.gsi.gov.uk

**CBI Minerals Group consultation response: “The National Infrastructure Assessment – Process and Methodology”**

The CBI Minerals Group (CBIMG) represents the minerals extraction industry within the United Kingdom including all major non-energy minerals and coal. The Group represents 500 mineral extraction and related companies either directly through being members of the Group or indirectly through member trade associations.

The UK Minerals Industry typically produces about 350 million tonnes of minerals per annum, directly contributes over £10 billion a year to the economy, provides direct and indirect employment over 80,000 people and is essential to provide the raw materials on which many important industries depend. Minerals are the largest material flow in the Country.

Minerals are essential for sustainable economic growth, and sustainable development is only achievable by ensuring an adequate and steady supply of all minerals. Adequate supplies are crucial for meeting the Government’s growth agenda and in particular aims for investment in new infrastructure.

CBIMG members welcome the opportunity to comment on National Infrastructure Commission proposals.

Our response to the questions in the consultation document are as follows:

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK’s international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

A fact that is often overlooked in planning for economic growth and sustaining (and improving) the quality of life of those living in the UK, is that an adequate supply of minerals is essential to both. That is an acknowledged pillar of National policy (NPPF, Paragraph 142). Even though Paragraph 8 of the consultation document does not specifically mention minerals supply as an element of the Commission’s remit, new infrastructure, even if planned for, will be impossible to deliver without the necessary materials.



INVESTOR IN PEOPLE

[name redacted] [job title redacted]

DL: [telephone number redacted] E: [email address redacted]

Minerals extraction is a long term business and it is encouraging to see the Commission aiming to carry out this assessment on a long term basis. The 30-year time horizon is largely compatible with planning for minerals supply. We would point out that mineral planning authorities rarely plan for supply on such a long timescale and this can cause significant problems for the industry.

A shift in thinking is required in planning for major infrastructure projects and the work of the Commission may facilitate that. It should no longer be assumed that the need for construction materials will be met and certainly not in the most sustainable way, if those needs are not considered as an integral part of the long term infrastructure planning process.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

The CBIMG agrees with that approach.

Provided that minerals supply is included in the “whole system approach” and that the essential nature of minerals (see the answer to Question 1) is accepted, there are no principles that are missing from the proposal.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

No. As mentioned in our response to questions 1 and 2, the provision of minerals must be factored in to the Assessment. The provision of those materials itself requires adequate transport infrastructure to deliver them sustainably to their point of use. The movement of minerals represents the largest material flow in the economy.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

Yes. In considering the provision of minerals, the NIA must remember that those materials can only be provided from where they naturally occur. Mineral extraction operations are far less footloose than many types of infrastructure. The siting of infrastructure should not be allowed to sterilise mineral resources.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

Yes. The answers to questions 1 to 4 highlight the interdependencies that are relevant to minerals supply; the essential nature of minerals, the need of the minerals industry for adequate transport infrastructure and the needs of the construction industry for materials.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

Yes.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

Yes. The Commission should acquaint itself with the material demands of priority elements of new infrastructure; provision of generating capacity, both renewable and conventional, stands out as a prime example of infrastructure that will make heavy demands on minerals supply. Those needs will have to be met at the same time that existing infrastructure (notably roads) must be maintained using the same type of materials. The timing of projects may consequently be influenced by the ability of the industry to provide adequate production capacity.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

Yes – subject to any methodology issues that arise out of the previous answers.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

No

**Q10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?**

The four drivers identified in the consultation are certainly important.

However, the general attitude of local communities to the provision of certain types of infrastructure within there area cannot be overlooked. The final delivery may be determined by the local authority and that authority will be heavily influenced by local opinion.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

No

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

None other than those contained in the answers above.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

The established system for evidence gathering and testing proposals through the land use planning system is a model that could probably be adapted for this purpose.

**[signature redacted]**

**[name redacted]**

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CBI

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## **Introduction**

The methodology for carrying out the National Infrastructure Assessment is a crucial concern for anyone concerned with the achievement of sustainable development in the UK. We do not believe that the proposals set out in this consultation document fully take that on board.

Infrastructure development in this country has been subject (as the document states) to a “fragile and incomplete political consensus.” The achievement of such a consensus is largely dependent on the taking into account of environmental factors, which are often the basis for successful and/or widely supported objections to infrastructure development proposals.

The Centre for the Understanding of Sustainable Prosperity (CUSP) is an ESRC-funded research programme concerned with sustainability and its implications, at all levels, from individuals’ understandings of their own “prosperity” to global questions such as climate change and the implementation of the UN Global Goals for sustainable development (SDGs).

## **Responses to questions**

1. The Commission will need to consider ‘big picture’ global factors affecting the UK, such as climate change and food security, and not simply issues internal to the UK economy. In particular, it will need to explore fundamental questions for economic analysis and policymaking such as the challenges of “secular stagnation” and “limits to growth”, rather than assume that OBR and Treasury long-run forecasts for GDP are necessarily reliable.

The Commission should also be aware that quality of life, international competitiveness and economic growth are not synonymous. For example, there is a substantial body of research showing that economic growth is a poor indicator of quality of life, and may even undermine quality of life. Consequently the Commission will have to make decisions that trade these factors off against each other. Any methodology will need to be able to account for these trade-offs.

2. We fully endorse the idea of a “whole system approach, understanding and studying interdependencies and feedbacks”, which is the approach we adopt for our own research. The key question this raises is: what are the boundaries of “the whole system”? For infrastructure planning, this should include land and water availability, ecosystem services, and climate trends. Land, water, biodiversity and carbon should each be considered in terms of an “envelope”, rather than the fiscal envelope providing the only sense of limits to development. We suggest the Commission should explore whole-system frameworks for the analysis and operationalisation of sustainability, such as the Planetary Boundaries approach developed by the Stockholm Resilience Centre and other research institutes over the past decade.



Infrastructure planning also requires a full and robust consideration of societal concerns that are broader than purely fiscal or economic issues. Such issues are highly contested and value based, and are likely to be the biggest source of complexity and uncertainty in the planning process. As a result broad societal concerns are often the issues that are hardest to incorporate into formal analysis. Nevertheless they should be an essential component of any future infrastructure plan.

3. The Commission should avoid any methodology which automatically points to an emphasis on building new infrastructure when there are other possible responses to the trends being identified. Many of these focus on managing demand, for example through the use of economic instruments such as water metering or auctioning off a limited number of aircraft take-off and landing permits. We note that demand management is only mentioned once in the discussion of the sectors, and would stress that a broad range of demand-side strategies should be considered across all sectors.

In order to capture as many of the interdependencies between the sectors as possible the Commission should consider participatory methodologies. Different stakeholders have different experiences with each sector, leading to different perspectives. Exploring the sectors using diverse groups is likely to identify many more inter-linkages than a more highly focused and technocratic exercise.

4. This question of infrastructure versus other options may cause difficulties for the Commission, because if there is a focus on waste disposal infrastructure, for example, that may lead it to not properly considering waste minimisation as an alternative approach; or if there is a focus on building power stations, the aim of improving energy efficiency may be played down. The Commission will need to find ways, through its methodology, internal organisation, and stakeholder engagement, to ensure that all significant options are properly explored.
5. Infrastructure and housing are interdependent, and the Commission will need to take into account the widespread need for affordable housing, as distinct from luxury developments and housing as a form of investment for overseas buyers. The relative importance given to different varieties of housing will help to shape the pattern of infrastructure. The assessment methodology should be sensitive to this.
6. The issue of “evaluation and appraisal methodology” should include a consideration of the way in which discount rates generally imply a relatively short-term time horizon for considering costs and benefits, rather than the 30-year horizon envisaged by the Commission.

It is unclear how the objective of improving quality of life is captured in this outline of cross cutting issues.

7. In the way that “governance and decision-making” is described here, there is too little emphasis on the rights, needs, and opinions of local people, and the roles and responsibilities of local planning authorities, with an implication that the Commission will be acting to increase the powers of central government. This question should be considered carefully and explicitly, particularly if consensus is to be sought.
8. The approach outlined by the Commission appears to underplay the socio-economic nature of the infrastructure system. Socio-economic systems are value driven and often highly contested. Consequently modelling efforts should represent multiple perspectives, preferably through participatory scenario development. Ideally this would take place with a wider range of stakeholders and at an earlier stage than is outlined in this consultation document. This would ensure that a broad range of values and system understandings are captured at the start rather than the end of the modelling process.

We agree with the Commission that models are necessarily partial representations of reality. Alternative models make different assumptions and often emphasise different elements of complex systems. Therefore, using and contrasting multiple models often generates useful insights and allows for more robust exploration than a single model.

The central role of “drivers” in the approach outlined here implies that an assessment of the “need” for infrastructure can be derived from information about likely future trends. However, these trends are often the result of responses to existing infrastructure provision, relative prices, etc, at the level of individual firms and households. It would be mistaken simply to aggregate these responses and then derive total “need” for infrastructure from them. That would lead essentially to infrastructure development simply fuelling the continuation of existing trends. Relying on trend analysis alone risks missing the opportunity presented by the Commission’s assessment process to step back and consider whether these trends are really what society wants and whether they are distributionally just or environmentally sustainable. This is a basic challenge for the Commission if it is to avoid a simplistic “predict and provide” approach.

9. It will be important for the Commission not place too much reliance on existing methodology within the civil engineering sector, because (as we have argued here) it will need to take into account a much wider range of considerations. For example, it will be essential to include infrastructure-climate feedbacks in any model used. Likewise, the methodology must consider a range of worldviews and alternative system understandings. On this point we should note that orthodox economic forecasting has generally proved unreliable, and therefore a pluralistic approach to economic modelling is especially important. This should encompass a wide range of heterodox (e.g. post-Keynesian) models.
10. The appropriate methodology is one which does not simply forecast trends and then propose infrastructure development to fit in with them, but one which helps to enable society to choose which direction it wants to take. As we have set out above, it would be useful for the Commission to run participatory workshops in which different scenarios are considered for the economic, environmental, and infrastructural future of the UK.

11. See answers to questions 8 & 12.

12. Some very important factors are missing here. These include:

(1) Environmental issues such as air pollution, nature conservation, and biodiversity.

(2) The question of competing uses for the same piece of land: infrastructure development is usually an option which needs to be considered in comparison to other options for land use (e.g. housing, agriculture, green space).

(3) The distributional impact of different options for infrastructure on the incomes, life chances, and quality of life of different sections of the population.

13. The range of organisations consulted should include ones which reflect the aspects referred to in our answer to questions 7 & 12 (i.e. local democracy, environment, land use, and distributional impacts).

## National Infrastructure Assessment consultation

Response by [name redacted], [job title redacted], Centre for Transport Studies, University College London, [email address redacted]

This submission mainly addresses evaluation and appraisal methodologies for transport investment (Q6).

### Benefits of investment

The case for any kind of investment depends on identifying the nature of the benefits, and who gains from them. The standard approach to transport appraisal used by the Department for Transport (DfT) is problematic in this respect. The main benefit is supposed to be the saving of travel time, beneficial because it permits more productive work or more valued leisure. However, average travel time has not changed during the past 40 years as measured by the National Travel Survey, despite many £ billions of investment in transport infrastructure. This shows unambiguously that time savings are short run, not long run, and therefore not appropriate as the basis for appraisal of long-lived infrastructure.

The long run benefits of investment in transport infrastructure are seen as increased access to land that permits development, as exemplified by London's Docklands where public investment in new rail routes has stimulated substantial commercial and residential development, to meet the needs of London's growing economy and population. However, this enhancement of real estate values is not included in standard appraisal, for instance of Crossrail, since it would be regarded as double counting economic benefits already included as time savings. So observable market values reflecting increased economic worth are rejected in favour of notional time savings (and notional agglomeration benefits) – notional because inferred from models, not observed.

The theoretical link between time savings to users and the enhanced economic activity resulting from development is very tenuous. Moreover, the standard approach to appraisal lacks any spatial dimension, and hence is silent on the spatial distribution of benefits, for instance of HS2.

Another distributive deficiency of the standard approach is the failure to address who benefits from investment in the Strategic Road Network. Congestion arises in or near populated areas, where local commuters add to long distance traffic. The available evidence is consistent with the proposition that the benefit from adding capacity in the form of another lane or improved junction accrues to local users who to advantage of the initially reduced congestion to travel further to

have more choice of homes or employment, with long distance users no better off as the resulting additional traffic restores congestion to what it was at the outset – hence the maxim that we can't build our way out of congestion, which we know from experience to be generally true.

What is needed is an approach to transport investment appraisal that recognises the nature and distribution of the long run benefits, which take the form of land use change and real estate value enhancement. Appraisal of investments should not therefore take place in a transport silo. Transport authorities should work with developers and planners to identify the development of commercial and residential property that the transport investment would make possible. To inform decision making, the sub-discipline of spatial economics needs to be further developed to illuminate the distribution of benefits, complementing the welfare economics framework of the standard approach.

### Reliability

Beyond time savings, a further benefit of transport investment can be better reliability through the reduction of road traffic congestion. However, the standard approach to appraisal places little weight on this aspect. Reliability can be improved and the consequences of lack of reliability mitigated through investments in digital technologies. For instance, provision of predictive journey time information to road users mitigates the uncertainty of arrival time under congested conditions, and encourages those whose start time is flexible to avoid peak period, thus reducing congestion for those who are less flexible.

Digital technologies are a lot less costly than traditional civil engineering technologies. It is important that they be fully exploited, hence the need to have good values for reliability in investment appraisal, as well as an understanding of the user response to information.

### Demand

The magnitude of benefits from transport investments depends on the expected growth of demand for travel. There have been some important changes in demand as we have moved from the twentieth to the twenty first century. Per capita surface travel has ceased to grow in Britain, and per capita car use has ceased to grow in the developed economies generally – the phenomenon known as 'peak car'. Car use in London peaked in about 1990 at 50% of all trips, and is now on a downward trend, currently at 36%.

Population growth is now the main driver of the growth of travel demand, but the pattern of demand depends on where the additional inhabitants are housed: if on greenfield sites, then road investment to support car use would be needed, whereas if in existing urban areas where road construction is not feasible, then investment in public transport would be required. London exemplifies a city with a growing population housed at higher density within existing boundaries, for which rail investment is crucial for future success. London also exemplifies

how a city can thrive economically, culturally and socially both despite and because of declining car use.

Planning investment in transport infrastructure therefore requires projections of population growth, both magnitude and location, the latter dependent on land use planning decisions. London has suitable governance for this purpose – the statutory London Plan - and other city regions will follow suite. However, there is no mechanism for planning the location of population growth for England as a whole. The Commission would need to take a view on likely outcomes.

DfT's National Transport Model, as judged by its most recent published outputs, fails to recognise the changes in magnitude and pattern of demand for travel outlined above. For instance, the model projects big increases in car traffic in London, despite the evidence that such traffic has declined over the past twenty years, with no expectation of policies that would promote its growth.

The Commission has indicated an intention to rely predominantly on existing models. I recommend that the Commission should commission an independent evaluation of the National Transport Model before placing reliance upon it.

## Conclusions

There are serious deficiencies in the appraisal and demand modelling methodologies current in use by DfT, which lead to mistaken investment decisions, in particular:

- too little investment in urban rail, because the benefits from development are not recognised;
- too much investment in inter-urban roads, in the vain hope of reducing congestion;
- too little investment in digital technologies that would allow more effective use of existing infrastructure.

The arguments outlined above are treated more fully in my new book, to be published in 1 September: 'Travel Fast or Smart: a Manifesto for an Intelligent Transport Policy' <http://londonpublishingpartnership.co.uk/perspectives-series/> Copies are available from the author.

2 August 2016

<name redacted>

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**From:** <name redacted> <e-mail address redacted>  
**Sent:** 03 August 2016 08:32  
**To:** NIA Evidence  
**Subject:** National Infrastructure Assessment: Process and Methodology

**Categories:** Green category

Dear NIA,

We, at the University of Exeter's Centre for Water Systems, welcome the consultation on the National Infrastructure Assessment: Process and Methodology. In our view, the approach is comprehensive in its consideration of risk, resilience, sustainability, interdependencies, feedbacks, funding & financing, governance and performance measures. Consequently, we do not have specific answers to the 13 questions, but would like to signpost the work of our Centre, particularly on critical infrastructure reliability, resilience and sustainability undertaken by the ongoing 'Safe and SuRe' project, which is the subject of Professor David Butler's EPSRC Established Career Fellowship (2013-2018). All of the outputs from the project are available (and will continue to be) through the project website: [safeandsure.info](http://safeandsure.info)

To access the member's area downloads, the following simple login details can be used: <log-in details deleted>

The Safe and SuRe project's research into reliability, resilience and sustainability, which includes methodological approaches to measuring critical infrastructure performance, would be relevant to NIA consultation areas including items: 4, 26 & 32. Vision and priorities & Objectives; 25. Long-term planning; 45. Water and Drainage; 46. Flood defences; 53. Governance and decision making; 54. Evaluation and appraisal methodology; 55. Performance measures; 58. Scenarios; 64. Understanding the infrastructure baseline; 66/71. Modelling and analysis.

We will endeavour to respond to the Call for Evidence due from the Commission in the autumn of 2016 and <name redacted> is approachable for participation in the proposed Expert Roundtables or a Panel of Experts (e.g. Engineering and Science). If you would like further information, the Safe and SuRe team can answer enquires, clarify queries or translate the research for specific users. Please contact either <name redacted>

<e-mail address redacted> direct or our information request email: [safeandsure@emps.exeter.ac.uk](mailto:safeandsure@emps.exeter.ac.uk)

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Urban Water Journal: <http://www.tandfonline.com/loi/nurw>

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**<name redacted>**

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**From:** <name redacted> <e-mail address redacted>  
**Sent:** 04 August 2016 14:10  
**To:** NIA Evidence  
**Cc:** <name redacted>  
**Subject:** Consultation on National Infrastructure Assessment: Process and Methodology

Dear NIA,

We, at the University of Exeter's Centre for Water Systems, welcome the consultation on the National Infrastructure Assessment: Process and Methodology.

In our view, the approach is comprehensive in its consideration of risk, resilience, sustainability, interdependencies, feedbacks, funding & financing, governance and performance measures. Consequently, we do not have specific answers to the 13 questions. However, we would like to signpost the work of our Centre, particularly on critical infrastructure reliability, resilience and sustainability undertaken by the ongoing 'Safe and SuRe' project, which is the subject of Professor David Butler's EPSRC Established Career Fellowship (2013-2018). All of the outputs from the project are available (and will continue to be) through the project website: [safeandsure.info](http://safeandsure.info)

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Best regards,  
<name redacted>

<name redacted>

**<signature redacted>**

**<job title redacted>**

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## National Infrastructure Assessment: consultation

### Response from the Centre on Innovation and Energy Demand, University of Sussex

#### Introduction

Researchers at the Centre on Innovation and Energy Demand (CIED) are driven by an interest in prospects for a more sustainable energy future. Our primary focus is on the processes of innovation – both technological and social – that will contribute to this objective, using a range of multi-disciplinary social science approaches.

We welcome the opportunity to contribute to the National Infrastructure Commission's consultation on the process and methodology for the National Infrastructure Assessment. We hope that the following insights from recent CIED research will provide a useful input to the process.

We would be delighted to contribute further to the NIC's ongoing engagement work in developing its National Infrastructure Assessment.

Contributors: [names redacted]

#### Response to consultation questions

**Q2. Do you agree that, in undertaking the NIA, the Commission should be [...] comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

We fully agree with taking a whole systems approach to energy, as only then is it possible to assess possible interactions between the provision of electricity, heat and transport services into consideration. As your consultation document rightly notes, this is especially important if electricity is going to play a larger role in delivering mobility and heat services in the future. However, we also believe that despite the obvious focus of the NIC on infrastructure delivery, a whole systems approach should also take a number of other factors into consideration, including the demand side, behavioural aspects, policy and regulatory issues. It is the interplay of these factors together with infrastructures that will make up the whole energy system.

Energy-related decisions are structured by the systems that provide energy services such as heating, comfort, convenience, and personal mobility. These "socio-technical" systems involve interlinked social and technical elements that co-evolve over many decades. It is important to understand how these systems function, how they can change and how these changes can be directed and accelerated by public policy.<sup>1</sup>

It is our view that larger and more rapid improvements in demand reduction will be required in the next decade if we are to achieve our legally binding carbon targets. Instead of focusing on physical infrastructure alone, we believe that framing the challenge in a different way – as requiring more

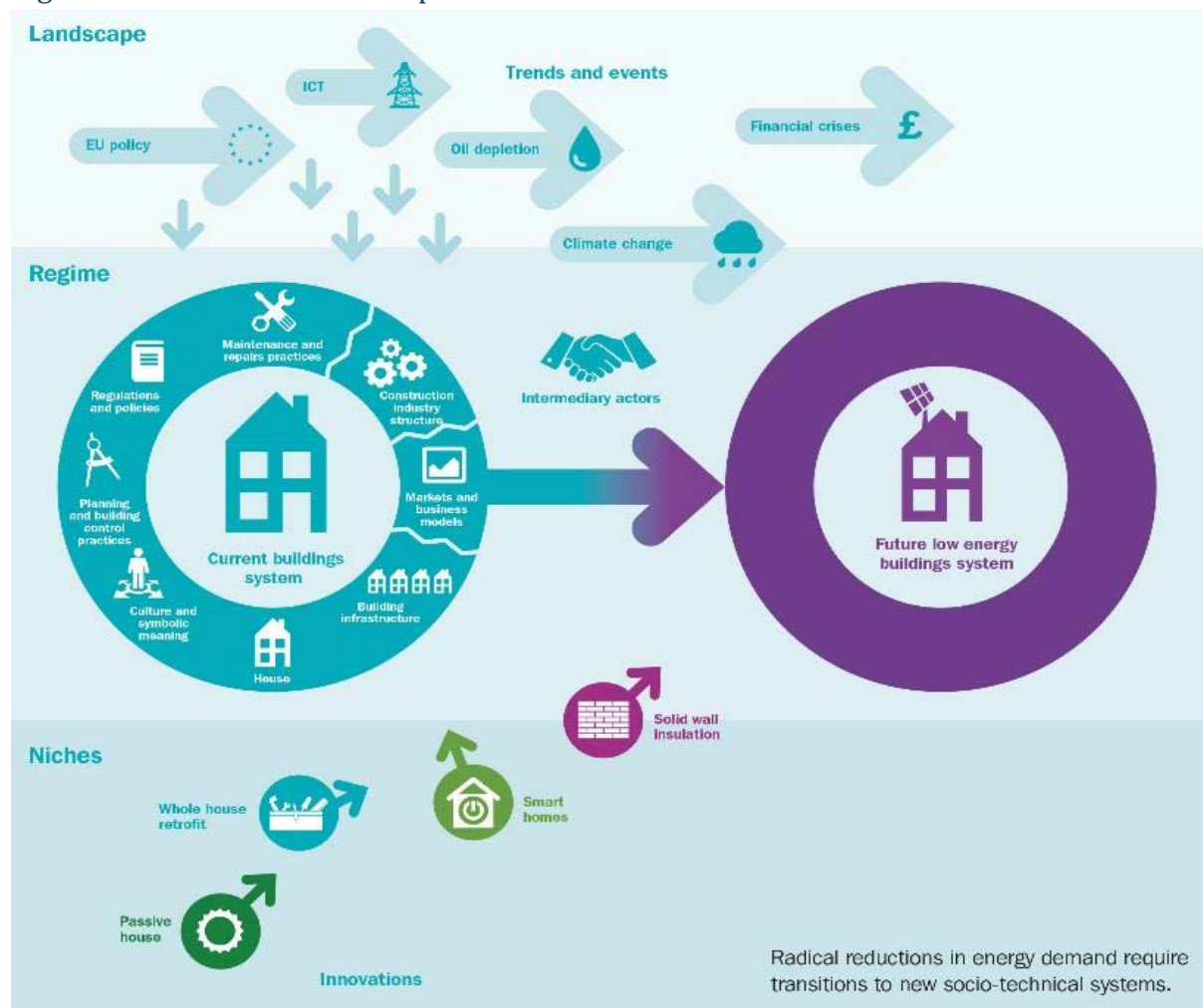
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<sup>1</sup> Sorrell S (2015) [Reducing energy demand: A review of issues, challenges and approaches](#) Renewable and Sustainable Energy Reviews, 47. 74-82

far-reaching changes across different scales and nested hierarchies, from users and households to city planners, politicians, and “system builders” - will bring more success in delivering significant levels of demand reduction.

The “Multi Level Perspective” (developed by Prof Frank Geels and Johan Schot) provides an analytical tool for understanding socio-technical systems. Radical change occurs as a result of interactions between three levels: the existing system (the “regime”), the “niches” in which radical innovations are being developed and protected in some way from the dominant system and the external socio-economic “landscape” that is imposing pressures on the system. This is illustrated in Figure 1.

Figure 1: The Multi Level Perspective



**Q3 Do you agree that the NIA should cover these sectors in the way in which they are each described?**

**Transport:** We agree that it is important to consider the impact of future transport provision on the energy sector, in particular the potential implications of large-scale car, lorry and rail electrification.

**Energy:** We support the NIA’s proposal to examine the interaction between electricity, heat and transport. We also believe that it will be crucial for the NIA to consider the role that energy

efficiency and demand reduction could play as well as intermittent renewable sources of energy and storage.

It is absolutely clear that reducing energy demand and increasing energy efficiency are some of the cheapest ways of achieving carbon mitigation. There is a wealth of evidence pointing to a variety of co-benefits that energy efficiency investments can bring, including energy security.<sup>2</sup> The Government's recent adoption of the 5<sup>th</sup> carbon budget underlines the importance of achieving demand reduction in order to meet our climate change obligations.

We note that there are different ways that reduction in demand might come about:

1. improving the efficiency of existing energy-using devices (boilers, internal combustion engines, refrigerators etc) and passive systems such as cars and houses (e.g. aerodynamic streamlining, loft and cavity wall insulation)
2. replacing existing devices or passive systems with radically new ones (e.g. electric vehicles, LED lights, heat pumps)
3. modifying behaviour to reduce energy use (e.g. turning off radiators in unused rooms, turning off lights when not in use etc)
4. shifting towards lower-energy behavioural practices (e.g. from car to bicycle)
5. reducing demand for particular energy services (e.g. reducing indoor temperatures, delaying the start of heating, giving up foreign holidays)
6. developing entirely new socio-technical systems that use less energy (e.g. intermodal transport systems, compact cities)

While all six options imply some level of technological and behavioural change there are marked differences in the balance between them. Specifically, options 1 and 2 mainly entail technological change; options 3-5 mainly entail behavioural change; and option 6 entails far-reaching and interlinked changes in both.

We suggest that the NIC should consider all of these routes in its assessment.

**Q5 The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?**

As described in our response to Q3, the interdependencies between energy, transport and heat are likely to be particularly important in delivering a vision that is compatible with achieving our long-term carbon targets.

**Q8 Do you agree with this methodological approach to determine the needs and priorities?**

We agree with the NIC's proposed use of scenarios to explore different plausible futures. Economic growth and population growth are not necessarily good determinants of increasing energy demand (even if technological advances are taken into account) and have in fact consistently overestimated the need for more generation capacity in the UK.

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<sup>2</sup> For example, see IEA (2014). Capturing the Multiple Benefits of Energy Efficiency. Paris, IEA/OECD Publishing

**Q10 Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?**

In addition to the list of drivers identified in the consultation document, we believe that end users should also be considered as an important driver. User environments (such as user practices, behavioural routines, beliefs and skills) and wider societal factors (such as cultural discourses, norms and social acceptance) will also affect the extent to which new technologies are adopted. We believe that insights from social science should play a key role in the development of future scenarios.

As well as considering the drivers for change, we believe it would also be useful for the NIC to consider barriers to change. This includes existing infrastructure, incumbent industries and industry structures, skills and capabilities and the habits and aspirations of consumers.<sup>3</sup>

## About the Centre on Innovation and Energy Demand

The [Centre on Innovation and Energy Demand](#) (CIED) is a collaboration between researchers from the Sussex Energy Group at the Science Policy Research Unit (SPRU), University of Sussex; the Transport Studies Unit (TSU) at the University of Oxford; and the Sustainable Consumption Institute (SCI) at the University of Manchester and is one of six Research Centres on [End Use Energy Demand](#) funded by the Research Councils UK (RCUK) Energy Programme.

CIED sits at the forefront of research on the transition to a low carbon economy. We investigate new technologies and new ways of doing things that have the potential to transform the way we use energy and achieve substantial reductions in energy demand.

Our approach moves beyond an exclusive focus on technology and energy supply. We understand that low-energy innovation does not happen in an “empty” world, but within the context of existing systems that may create barriers and active resistance. Our research explores how innovations are adopted by people and organisations, how they become more widespread within societies and how this process is shaped by market forces, government policy, social interactions and cultural norms. The innovations CIED examines include new technologies, new energy systems, novel business models and behaviours and combinations of all of these. We use this knowledge to develop practical policy recommendations.

Our research is:

**Interdisciplinary** drawing on ideas from economics, history, innovation studies, sociology and urban geography.

**Multi-method** including qualitative and quantitative techniques ranging from historical and contemporary case studies, surveys, modelling and econometric analysis.

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<sup>3</sup> Kivimaa P and Kern F (2015) '[Creative Destruction or Mere Niche Creation? Innovation Policy Mixes for Sustainability Transitions](#)' SPRU Working Paper Series (SWPS), 2015-02: 1-28. ISSN 2057-6668

**Practical and relevant** because we investigate low-energy innovations relevant to transport, industry, households and non-domestic buildings, and work with stakeholders to better understand their adoption of low-energy innovations.

**August 2016**

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**National Infrastructure Assessment: Process and Methodology consultation**

Centrica response

July 2016

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## Executive Summary

Delivering new, affordable, low carbon infrastructure investment is a major challenge across a number of sectors in the economy. The energy sector is responsible for delivering a significant proportion of this new investment, and to date good progress has been made.

The independent Committee on Climate Change (CCC) sets national carbon targets which are managed through a carbon budgeting process. While the UK has met its targets to date, it is widely anticipated that the latter part of the Fourth carbon budget period and the following Fifth Carbon Budget will be particularly challenging to achieve. Much of this challenge relates to the approach that will need to be taken to decarbonise heat and transport infrastructure.

There is currently a lack of a coherent strategy for decarbonising these sectors. Previous assumptions made by the CCC regarding electrification appear expensive and challenging to deliver in the timeframes remaining. Centrica believes the National Infrastructure Committee (NIC) should give particular focus to these sectors and consider how the existing gas distribution infrastructure can be better used to deliver lower cost decarbonisation.

The referendum decision to exit the European Union also needs to be considered in the context of the UK's security of supply and the potential impacts on investment in generation infrastructure. Current arrangements, including the European Internal Energy Market (IEM), are important for the trading of fossil fuels (gas, coal) and the effective operation of interconnectors. Centrica believes the UK should prioritise remaining part of the IEM given the implications for energy security.

Finally, we note that while the NIC has an important role to play in providing cross-sectoral strategic advice, it should not seek to set prescriptive targets for investment in particular sectors. The NIC's key role should be to ensure the energy market is able to function competitively to deliver the low carbon infrastructure the UK needs.

*We have responded to those questions which are of most relevance to Centrica.*

**Question 1 – The Government has given the National Infrastructure Commission objectives to:**

- **Foster long term and sustainable economic growth across all regions of the UK**
- **Improve the UK’s international competitiveness**
- **Improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works on this objective?**

We support the objectives given to the NIC. In terms of energy, a well-functioning energy sector is an important foundation for ensuring industry can operate efficiently and maintain international competitiveness. At a domestic level, affordable, reliable energy is essential to maintaining living standards, through allowing people to heat their homes affordably.

In addition to the objectives set out, we believe the NIC should have a focus on ensuring well-functioning markets are the primary vehicle for delivery. A well-functioning market requires long term clarity (vision) and continuity of policies and objectives.

Recent decisions by Government to revise funding levels under various policies (including the Renewable Heat Incentive and Feed in Tariffs) have concerned some investors and driven uncertainty in the market. The ability to take a longer term strategic view of the market, as well as providing transparency regarding Government expenditure (for example through regularly publishing spending levels under the Levy Control Framework) would help improve investor confidence. We believe the NIC should help make this case.

**Question 2 – Do you agree that in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative?**
- **Independent, objective and rigorous?**
- **Forward looking, challenging established thinking?**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks**

We agree with the broad principles set out for the Commission’s approach. We note that in the case of energy, the Commission should be mindful of the long term planning undertaken by the CCC and the carbon budget setting process. This should not however, prevent the

NIC from challenging some of the assumptions underpinning the CCC's long term analysis. In particular (as evidenced further in our response to questions 4 and 5), we note some of the long term assumptions underpinning the CCC's analysis of the electrification of the heat and transport sectors could be challenged.

Separately, we also believe that the NIC should avoid introducing additional targets for the energy sector. The sector already has a number of interim targets for decarbonisation, including sector specific targets for renewable heat, power and transport.

**Question 3 – Do you agree that the NIA should cover these sections in the way in which they are described?**

We welcome the commitment from the NIC to 'cover the energy system as a whole', as this ensures the explicit recognition of the interdependencies. The energy sector itself is undergoing a major change, with the rise of distributed generation and in-home digital technology fundamentally changing the traditional relationship between generators, suppliers and consumers. This changing market dynamic is set to continue and develop further, with the implication that care needs to be taken when framing analysis in terms of a static whole system approach.

Any long term thinking that the NIC undertakes in respect of the energy sector should therefore take account of the disruptive market forces currently at play and the potential for the market to significantly change in terms of structure and operation.

**Question 4 – Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

**Question 5 – The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

*Joint response to questions 4 and 5:*

We strongly support the NIC's proposed cross-sectoral approach, recognising that interdependencies typically exist between different infrastructure classes, and that strategic thought is required to analyse the extent to which interdependencies determine investment and public policy.

In terms of energy and the UK's long term decarbonisation target, we note there should be a particular focus on the interdependencies across the heat and transport sectors. We also believe, as set out in our previous responses to the NIC, that consideration needs to be given to the UK's security of supply, especially in the new context of Brexit. Both of these issues are addressed in more detail below:

### **Heat and Transport**

Heat and transport remain priority sectors for decarbonisation and the UK is unlikely to meet its interim 2020 targets in either sector.<sup>1</sup>

Much commentary to date has focused on the need to electrify the heat and transport sectors to achieve decarbonisation. We believe electrification of both sectors (especially heat) is a sub-optimal decarbonisation path, representing significant additional costs for energy customers and tax payers than could otherwise be the case.

Today, 81% of total demand for heat is provided by gas networks and only ~10% of domestic properties use electric heating.<sup>2</sup> If heat were to be electrified a further 24-46 GW<sup>3</sup> of additional generating peak capacity would be required.

Figures 1 and 2 below, taken from research published by Imperial College in April<sup>4</sup> this year, reflect the fundamental challenges associated with electrifying heat, namely:

- Peak gas demand is between 5 and 6 times the current peak in the electricity system.
- Peak gas demand for heat is 5 times higher than if it were spread evenly over the days and seasons.
- The carbon intensity of heat (i.e. gas) is significantly lower than that of the grid.
- Power is currently ~3 times more expensive than gas on a £/MWh basis.

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<sup>1</sup> National Grid, *Future Energy Scenarios*, 2016

<sup>2</sup> Carbon Connect, *Pathways for Heat: Low Carbon Heat for Buildings*, November 2014

<sup>3</sup> *Ibid.*

<sup>4</sup> Imperial college *Managing Heat System Decarbonisation*, April 2016

Figure 1: GB actual half hour electricity demand in 2010 (source: Imperial College)

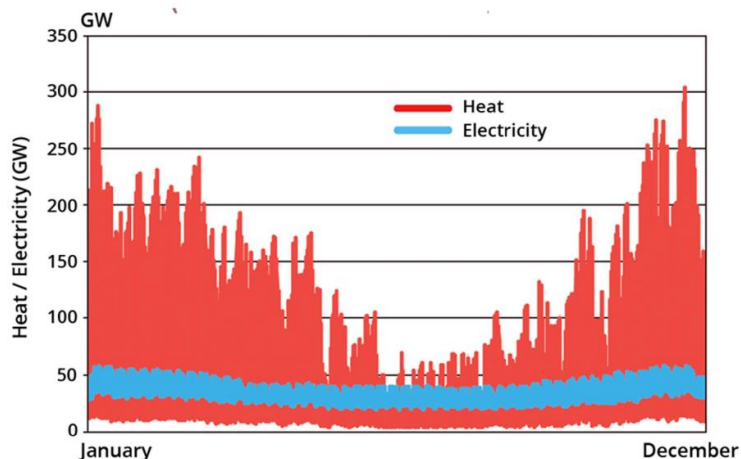


Figure 2: Comparative Statistics of the Gas and Electricity System (Source: Imperial College)

	Gas (for heat)	Electricity
Annual energy delivered (TWh) <sup>42</sup>	675	350
Peak demand (GW) <sup>43</sup>	300	60
Storage duration (h) <sup>44</sup>	900	9
Storable energy (GWh)	50,000 <sup>45</sup>	27 <sup>46</sup>
Storage cost (£/MWh)*	30 <sup>47</sup>	>60,000 <sup>48</sup> 120,000 – 1,400,000 <sup>49</sup>
Retail energy cost (£/MWh) <sup>50</sup>	48	154
Heat carbon intensity (gCO <sub>2</sub> /kWh) <sup>51</sup>	185	375


Based on the main characteristics of the UK’s heating needs, Centrica believes that any cost effective solution to heat decarbonisation should focus (at least in part) on optimising the existing gas network, which has undergone extensive upgrade work in recent years, while also recognising the role other innovative technologies have to play in particular market segments (i.e. gas absorption heat pumps and combined heat and power technologies for those buildings that can support them).

Analysis published by KPMG<sup>5</sup> last month considered the relative costs of gas network optimisation (increased use of green gases such as biomethane and hydrogen) compared to competing scenarios based on varying levels of electrification. Each scenario was designed to ensure that GB’s 2050 80% decarbonisation target was met.

The incremental costs associated with each scenario are summarised below, and demonstrate that an “electric future” is around three times more expensive than an “evolution of gas approach.”

<sup>5</sup> KPMG, 2050 Energy Scenarios – UK Gas Networks Role in a 2050 Energy System

Figure 3: Relative costs of decarbonisation scenarios (Source: KPMG)

	 Evolution of Gas	 Prosumer	 Diversified energy	 Electric Future
Practical obstacles	Low/Medium	Very high	Medium/High	High
Incremental cost	£104-122bn	£251-289bn	£156-188bn	£274-318bn
Incremental cost per consumer up to 2050	£4,500-5,000	£11,000-12,500	£6,800-8,000	£12,000-14,000

There are significant conclusions emerging from KPMG’s analysis, and we have highlighted three below which we believe merit further consideration:

- The most cost effective path, “evolution of gas” involves better use of the existing gas network through the introduction of green gases such as hydrogen and greater use of hydrogen in the transport sector.
- The European interim 2020 targets for heat and transport are unlikely to be met and planning should be put in place instead to support the lowest cost glide path to 2050.
- Further effort could be made to develop the UK’s shale reserves given the significance of gas to a low cost energy future.

We note specifically the strong interdependence between the transport and heat sectors as borne out in KPMG’s analysis, i.e. for costs to be managed most effectively, transport decarbonisation (the use of hydrogen fuel cells) will need to take place alongside heat decarbonisation to optimise whole system costs.

We believe these are all considerations which would merit further attention from the NIC, in particular given its unique role in being able to look across Government departments (i.e. DCLG, BEIS, and HM Treasury which have a focus on these issues), regulators and wider market participants (National Grid, Distribution Networks Operators – DNOs).

### **Security of Supply and Brexit**

We believe it remains in the best interests of the UK to seek to retain access to the Internal Energy Market (IEM) and maintain cross border trade in energy including through interconnection. Following the result of the European referendum, it is important for the NIC to be aware of the strategic value of the UK’s ongoing participation in the single energy market.

The UK, like Centrica, is inextricably part of the European energy market. In 2014<sup>6</sup> the UK imported 46% of its energy demand, including 86% of coal needs and 45% of gas (most of the latter coming from other EU/EEA countries).<sup>7</sup>

In the near term, we do not foresee any significant challenges to security of supply arising directly from Brexit. However we believe it would be prudent for the both the National Infrastructure Commission and the UK Government to review the arrangements that are currently in place, maintain a supportive framework for cross-border trade in energy and consider what additional long term infrastructure is required to maintain security of supply in the future, including the further development of shale domestically.

There are also some specific issues relating to Ireland. Ireland is heavily interconnected with GB in both power and gas. A new all-island energy market design is being implemented (to improve integration with GB as per the EU's Target Model).<sup>8</sup>

A move away from the Target Model by GB would reduce the benefits of the new market design in Ireland.

#### **Question 6 – Do you agree that the NIA should focus on these cross cutting issues?**

One of the cross cutting issues referenced for the NIA relates to the “current institutional frameworks for planning” which we believe is an important area of focus.

Given our view that gas will continue to play an important long-term role in both the heat sector and power sector, we believe it is right further strategic thinking is given to developing the UK's indigenous shale gas reserves. As the UK North Sea Basin matures, it is right that the UK explores the potential to develop its large indigenous shale gas reserves. There is an estimated 1,300 Trillion Cubic Feet (TCF) of gas in-place in the Bowland Basin alone (UK annual consumption is 3TCF). Centrica is a joint venture partner with Cuadrilla in a shale exploration project in the Bowland Basin, and we believe the NIC could consider what more should be done to support the efficient and effective processes necessary for determining planning applications. The NIC should also assess whether the UK has the right infrastructure and supply chain in place to capture the employment, skills and investment opportunities UK shale gas could generate.

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<sup>6</sup> DECC, *UK Energy Sector Indicators*, October 2015

<sup>7</sup> *Ibid.*

<sup>8</sup> The target model involves the European Commission, regulators, system operators working together to develop the policy framework and operation details of a more integrated set of energy market arrangements.

**Question 9 – Do you have examples of successful models which are particularly good at looking at long-term complex strategic prioritisation in uncertain environments?**

In relation to energy we would flag the following reports and associated models which are all publicly available:

- KPMG's *2050 Energy Scenarios – UK Gas Networks Role in a 2050 Energy System*,
- DECC's 2050 calculator tool.
- The Committee for Climate Change's Fourth and Fifth Carbon Budgets.
- National Grid's 2016 *Future Energy Scenarios* report and accompanying analysis.
- Centrica's *Energy Choices* report.

**Question 11 – The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

We believe the NIC should be cautious in prescribing investment levels for particular asset classes or technologies.

In recent years, policy and regulatory intervention has been a key feature of the UK's energy market as successive Governments have sought to tackle climate change. A key policy response was the introduction of the Energy Market Reform (EMR) policy framework. The EMR package is designed to provide financial support for qualifying low carbon generation technologies and is progressively moving from an administrative process to a technology neutral, market based auction process.

We support this progression to a market based system as it avoids "picking winners" and allows the market to continue to innovate and deliver cost discipline. As the NIC's *Smart Power* report made clear, the energy market is currently experiencing a period of transformation as technology is enabling distributed energy models and consumer control to revolutionise the way we invest in and consume energy. Care needs to be taken to ensure that market continues to develop effectively.





## **Chartered Institution of Highways & Transportation response to the National Infrastructure Assessment consultation – 5 August 2016**

[name redacted], [job title redacted], Chartered Institution of Highways and Transportation (CIHT), Tel: [phone number redacted], Email: [email address redacted].

The Chartered Institution of Highways & Transportation (CIHT) is a membership organisation representing over 13,000 people who work in the highways and transportation sector. CIHT members plan, design, build, operate and maintain best-in-class transport systems and infrastructure, whilst respecting the imperatives of improving safety, ensuring economic competitiveness and minimising environmental impact.

CIHT welcomes the opportunity to respond to the National Infrastructure Commission call for evidence on the National Infrastructure Assessment. CIHT has supported the National Infrastructure Commission's role in advising the Government on the identification of the UK's long-term infrastructure needs and the establishment in legislation of its remit and duties.

### **CIHT call for National Transport Strategy**

CIHT have consistently called for a National Transport Strategy, including in its published Manifesto<sup>1</sup>. The benefits of a national strategy - one that sets out a long-term framework over a sustained period (with a 20-30 year time horizon) – are clear when it comes to determining infrastructure priorities in the context of the national economy. The establishment of the NIC and development of a National Infrastructure Assessment will help take this forward. CIHT's response will have a focus on transportation.

#### **Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

#### **What issues do you think are particularly important to consider as the Commission works to this objective?**

There will be a range of drivers, with three broad elements: economic growth (and in particular the conditions in the global economy), population growth and climate change.

#### **Sector needs certainty**

Certainty, and continuity of investment over a sustained period is important if overall improvements to the transport network are to be delivered effectively and efficiently. This need for certainty applies to the Government, "client" bodies and the wider supply chain of organisations working in the sector.

The fact that the Commission will develop its advice within the framework of affordability scenarios provided by the Treasury is welcome. However, it is essential that the assumptions and context within which those scenarios are developed is published by the Treasury before the Commission invites comments on its proposals.

The Treasury must also make it clear how the work of the Commission will be subsequently reflected in Government decisions relating to investment priorities. It must also show how it

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<sup>1</sup> [CIHT Making the Journey – A Manifesto for Transport](#)



will be taken into account as part of established regulatory frameworks that are used to determine future levels of investment by public and private sectors. It is essential that any assessment of infrastructure needs must look to balance investment across all networks and regions so as to maximise the efficiency of both public and private investment.

Certainty of investment over a sustained period will allow progress to be made in terms of developing a truly co-ordinated transport system, one that's networks are more resilient to disruptions – both planned and unplanned. Examples such as the recent flooding in parts of Cumbria, Lancashire and Yorkshire and the temporary closure of the Forth Bridge has only served to highlight the importance of the UK's networks.

The NAO report 'Delivering major projects in government: a briefing for the Committee of Public Accounts'<sup>2</sup> – states that a third of major government projects due to deliver in the next five years are rated as in doubt or unachievable unless action is taken to improve delivery. This further highlights the need for certainty.

### **Skills and workforce shortages**

The National Infrastructure Assessment requires an increased focus around the delivery of jobs and to address the skills shortage. This includes an understanding of who is responsible for tackling the shortage and how we are going to fill the jobs that will be required to deliver the proposed infrastructure. The development of skills is a key area of concern and one that should be carefully considered when considering delivery of national needs. The recruitment, development and retention of the next generation is vital to deliver these ambitious plans. In a recent survey of CIHT's Corporate Partners, 96% of respondents anticipated having a skills shortage in the next few years.<sup>3</sup>

The NIC has the ability to establish the certainty that would help industry invest in skills and secure the pipeline of skilled engineers and professionals for the future. CIHT welcomes the Department for Transport Skills strategy<sup>4</sup>.

CIHT has recently launched a suite of career materials and guidance as part of a programme to help the industry deal with the range of technical skills shortages. This includes a diversity and inclusion toolkit which provides practical guidance on data gathering, attracting and retaining a more diverse workforce and on changing culture and behaviour. It is the first toolkit of its kind for the highways and transportation sector and provides a route map to success through diversity and inclusion.

The National Infrastructure Plan for Skills<sup>5</sup>, published by Infrastructure UK, sets out concerns in major sectors like roads, rail and energy. The report found that through growth in infrastructure investment, there would be a demand for over 250,000 construction and over 150,000 engineering workers by 2020, with a shortfall of nearly 100,000 additional workers by the end of the decade. Programmes like HS2 and increased investment in roads will put further stress on the industry's capacity to deliver, the report found. It noted that demand is forecast to outstrip supply over the next five years in all English regions.

The NIC has the ability to establish the certainty that would help industry invest in skills and secure the pipeline of skilled engineers and professionals for the future. It is now crucial that the government works with industry very quickly to ensure the skills, capacity (e.g. timetabling

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<sup>2</sup> <https://www.nao.org.uk/report/delivering-major-projects-in-government-a-briefing-for-the-committee-of-public-accounts/>

<sup>3</sup> [Routes to Diversity & Inclusion, CIHT 2015](#)

<sup>4</sup> [Department for Transport Skills Strategy 2016](#)

<sup>5</sup> [The National Infrastructure Plan for Skills 2015](#)



of scheduled works to enable the necessary skilled professionals to be available) and capability to deliver these infrastructure projects are available.

### **Construction materials and equipment**

Recent investment in infrastructure such as the £15bn allocated to Highways England for the strategic road network, HS2 and other large programmes of work such as Crossrail, will impact on the availability of materials, plant and equipment in the sector. A 2010 study by BIS estimated that 64% of building materials were imported from the EU. With Brexit, importers may now face duties or limits on quantities, which could lead to further shortages of construction materials or an increase in costs.<sup>6</sup> Clarity is essential to provide the certainty required by the supply chain side of the sector, enabling them to invest in resource and capability to deliver the investment envisaged.

### **Resilience – invest to save, mitigating against disruption**

Review the resilience of the UK's infrastructure and move the consideration of resilience from event-driven reviews (Quarmby Review in 2010<sup>7</sup> and the further review on the causes of vulnerability in 2014) to regular review and planning by asset owners themselves, as a fundamental part of maintaining an integrated transport network. CIHT has previously recommended a formal review and commitment for asset and infrastructure resilience assessment to be made a statutory requirement in its response to the Transport Resilience Review<sup>8</sup> in 2014.

### **Security – the Commission needs to ensure that a security-minded approach is embedded across all Infrastructure Delivery**

The National Needs Assessment should ensure that security issues are fully considered. The NIC should focus on the security aspects of infrastructure provision in terms of physical and cyber security. This is important when it comes to the potential security implications of moves towards open data and BIM models. It is recommended that PAS 119-5 2015 is strongly championed by the NIC to ensure such thinking is embedded within the infrastructure community.

### **A wide view of how infrastructure supports other policy agendas: housing, health and education**

Take account of other key policy areas such as planning, housing, health and education and how these policy areas work together to deliver the national needs. CIHT believes that NIA should include a maintenance programme for local networks. Local networks are fundamental to the economic, social and environmental wellbeing of communities. It helps to shape the character and quality of the local areas that it serves and makes an important contribution to wider local authority priorities, including regeneration, social inclusion, community safety, education and health.

### **Spatial strategy and attention to planning**

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<sup>6</sup> What does Brexit mean for construction?

<sup>7</sup><http://webarchive.nationalarchives.gov.uk/20111014014059/http://transportwinterresilience.independent.gov.uk/>

<sup>8</sup> <http://www.ciht.org.uk/en/document-summary/index.cfm/docid/FE7FEF4E-E237-45F7-8C526F39F890E407>



CIHT believes that an infrastructure strategy (including digital infrastructure), linked to a high-level spatial strategy is essential when carrying out a National Infrastructure Assessment. There needs to be an integrated approach from Government (national, sub-national and local) and its agencies. This should extend beyond the electoral cycle to produce a long-term spatial strategy that links the future transport needs of the country.

CIHT's response to the National Planning Policy Framework<sup>9</sup> highlighted the importance of effectively integrating planning and transport to ensure that the objective of delivering sustainable growth is realised. There is a need for changes to the National Planning Policy Framework in order to facilitate better/improved and timely delivery.

Questions such as how future housing requirements will be met must be clear in spatial terms. The NIC should recognise the challenges provided by the operation of the current housing market: the majority of housing availability sits within the current housing stock and locational choices are a trade-off between affordability and travel costs. This gives support to an argument that a light touch spatial strategy is important (for example the devolved administrations have been preparing light touch spatial strategies)<sup>10</sup>.

The NIC should also consider when addressing the National Infrastructure Assessment which existing corridors demand investment (particularly regarding public transport, including bus provision with walking and cycling).

### **The environment**

The commission's remit on sustainability and environment is inadequate as currently stated. The NIC needs to be more than reactive to climate change and recognise that infrastructure and everything that comes with it, is one of the drivers of climate change, and therefore we should be pro-active as well as reactive. Under the current remit it might conclude that the transport systems connecting to a coal fired power station should be resistant to flooding, without questioning having a power station that uses this type of fuel in the first place. Its role is meant to be a long term, evolving assessment. Large infrastructure projects / schemes usually have ramifications for the natural environment and as a result CIHT would like the commission to ensure that the programme works to agreed carbon targets.

### **Recognising the opportunities and challenges thrown up by devolution both nationally and regionally**

There is an opportunity to build on the emergence of sub-national groupings to encourage a more strategic focus to decision making. The emergence of statutory Sub-national Transport Bodies offers new opportunities to feed in local 'strategic' views into a national 'strategic' view. The National Infrastructure Assessment should take advantage of this by working closely with sub-national partnership bodies enabling an integrated/co-ordinated approach to infrastructure planning to meet local 'strategic needs'.

Other points include:

- Devolved governments in both Scotland and Wales have already demonstrated a more joined up approach in developing transport strategy. There is an opportunity to learn from their approach.

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<sup>9</sup> [CIHT response to the National Planning Policy Framework](#)

<sup>10</sup> [CIHT response to the Transport Select Committee call for Evidence on Local Decision Making on Transport Expenditure.](#)

- London provides an example of how a Mayoral approach, with executive powers, can deliver positive change in terms of transport. The 1999 Greater London Act transferred responsibility for multi-year budgets to the London Mayor<sup>11</sup> - which has allowed for long term planning (for schemes such as Crossrail) and for focus on local networks that help improve health and wellbeing through the support given to walking and cycling.
- The devolution deals currently underway present great opportunities for a greater response to local needs but the number of transport authorities across the UK does present challenges in terms of consistency of approach, ineffective use of resources and differing governance standards.
- The move to devolution of greater agglomeration of transport operations, if structured (through governance/executive powers and funded for multi-year periods) correctly could deliver real benefits.
- More focus needs to be given on how we manage transport in all its forms across the country. The Rees Jeffrey work on the Major Road network, combined with the developing approach of Highways England and the emergence of sub-national transport bodies such as Transport for the North, Midlands Connect and England's Economic Heartland give the opportunity to consider carefully how transport should be managed. CIHT would be pleased to engage further in that discussion.
- The availability of funding for transport, especially at a local level will continue to be a concern moving forwards.

### **Considering new and emerging technologies and disruptive trends**

The public sector should act as an enabler/facilitator for technology enabled innovation as the market will respond in ways that might not be envisaged. The public sector should provide leadership and a vision on the kind of place we are looking to achieve.

There are a large range of emerging technologies – from increasingly autonomous and electric vehicles to wireless power technology. Print on demand (3D) and drones are just some examples of what might have a disruptive influence on supply chains and logistics.

The way in which technology changes behaviour and demand is one of the uncertain elements faced today – rather than trying to predict, the opportunity is to embrace uncertainty so trying to predict what technology will do is unlikely to be the right approach. If the question is turned around to say – What do the users of our transport networks need? Then there is the opportunity to map which factors affect and influence those needs. They can then be assessed;

- Which of those factors can be controlled and which cannot?
- Where can technology play a part in controlling those factors and who manages that technology?

That approach will give a much clearer route to which bits of technology to focus on. Alongside that approach there is then a need to accept that there will be changes that were not predicted and how are these managed?

The commission should also ensure that technology is tested from a security-minded perspective.

### **Q2. Do you agree that, in undertaking the NIA, the Commission should be?**

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<sup>11</sup> [Can Devolved Transport Overcome the Black Spots, Guardian Newspaper \(2015\)](#)



- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

CIHT agrees that the NIA should be all of the above but would include - working timely to an agreed framework and should consider scenario planning to support a whole systems approach.

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

We welcome the whole systems approach suggested and would expand as follows:

Understanding and considering the customer when making the decision

- Identify the different classes of groups (customers) who are reliant on the network. As well as different users of the network, these customer groups could include amongst others, adjacent communities, non-users of the network, the environment, heritage and the highway asset itself. These customer needs should include both those that are known early on and those that are defined in terms of required outcomes.
- Identify the different purposes that the network is required to deliver to different customer groups
- Analysis to confirm how the network will best meet the different purposes identified and to identify what investment is required to meet those different purposes of all customers.
- Confirm the wider benefits that will arise from meeting the needs of all customer groups and thereby define the value for money of the investment.
- Identify areas where investment in other modes will better meet the needs of customers and identify the parties best able to deliver that investment.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

CIHT agrees with the sectors covered, but would stress the importance of considering health, resilience and security for these sectors when making decisions. (Please see below, Q4 for CIHT's views on housing).

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

Infrastructure provision should consider the interaction between transport, health and housing when developing the case for new transport schemes in the UK. CIHT notes that in recent times, the funders, professional advisers and users have tended to focus only on the direct economic benefits, without factoring in quantified health and wellbeing savings.

For example the current aim of an extra 1 million homes in this parliament, alongside provision of social infrastructure to support this extra provision will rely fundamentally on integrating spatial and transport planning. The aims of productivity and automatic planning permission for brownfield sites runs the risk of not fully considering how such schemes integrate with transport provision. This could miss opportunities for ensuring adequate public transport and particularly walking and cycling: important given the health challenges the UK faces.

## Funding

Maintenance and resilience of the existing asset, especially the Local Road Network, is too often overlooked with focus on the funding model for capital expenditure on highways maintenance given precedence. It is vital to recognise that the highway maintenance service in local authorities is also dependent on revenue funding from Department for Communities and Local Government (DCLG) and other sources.

It is worth remembering that the Local Road Network (national infrastructure) makes up 98% of roads at an estimated value of £400bn<sup>12</sup> and is currently subject to the problems of annualised budgets.

Revenue funding is subject to significant economic pressures that affect the ability of local authorities to deliver their highway services. A number of reports have highlighted the need to consider both revenue and capital funding together to ensure an effective and efficient service delivery (NAO<sup>13</sup>, Transport Resilience Review<sup>14</sup>). Without considering the two elements together it is unclear how an effective and efficient service can be delivered.

### **Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

When working across sectors there needs to be an integrated approach from Government; national, regional and local agencies and across political parties to produce a long-term plan that links the future infrastructure needs of the country.

See reference to a spatial strategy and attention to planning in response to question 1. Providing a spatial strategy will help recognising the interdependencies between all the sectors set out in the consultation document.

There should also be consideration given to how infrastructure decisions influence other policy agendas such as health (for instance with links to air quality).

### **Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

CIHT agree with these cross-cutting issues

### **Q7. Are there any other cross-cutting issues that you think are particularly important?**

As referenced above in responses to questions 1-5, CIHT would suggest planning, health, security and climate change/environment should be recognised as a cross-cutting issues.

### **Q8. Do you agree with this methodological approach to determine the needs and priorities?**

CIHT does not wholly agree with the methodological approach. The NIC would be encouraged to move away from a 'predict and provide' approach to one of more 'decide and provide'. When considering the National Infrastructure Assessment, consideration should also be given to what society wants the future to look like. CIHT would be pleased to share the findings of

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<sup>12</sup> [Action for Roads](#)

<sup>13</sup> [NAO report \(2014\) 'Maintaining strategic infrastructure: roads'](#)

<sup>14</sup> [Transport Resilience Review \(2014\)](#)



its CIHT Futures<sup>15</sup> project that should provide more information and insight into issues such as uncertainty and forecasting.

CIHT would also encourage the Commission to look at the New Zealand Government's Future Demand project<sup>16</sup> which explored the uncertainty of demand for personal travel by developing four future scenarios looking at the possible impact on travel. These scenarios set out a range of plausible futures that will help us make better investment decisions.

Technology enabled solutions are making it possible for customers to have greater visibility of the cost of transport choices, in this sense the market will drive this trend in response to customers' expectations.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

See reference above to New Zealand – Future Demand Project and CIHT Futures project.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

CIHT agrees with the drivers set out in the paper. However CIHT would develop the drivers further:

There is a generational dimension with the priorities of younger people likely to change demand for transport in the future. This is partly being driven by technology and enabled by innovation and this is encouraging/enabling a shift from ownership of transport towards access to transport/connectivity: this is a fundamental shift in terms of attitude and expectations.

It is important when assessing the national needs that the process recognises the wider benefits of (transport) infrastructure. Improved and integrated infrastructure will help tackle some of the big societal changes, including the ageing population, rise in obesity and social exclusion that we face. The benefits of investing in a long-term infrastructure plan will have a positive impact on accessibility, education, protecting the environment and enhancing the quality and functionality of existing places as well as improvement in quality of life and climate change.

### **Connectivity**

Improved connectivity is vital to enabling growth. Clarity and certainty in terms of strategic planning will produce greater confidence amongst investors, business and housing (developers). Cities, towns, villages and rural communities all contribute to the success of the UK economy, increasingly so as the implications of the new digital economy challenge the traditional 'agglomeration model'. The CIHT Futures<sup>17</sup> project will help set out the need to adopt a new approach to strategic planning, one that embraces a scenario based planning approach.

The weaknesses in connectivity is holding back much of the UK's regions in terms of jobs, enterprise creation, economic growth, and housing. It is therefore important that investment

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<sup>15</sup> [CIHT Futures](#)

<sup>16</sup> [New Zealand Future Demand Project](#)

<sup>17</sup> [Future Uncertainty in Transport – Understanding and Responding to an Evolving Society, CIHT 2015 - 16](#)





priorities in one area of the country are determined only having taken into account the relative benefit compared to investment made elsewhere.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

Refer to Q2. Our previous suggestions of a whole systems approach. Ensure that the Commission has engaged with the right people from the profession that includes professional Institutions such as CIHT and ICE, engaged with Institutions from the Planning profession such as RTPI and consulted with associations such as CECA, ACE and ADEPT.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

The Commission needs to recognise that local networks are as fundamental as national networks.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

There should be strong engagement with the public listened to through a range of consultative mechanisms. With large scale infrastructure there will likely be a challenge of balancing local needs against those of the UK (from an economic, social and environmental perspective) – how this balance is achieved will rely on good public engagement and strong communications.

The experience of local community engagement on national strategic infrastructure projects could be used to develop an approach that is enabling of engagement but that still moves the decision making process forward.

Effective engagement could include setting up an interactive exhibition in a public streets, supermarkets and other public and semi-public places. This is an effective way to gather wishes and needs as well as engage in conversations with many more place users than is normally possible indoors. This method is particularly useful for public realm and development schemes, meeting people where they are while the site area is in sight. It also involves a wider range of groups, especially those who would perhaps not normally visit a formal exhibition or workshop.

Site visits, excursions and walkabouts bring people together in situ and to places that might inspire design solutions in light of known problems and priorities, locally and relevant to the scheme. Encourage peer-to-peer conversations and hear the success stories and lessons from the people who made the scheme happen and pass these stories and lessons on to others in similar situations.

Web-based technology and social media provide excellent tools for raising awareness within the locality and reaching out beyond the usual office hours. It is also important to consider that different social media channels are used differently by their users, and as such, the approach to using them in participation exercises will also need to be different and relevant to the target audience. Without any doubt, any good engagement strategy should include a section on social media and how the various channels might be utilised to inform, simulate conversations and feedback on design work.

Consultation and engagement with expert bodies such as CIHT. CIHT can bring together experts from a range of fields through workshops, expert roundtable discussions and various



methods and would be very happy to assist the Commission when convening the expert roundtables set out at paragraph 80 in the consultation.

## **National Infrastructure Commission**

### **The National Infrastructure Assessment, process and methodology**

#### **Background to CIWEM**

CIWEM is the leading independent Chartered professional body for water and environmental professionals, promoting excellence within the sector. The Institution provides independent comment on a wide range of issues related to water and environmental management, environmental resilience and sustainable development.

CIWEM welcomes the opportunity to respond to the National Infrastructure Commission (NIC) consultation on the National Infrastructure Assessment (NIA) process and methodology. This response has been informed by our Members working across the environment sector.

#### **Consultation questions**

##### Objectives

1. The Government has given the National Infrastructure Commission objectives to:
  - foster long-term and sustainable economic growth across all regions of the UK
  - improve the UK's international competitiveness
  - improve the quality of life for those living in the UK.

What issues do you think are particularly important to consider as the Commission works to this objective?

CIWEM welcomes the development of a national infrastructure assessment. Infrastructure is critical to a successful economy and new infrastructure has the potential to stimulate the low carbon economy and increase environmental stewardship. In the past many decisions have been taken in isolation rather than considering the mutual benefits and efficiencies that could be achieved by considering them holistically. Planning infrastructure on a long term and national scale can help contribute to reducing carbon emissions and also ensure that the nation is adapted to the impacts of climate change.

In terms of the NIC's objectives, we do not consider that economic growth can be sustainable in the long term as an ultimate goal. Growth is commonly seen as way to ensure continuous improvement in quality of life, and perhaps to 2050 this may be appropriate. But beyond 2050, it may be more appropriate to think about how infrastructure can establish an economy that is in a state of dynamic equilibrium that improves, or maintains, a high quality of life. Quality of life is a fairly relative concept and so could improve indefinitely, but the size of an economy will always be limited by the quantity of goods and service that can be

physically traded. Objective 3, improving quality of life, relative to the size of the economy, should therefore be the more important objective.

Improving the UK's international competitiveness will also arguably need more emphasis in the wake of the UK's decision to leave the European Union.

We also consider that the NIA should also have an objective to ensure that infrastructure, particularly critical infrastructure, is resilient.

## Principles

2. Do you agree that, in undertaking the NIA, the Commission should be:
  - Open, transparent and consultative
  - Independent, objective and rigorous
  - Forward looking, challenging established thinking
  - Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

Yes we agree the Commission should adopt all of these principles. It should also be evidence based and take a risk-based approach.

The notion of being "objective" implies the use of facts and figures, but there are some issues particularly where interdependencies are involved where there are not enough facts or data. In these cases we can only rely on subjective discussion, reasoning and intuition of experts to provide a risk based approach.

## Sectors

3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

Yes CIWEM agrees with these broad sectors.

Energy is particularly key as it possibly has more interdependencies with the other sectors than any other individual sector. We are pleased to see the inclusion of low carbon heating given the context of the UK's carbon targets. It should also include energy from waste where appropriate.

Flooding should have more emphasis on prevention (e.g. not locating in, or relocating from, high risk areas). It should also ensure that future developments do not add to flood risk. The Commission is only looking to 2050 but it should keep in mind the potential impacts of flood risk, particularly from sea level rise, beyond this. The current framework for business cases uses a planning horizon up to 100 years in 3 epochs so the NIA should aim to fit in with this.

Waste, especially given the outcome of the recent referendum of the UK's membership of the European Union, is particularly critical to the UK as a heavily populated and developed island.

A very significant focus within the subject of waste should be the issue of internal reuse of waste (for example, industrial symbiosis and the circular economy).

There is an implication throughout the consultation document that there is a need to increase the capacity of, or reduce the impact of, existing infrastructure use. However, there is not much emphasis on actually reducing the demand on the infrastructure networks. Perhaps this is a valid assumption, but CIWEM believes encouraging the reduction of demand (particularly for water, energy and waste) should be a part of the main objectives.

4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

The NIA should particularly focus on co-location of infrastructure and interdependencies, for example the development of heat networks and locating power generation close to large users or vice versa, in order to optimise infrastructure efficiencies.

Maintenance/maintainability of subterranean infrastructure across all the appropriate sectors will be important, especially "smaller" infrastructure like pipes and cables where the spatial scale makes locating and working around them more challenging. Specifically where maintenance of one infrastructure network reduces the efficacy of another infrastructure network e.g. replacement of buried water mains necessitating the closure of a road.

5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?

Please see the answer to question 4.

6. Do you agree that the NIA should focus on these cross-cutting issues?

Yes this seems comprehensive.

7. Are there any other cross-cutting issues that you think are particularly important?

We believe that the balance between capital expenditure and operational expenditure in new infrastructure, as well as considering the maintenance and extension of the life of existing assets, should be a focus for the NIA.

8. Do you agree with this methodological approach to determine the needs and priorities?

Yes, the methodology appears to be logical. Prioritisation will be the most difficult and working across government departments will be essential.

9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

The Environment Agency's long term investment scenarios 2014 (LTIS)<sup>1</sup> is an economic assessment of future flood and coastal erosion risk management in the period 2015 to 2065. It is a good model for looking at long term, cost effective investment.

The model can:

- optimise investment over time
- link long-term projections to existing plans
- assess the risk of flooding from surface water alongside the risk from rivers and the sea
- assess the benefits of a range of measures, including structures and individual property protection
- explore the potential to reduce the consequences of flooding through flood forecasting and warning

10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?

Within the population and demography section the Commission should also emphasise behavioural and social change.

11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

CIWEM recommends that it would be beneficial to consider a portfolio biased towards the investments that reinforce or multiply the value, or equally reduce the risk, of other investments in the portfolio.

12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

Aside from more details on the methodology to combine the priorities/needs with relevant model outputs, no.

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[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/381939/FCRM\\_Long\\_term\\_investment\\_scenarios.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/381939/FCRM_Long_term_investment_scenarios.pdf)

**[email address redacted]**

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**From:** [name redacted] [email redacted]  
**Sent:** 07 June 2016 11:31  
**To:** NIA Evidence  
**Cc:** [names redacted]  
**Subject:** NIA Consultation - Process and Methodology - an SME perspective on disruptive technologies for understanding actual demand

Dear Sir,

In response to your request for commentary regarding the NIA Consultation on Process and Methodology dated May 2016, please find below our commentary.

The views expressed reflects our insights and on-going activities developing new transport models for major international airports, devolved government, smarter cities and local authorities in support of the Engineering Consultancies who traditionally lead on such studies. Whilst we are a relatively young company, which was started with UKTI funding, we have made a very significant impact (with the support of Vodafone) in developing the evidence base for future major engineering decisions.

Current engagements include London Heathrow, London Gatwick, TfL, TfGM, Welsh Government, Liverpool, Exeter, Northants CC etc.

Our approach is disruptive and utilises new source of UK data derived from the mobile phone communication network to understand people and vehicle movements (journey paths). These techniques are disruptive and a direct substitution for infrastructure sensors (CCTV, induction loops in the roads manual surveys). They also replace increasingly out-dated transport modelling techniques, which rely on small data samples and which do not take account of the emerging big data capabilities from the Internet of Things (IoT) or sensors, starting with smart phones.

Specific Responses to the Consultation:

#### **Q1. The Government has given the National Infrastructure Commission**

**objectives to:**

- **foster long-term and sustainable economic growth across all**
- **regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

The development of new models for understanding actual demand in and around UK infrastructure should employ data mining and new sources of data, including people and vehicle journey paths, derived from anonymised network data.

The Commission should also consider the relationships of the Scottish and Welsh Infrastructure Plans within a coordinated UK Plan and not stand-alone.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

**Open, transparent and consultative**

**Independent, objective and rigorous**

**Forward looking, challenging established thinking**

**Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

Adoption of new analysis and predictive analytics techniques (in preference to legacy modelling techniques) as advocated in Policy Exchange Report ‘Smart Devolution: *How smart Cities and city devolution can work together to deliver the Governments vision for regional economic growth and public sector reform*

Adoption of a glossary of terms and standards agreed at the outset as the guiding standards for information exchange.

**Q3. Do you agree that the NIA should cover these sectors in the way that they are described?**

para 28. Assess current and likely future plans using the latest data mining and analytics techniques to ensure that actual demand is visible to decision makers.

para 30. **The Remit letter.** Consider the affordability of different options and deliver recommendations that are realistic based on an understanding of actual demand for the proposed infrastructure.

para 31. **Independent, objective and rigorous.** Assessment of infrastructure needs built on extensive expertise and a robust methodology linked the latest techniques available to the NIA.

**Q4. Are there particular aspects of infrastructure provision in these sectors, which you think the NIA should focus on?**

para 33. Critical Drivers:



**Population & Demography - CHANGE TO UNDERSTANDING PEOPLE AND VEHICLE FLOWS THROUGH POPULATION AND DEMOGRAPHIC ANALYSIS**

**Technology - CHANGE TO PREDICTIVE ANALYTICS, MODELLING AND DATA MINING TECHNIQUES**

**Q5. Particular Areas where inter dependencies are likely to be important?**

para 35. Analysis of Demand and Supply of Infrastructure Services should also include a fully understanding of the Origin Destination of people and transport movements, journey time reliability and the impact of change on the built environment

para 37. Specific infra changes such as new bridges should have a higher threshold for analysis, as their impact will change journey time reliability dis proportionality to the replacement of existing assets.

para 42. **Multi-Modal Approach.** Analysis of transport needs at key road, rail, ports and airports should be based on best of breed analysis and should be rolled out quickly to ensure a consistent approach to multi modal analysis. The plan could also embrace Air Traffic and Ports/Shipping links and the relationship to the European Economic Zone.

para 43. **Digital Communications.** Maximum use should be made of 3G/4G/5G and IoT networks to gather relevant data and to supplement traditional roadside infrastructure to reduce the overall cost of ownership to UK plc. The NIA should look to propose projects and R&D initiatives to help UK embrace IoT at a faster pace to improve the economic standing of UK. Example customers should be suggested and funded like GLA.

The NIA could also look at how Satellite communications will help to improve connectivity across the infrastructure. They should consult the Satellite Catapult.

**Q6 Do you agree that the NIA should focus on these cross cutting issues?**

para 49. **Geography and Local Growth.** Adoption of new analysis and predictive analytics techniques in preference to legacy modelling techniques as advocated in Policy Exchange Report ‘Smart Devolution:

**Q7. Are there any cross cutting issues that you think re particularly important?**

A particular failing in UK plc is a lack of understanding of the origin and destination of journeys and how they impact on infrastructure changes. The traditional techniques of Transport Needs Assessment as defined by the HM Treasury Green Book are considered out-dated and encourage limited assessment of change in the context of critical national infrastructure.

There should be a sponsored developed of actual journey paths of vehicle and people movement at the inter city and inter regional level to encourage public debate on the changes which needed to improve journey time reliability across the country.

**Q8. Do you agree with this methodological approach to determine needs and priorities.**

**No**, Recent experience with Engineering Consultancies and emerging Big Data and IoT specialists working on major new analysis of airport hubs, new bridges and Core Cities is exposing a significant weakness in the UK plc eco system and its ability to provide valid demand models. The current approach assumes that experts in the field are operating to best practice and using the latest techniques.

The NIA will need to sponsor and support the Smart Cities and Transport Catapults to help accelerate new techniques as exemplified by the recent Transport Catapult report 'Utilising Mobile Network Data for Transport Modelling' to DfT , which advocates adoption of these new data sets.

This reflects a recent OFCOM report (2015) which highlight the emergence of the 4G/5G network as a key enable in the IoT debate:

Smart Phone is becoming part of our daily lives:

- Smartphones have become the hub of our daily lives
- They are now in the pockets of two thirds of UK adults (up from 39% in 2012)
- Use has increased to nearly two hours every day
- We now spend almost twice as long online with our smartphones than on laptops and personal computers
- One third of internet users see their smartphone as the most important device for going online

<http://stakeholders.ofcom.org.uk/market-data-research/market-data/communications-market-reports/cmr15/>

**Q9. Do you have successful models, which are particularly good at looking at long terms complex strategic prioritisation?**

Based on recent work with the Welsh Transport & Economics Directorate and Heathrow Airport amongst others in support of Engineering Consultancies, it is apparent that the legacy models are based on historic census data, limited data capture and assumptions which are in many cases 20 years old. Perhaps this explains why UK plc has not been successful in estimating the impact of proposed projects.

It is proposed that the NIA will need to sponsor a next generation of algorithms and data mining techniques which are not models, rather new insights derived from leveraging IoT sensors and the actual movement of people and vehicles. Exemplars such as the new transport models derived from TfL Project EDMOND, London Heathrow etc. need to be adopted on a wider scale.

NIA should look to consider a new way of procuring Smart City capabilities for the UK so that business cases stand-up for the private sector as well as the government buyer.

**Q10 Do you believe the commission has identified the most important infrastructure drivers.**

**'Differences in population characteristics and behaviours .... and react in different ways to what is provided'**

In order to gain the buy into a more detailed understanding of the right to privacy is required in order to access wider data from individual movements of people and vehicles. This will require consent and opt-out protocols for the UK population as their data mined for public good. The area of demographic information is particularly sensitive, as this is allowed by the individual user for particular use cases by Government. It is not a given that these records will be made available for future analysis.

**Q11. The Commission will seek to understand how the most important technologies can affect the supply and demand for infrastructure?**

Any traveller on the major routes in and around the UK will see the large-scale deployment of roadside assets (CCTV, induction loops) but fail to understand how these are collectively contributing to a greater understanding of the demands on these assets.

The recent example of Westminster Council, deciding to cease the use of CCTV across the Borough and the recognition by TfL that the cost of legacy infrastructure is not sustainable. There is a step change needed in adopting other techniques, where comms infrastructure is being developed separately e.g IoT, 5G, Autonomous Vehicle. This will require the NIA to have a visible and structured engagement with SMEs, Catapults and IoT providers.

**Q12. The NIA will aim to set out a portfolio of investments that best meet the demands of the UK in the future. Do you have a view on the most appropriate methodology for the future?**

It is highly likely that a number of vested interests will seek a continuation of the norm. The way forward should seek greater competition and best ideas from the Core Cities, such as new rail links, which add value to on-going national plans. There is also a need to recognise that IoT will dramatically change the use of buildings, network and sensors in the coming years as 5G arrives. This requires a percentage of the NIA investment to be aimed at higher risk projects on a fail early basis.

para 71. **Modelling and Analysis.** This should be changes to Data mining Techniques and Analysis to encourage a move away from old fashioned techniques which are near the end of their life. It will also encourage Tech City to take an interest in these matters?

para 72 **Sector and Geographical evidence reviews.** Adoption of new analysis and predictive analytics techniques in preference to legacy modelling techniques as advocated in Policy Exchange Report 'Smart Devolution: *How Smart Cities and city devolution can work together to deliver the Governments vision for regional economic growth and public sector reform.*

**Q13. How best do you believe that the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

Recent work by the West Government with the people of Wales in the preparation of transport models for public enquiry does show that evidence can be gathered from anonymised mobile network data with the consent of the people (opt out regime). This does indicate that in future 'sourcing the crowd' with due recognition of privacy issues can lead to new data being legitimately gathered as a precursor to major infrastructure changes being signed off.

The NIA should also examine how other counties are using aggregated data to fulfill the same role.

### *About Citi Logik*

The SME was established in 2007 with UKTI funding to explore the use of 2G mobile network data in fully anonymised for compliant with EU and UK data privacy laws and regulations. The most significant development was securing funding from Transport for London in open competition to examine the use of 3G/4G anonymised network data.

These techniques are being currently applied with leading engineering firms to refine demand models at: the Transport Directorate of the Welsh Government, Heathrow Airport, Gatwick Airport, Transport for London (Project EDMOND), Transport for London (Project SITS).

regards

[name redacted]

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# **National Infrastructure Assessment: Consultation on Process and Methodology**

## **Response from City of London Corporation**

### **Introduction**

The City of London Corporation welcomes the opportunity to comment on the proposed process and methodology to be used in the preparation of the National Infrastructure Assessment. The Corporation's comments concentrate on the proposed sectors that the NIA will cover, in response to consultation questions 3 and 4.

### **Question 3: Do you agree that the NIA should cover these sectors in the way in which they are described?**

#### **Transport**

A key concern for the City Corporation is the need to maintain good transport links within London and with London's commuter hinterland to ensure that projected office and employment growth in central London can be delivered in the national interest. The City Corporation would therefore like to see the NIA pay particular attention to the relationship between employment growth and the need for transport investment, including the role that transport investment can play in delivering necessary economic growth in the capital and elsewhere.

#### **Digital Communications**

The City Corporation welcomes the commitment that the NIA will cover all areas of infrastructure needed in the deployment of next generation digital communications. High quality broadband connectivity and digital communications (offering fast upload and download speeds) are crucial for business and is a vital ingredient in London's success as a global financial and professional services centre. Small businesses, in particular, rely on fast broadband for their productivity and wider innovation. The NIA's commitment also supports the new London Mayoral initiative 'London Is Open'.

The City Corporation considers that, in addition to consideration of the infrastructure underpinning digital communications, the NIA should also consider the role of the current regulatory framework and the role of individual commercial providers in extending infrastructure and networks. Working within the scope of Ofcom's recent decision not to split Openreach and BT Group (but to make them legally separate entities), the NIA should formulate ways in which new markets entrants might be encouraged.

#### **Energy**

The City Corporation considers that examination of improvements to electricity and energy networks should also include consideration of the role of regulation. The City of London has the largest electrical footprint (over 600 megawatts) in the UK and demand for electricity in the Square Mile has greatly increased in recent years, owing, for example, to the widespread use of power intensive IT equipment and cooling systems.

UK Power Networks (UKPN) is the District Network Operator (DNO) for London. Its London network does not have the spare capacity necessary to cope with future demand. The current regulatory framework under Ofgem does not incentivise investment ahead of need and new electricity connections generally occur on an ad hoc basis, responding to immediate demand. The City Corporation considers that the regulatory framework should be amended to allow for investment in advance of need. The failure to allow such investment constrains developers' ability to ensure network capacity for new development and, as a result, businesses and developers suffer from uncertainty in the development of business plans, delays to new developments and risks to their business. For this reason, the NIA needs to consider the regulatory framework alongside the physical delivery of new infrastructure capacity. It is understood that some progress has recently been made on this matter, and that this issue continues to be reviewed by the Cabinet Office and the Infrastructure and Projects Authority,

**Question 4: Are there particular aspects of infrastructure provision in these areas you think the NIA should focus on?**

The City Corporation has previously commented on its priorities in relation to transport infrastructure and electricity interconnection and storage in response to the National Infrastructure Commission's Call for Evidence in November 2015. The City Corporation trusts that the NIC will take account of these priorities when drawing up the National Infrastructure Assessment. The City Corporation's earlier comments are attached to this response for information.

**Digital Communication**

In addition to consideration of the role of regulation in the delivery of digital communications, there are several areas of specific concern to the City Corporation and the Corporation would request that these issues are considered within the Commission's work on the NIA:

*1) Urban connectivity and broadband speed:* Much of the emphasis on improving access to digital communications is focussed on rural areas of the UK. However, problems with connectivity and broadband speed affect urban areas just as much as rural areas. For example, of all parliamentary constituencies in the United Kingdom, the Cities of London and Westminster has the worst level of superfast broadband coverage. Typically, the only alternative product is a dedicated line (a 'leased line') which could cost an SME c. £500 per month. This is unaffordable for almost all SMEs. As a result SMEs typically rely on domestic-level broadband products available to the residential market.

Exemplifying the problem of the lack of superfast broadband in urban areas, 20% of the much discussed 'last 5%' of premises not supplied with broadband is in cities, including London. When public funds were made available to finance BT's superfast broadband roll out they tended not to be spent in the most poorly served places – The NIA should consider how to encourage more targeted provision.

*2) Upload Speed:* One aspect that requires much greater attention is upload speed. Too often attention is directed towards download speed and that obscures the importance of upload speed. Many of the SMEs operating in the City and nearby, for

example in Silicon Roundabout, require good upload speeds - critical to carrying out concurrent tasks online and uploading media to the cloud. It is essential that any new service obligation includes an upload speed. There are estimates that the median upstream demand is 1.3 Mbps today and will grow to 2.7 Mbps. This contrasts with a 95th percentile upstream demand of 7.2 Mbps in 2015, growing to 36 Mbps by 2025 (The broadband requirements of small businesses in the UK, Broadband Stakeholder Group, August 2015).

3) *Connection Times*: Businesses in the Square Mile continue to suffer from long delays in the installation of new fibre connections to new and existing buildings – the City knows of installations that have taken up to a year to complete. Late installations delay or put at risk businesses' occupation of new office buildings. Recently, late connections have hindered occupiers in the Square Mile to the point where they have had no choice but to occupy their new buildings without any fixed telecommunications. This poses a considerable risk to the business continuity and resilience of these companies. It also damages London's reputation as a globally competitive business hub.

In August 2016 the City launched a Digital Infrastructure Toolkit which will speed up the installation of broadband to businesses. Representatives from telecoms operators, developers, landlords and trade organisations collaborated to produce the Toolkit. It offers guidance to all parties on how best to organise broadband installation and provides a standardised wayleave agreement which is freely available on the City's website at [www.cityoflondon.gov.uk/standardisedwayleavetoolkit](http://www.cityoflondon.gov.uk/standardisedwayleavetoolkit)

4) *International Competitiveness – the Gigabit City*: London and other UK cities are trailing significantly behind other global business centres such as Singapore where public funding has been used to install fibre connections to every home and business' and gigabit speeds are offered to residential and business users alike, which is over 10 times the 80Mbps offered by BT's Superfast Broadband. If the City - and London more broadly - is to compete with areas such as the Far East, greater effort is needed in ensuring that providers offer services that would allow London to become a "gigabit City", allowing speeds of up to and over a gigabit per second at affordable prices. Whilst BT's "gigaclear" product is a good step in this direction, it is a solution that uses outdated copper infrastructure which will act as a cap on speed and is not comparable to the fibre solutions being deployed in Far East cities.

International comparisons in the Akamai State of the Internet reports from 2015 indicate that the UK does not feature in the top ten Global Average Connection Speeds. The UK ranks behind Romania, Belgium and Israel in terms of average connection speeds of the countries in Europe, the Middle East and Africa.



## Civil Aviation Authority

### Response to the National Infrastructure Assessment consultation on process and methodology

#### Overview

1. The Civil Aviation Authority (CAA), as the UK's specialist aviation regulator, ensures that the aviation industry meets the highest safety standards; that consumers have choice, value for money, are protected and treated fairly when they fly; that improvements are made in airlines' and airports' environmental performance; and that the aviation industry manages security risks effectively
2. Although we work across a number of areas crucial to infrastructure, including the economic regulation of the UK's busiest airports and of new runway capacity, in this consultation response we focus on the issue of airspace and its central importance. The CAA is responsible for approving the overall layout of the published airspace structure, and assessing proposed changes to it. It does so in the context of its own strategic objectives; including safety, the environment and the needs of the consumers of aviation services. We are currently developing a major review of this decision-making process to ensure it is as fair, transparent and proportionate as possible. In June 2016 we closed a public consultation on the principles of proposed changes to that process, and early next year we intend to consult on new guidance setting out the detail to a new process.
3. **The UK airspace system is a key, but largely invisible, part of the UK national infrastructure.** Despite opportunities to improve UK airspace by redesigning the route network and introducing new technology, airspace hasn't been fundamentally modernised for 40 years, despite much greater traffic volumes. The benefits of modernising airspace are clear – fewer delays, improved resilience to disruption, better passenger experience, lower costs, reduced environmental impact through less fuel burn, and enhanced safety. The broader economic benefits of modernising the airspace system surpass the direct aviation benefits, with growth in GDP, employment and international trade all highly dependent on an efficient air transport route network.
4. However, some previous attempts to restructure London's airspace have stalled, largely in the face of opposition stimulated by the anticipated environmental impacts of change and the scale and complexity of community consultation. A lack of trust has developed between some local communities, the aviation industry and the CAA as regulator, which the CAA is seeking to address by improving the process by which airspace changes are made.
5. This response follows our earlier comments on HM-Treasury's consultation on the creation of the National Infrastructure Commission, which emphasised our view of the benefit of clear direction from government with respect to major infrastructure projects or programmes, and our experience working with the Airports Commission, and our commitment to work with the NIC where appropriate.

#### What is airspace?

6. In its simplest terms, airspace is the portion of the atmosphere controlled by a State above its territory and areas over the sea contracted by the International Civil Aviation Organization (ICAO) to provide air traffic services. It is an invisible national asset. For air traffic control purposes, airspace can be divided into two main categories, controlled and uncontrolled. Controlled airspace is where air traffic control needs to have positive control over aircraft flying in that airspace to maintain safe separation between them. Uncontrolled airspace is airspace where aircraft are able to fly freely through the

airspace without being constrained by instructions in routeing or by air traffic control, unless they require a service.

7. Controlled airspace contains a network of corridors, or airways. They link the busy areas of airspace above major airports. At a lower level, control zones are established around each airport. These portions are therefore nearer the ground and closer to population centres.
8. Commercial air transport largely operates inside controlled airspace, while recreational flyers and the military mainly use uncontrolled airspace, or segregated training or danger areas. The creation of controlled airspace will therefore tend to impinge on the availability of airspace for other users, and an appropriate balance is needed that satisfies both the economic requirement and the safety needs of the various types of operation.
9. The guiding principle of air traffic control is that safety is paramount.

### **Technological improvements**

10. In a small country with a huge demand for aviation, UK airspace is a scarce resource, and passengers, businesses, the military and recreational flyers rely on its efficient use to enjoy the many benefits that aviation brings. The basic structure of UK airspace was developed more than 40 years ago and was designed around decades-old technology such as ground-based navigation beacons, radars and radio communications. Since then, there has been a huge increase in the demand for air travel. Long investment cycles and the cost of upgrading the infrastructure for a low-margin sector have seen the airspace system fall out of step with technological developments in other sectors – especially information technology and telecommunication.
11. Significant technological improvements could be made to airspace in reasonably short timescales. In particular, the introduction of satellite guidance instead of ground-based radio navigation aids would allow aircraft to fly much more accurate and flexible tracks. Satellite guidance would allow the UK's complicated, busy airspace to be redesigned, increasing capacity and efficiency while maintaining safety standards. A route structure optimised for satellite guidance with aircraft flying a pre-programmed trajectory will also reduce the need for tactical intervention by air traffic controllers to instruct pilots to change direction, bringing down the cost of air traffic control, and will optimise climb and departure profiles.

### **Limitations of the current airspace structure**

12. As airports expanded and demand for air travel increased, the airspace structure evolved piecemeal. The frequent interactions between arrival and departure routes create inefficient routeings, while frustrating improvements made possible by technological advances in aircraft and navigation. To maximise the number of aircraft that can land at an airport and to manage delays on arrival, aircraft are either held at their departure airports or in the air in 'holding stacks', where aircraft fly in a circle until they are given clearance to start their final approach to the airport. This increases journey times, fuel burn, carbon emissions and in some cases noise and creates a 'blockage' in the airspace structure. Greater tactical intervention is needed from air traffic control to resolve the resulting interaction of flight paths.
13. Each day around 6,000 flights operate in UK airspace, of which 3,500 are to or from London. The airspace above London airports is one of the busiest and most complex in the world. The routes to/from London airports overlap, demonstrating the complexity of

the system whereby air traffic control is required to maintain safe separation between aircraft, with aircraft passing above and below each other to reach their destination. Few parts of London are not overflown by aircraft at one altitude or another. The high level of demand relative to the capacity of the airspace and to the capacity of Heathrow (and to a lesser extent Gatwick) is a growing challenge, causing passenger delays and poor resilience to disruption. The complex nature of the airspace above London will remain a limiting factor on airport capacity unless fundamental improvements to its design are implemented.

### **Future Airspace Strategy**

14. The UK and Ireland have jointly developed a strategic framework known as the Future Airspace Strategy to support a programme of modernisation and harmonisation of airspace structures and air traffic control methods. As part of the EU Single European Sky<sup>1</sup> initiative, this will provide a more systemised and efficient European Air Traffic Management system. The UK and Irish aviation industry, in response to the Future Airspace Strategy framework, have developed a joined-up programme of initiatives to modernise airspace by 2030.

### **The CAA's airspace change process**

15. We are currently developing a major review of this decision-making process to ensure it is as fair, transparent and proportionate as possible. In June 2016 we closed a public consultation on the principles of proposed changes to that process, and early next year we intend to consult on new guidance setting out the detail to a new process.

16. The CAA is proposing changes to the current airspace change process because:

- The airspace structure is a key part of the UK's national infrastructure but is in need of modernisation. If modernisation is held up, there will be significant impacts not just on air passengers and shippers but also the wider economy. While the CAA has a duty to modernise airspace (and in some cases the UK has an international obligation), it is up to the aviation industry to develop specific proposals for change. The CAA needs a rigorous process for ensuring it can make fair and lawful decisions about those proposals. We will not make a change simply because it enables modernisation; we will only do so once we have also given consideration to the range of factors and stakeholders we have also have a duty to consider.
- We need to 'future-proof' the process in the light of changing international requirements that are binding on the UK as a European Union Member State.
- Airspace modernisation requires the CAA to consider airspace change proposals on a scale unprecedented in recent years. These proposals may change flight paths and therefore noise impacts, and may also impact airspace users and service providers.
- Those affected should have the ability and opportunity to respond to consultation before a change is made. The CAA's decisions on airspace change must balance and take proper account of the needs and interests of all affected stakeholders.
- Airspace is a finite resource and there are competing demands for it from airspace users with differing needs (commercial air transport, General Aviation<sup>2</sup>, military,

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<sup>1</sup> <http://www.eurocontrol.int/dossiers/single-european-sky>

<sup>2</sup> The definition of General Aviation varies, but is essentially all civil flying other than commercial airline operations. It therefore encompasses a wide range of aviation activity from powered parachutes, gliding and ballooning to corporate business jets, including all sport and recreational flying.

unmanned aircraft and so on) which must be balanced and traded off against each other.

- Communities close to airports have grown increasingly sensitised to aviation noise. Some recent airspace change proposals have highlighted a lack of trust between some local communities, the aviation industry and the CAA as regulator. This can sometimes create an impasse on airspace changes which, in totality, might achieve an improved outcome in respect of all the factors we have to consider (although, as a consequence, an individual stakeholder may be in a worse position than if no change were made).
- It is therefore essential that the CAA's airspace change process meets modern standards for regulatory decision-making and above all else is seen as fair, transparent, consistent and proportionate.
- An independent report by the Helios consultancy reviewing the current process found that it could be improved and recommended a number of changes, on which, with some modifications, the CAA has decided to consult.

17. The Department for Transport is also considering whether to consult on new Government policies for airspace and noise. The CAA's airspace change process must implement these policies, and so will need to be flexible to respond to any policy changes as and when they happen.

### **CAA response to the National Infrastructure Commission consultation**

*Q1. The Government has given the National Infrastructure Commission objectives to:*

- *foster long-term and sustainable economic growth across all regions of the UK*
- *improve the UK's international competitiveness*
- *improve the quality of life for those living in the UK*

*What issues do you think are particularly important to consider as the Commission works to this objective?*

18. Given the important role that airspace has, we believe it should be considered by the National Infrastructure Commission as part of its assessment.

19. Despite much greater air traffic volumes, the UK's airspace infrastructure has not been fundamentally modernised for 40 years. The introduction of new technologies on aircraft (for example satellite navigation) enables aircraft to fly more accurate and direct routes and helps to free up areas of congested airspace, which supports a different approach to airspace design; consequently, they can only be deployed by bringing the airspace system up to date.

20. Throughout Europe, the [Single European Sky](#) legislation supports a programme of modernisation and harmonisation of airspace structures and air traffic control methods to provide a more systemised and efficient European Air Traffic Management system. The UK and Ireland have jointly developed a strategic framework known as the Future Airspace Strategy to help address the changes required by the legislation. The UK and Irish aviation industry, in response to the Future Airspace Strategy framework, have developed a joined-up programme of initiatives to modernise airspace by 2030. This

collaborative approach includes airlines, airports, air traffic control providers and the military, with regulators involved in an observer capacity. The Future Airspace Strategy framework aligns with the Single European Sky project and will roll-out new technology across the European Union under a series of European Commission Implementing Rules which are currently binding on the UK as a Member State of the EU; some of these will require airspace change. At present, if the UK does not comply with these rules it could be subject to infraction proceedings by the European Commission. The future status of the Single European Sky legislation in the UK will, however, depend on the nature of the UK's relationship with the EU and will be determined as part of the UK's negotiations to leave the EU.

21. The Future Airspace Strategy does not itself define the structure of UK airspace; it is a strategy for modernisation and efficiency. A more efficient route structure enables fewer emissions per aircraft as well as potential for aircraft to climb faster and descend later, thus also reducing the area in which people are expected to be significantly affected by noise.<sup>3</sup> When airspace is restructured as a result of modernisation, it is still essential for the change to go through the airspace change process in order to give the proposals the necessary scrutiny and to involve those parties affected. The feedback we have received is that this process itself needs to be modernised in line with best practice regulation, hence our current work programme on developing that process.
22. Airspace is a finite resource and there are competing demands for it from airspace users with differing needs (commercial air transport, General Aviation, military, unmanned aircraft etc). Demand for access to airspace is increasing and changing in its nature, as is evidenced by the exponential growth in the use of drones. As the volume of commercial traffic recovers from the recession, it will require increasing amounts of controlled airspace, exacerbating this situation. From the industry perspective, airspace modernisation is a complex programme which brings its own technical challenges and risks associated with a high-cost programme with long payback periods.
23. Competition between airports is growing. For example, Heathrow, Gatwick and Stansted are now competing businesses rather than being operated as an airport system under a common owner. Intense airline competition will continue to put pressure on airports to deliver (by seeking appropriate airspace design) efficient arrival and departure flows, but flows that are best for one airport may have an impact on other airports.
24. Some previous attempts to restructure London's airspace have stalled, largely in the face of opposition stimulated by the anticipated environmental impacts of change, primarily noise-related, and the scale and complexity of community consultation. People are increasingly sensitised to aviation noise, and want more clarity from the industry about the changes it wants to make and the impact they will have. Communication tools such as social media and other opportunities afforded by technology mean that people are more able to engage directly, and they have a legitimate desire for changes to the CAA's process to ensure that their views are seen and taken into account.
25. Some recent airspace change proposals have highlighted a lack of trust between some local communities, the aviation industry and the CAA as regulator. This can create an impasse on airspace changes – even on changes which, in totality, might benefit some parties but could disadvantage others. Local community concerns include the fairness and transparency of current arrangements for reporting aircraft noise, and for the recording and handling of complaints from members of the public. The issue affects all airports, but changes at Gatwick have proved particularly controversial, with new, active

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<sup>3</sup> The definition of the area in which people are expected to be significantly affected by noise can be found in the Government's Aviation Policy Framework 2013.

local campaign groups being established. These campaigns have contributed to decisions by Government, the airport or air traffic control provider to put a temporary hold on advancing some of the changes.

26. Some proposals to modernise airspace around Heathrow and Gatwick at altitudes higher than those typically thought to cause significant community concern have been vigorously opposed by some local community groups resistant to changes that they consider could impact their living environments. Nonetheless, aircraft will still make noise; there are rarely opportunities to create routes where nobody will hear them, and often providing respite from noise means new noise over new people.

27. While airports have improved the way they engage with local communities, there is still room for improvement and for better information. In addition to local residents, other stakeholder groups also need clear information and opportunities to have their say. In particular, General Aviation stakeholders (i.e. recreational flyers) need to understand how changes could affect their airspace they can use, and how they can use it. Other national or local bodies may also be interested and, if so, will want timely opportunities to share their views. This will require a consistent process. These are issues our proposed process aims to address, but our process improvements will only go so far. **Inclusion of airspace in the NIA would support Government leadership on airspace, promote its strategic importance and back its modernisation.**

*Q2. Do you agree that, in undertaking the NIA, the Commission should be:*

- *Open, transparent and consultative*
- *Independent, objective and rigorous*
- *Forward looking, challenging established thinking*
- *Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?*

*Are there any principles that should inform the way that the Commission produces the NIA that are missing?*

28. Yes, we agree with those principles. We also believe that in order to be objective and rigorous, the Commission's work should be evidence-based. We welcome the detailed method set out in the consultation document but would, for the reasons above, urge the inclusion of evidence about airspace usage.

29. To ensure a whole-system approach, we would affirm the importance of considering airspace as well as the physical, ground-based infrastructure supporting transport. Aviation is crucial to the UK both economically and socially, and any significant improvements to aviation infrastructure on the ground will only be successful if they are accompanied by the modernisation and reform of airspace, for the reasons we set out above.

*Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?*

*Q4. Are there particular aspects of infrastructure provision in these sectors which you think*

*the NIA should focus on?*

30. The description of transport should be expanded to include airspace. Airports are mentioned in the consultation document, but airspace is an integral part of the overall air transport system within which airports operate. In other words, without functional and efficient airspace, the transport of people and goods by air, and indeed the aviation industry more widely, cannot operate effectively.

*Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?*

31. The NIA should recognise the interdependency between a) airports and airspace, and b) airports and surface access, such as rail and road access for passengers.

*Q6. Do you agree that the NIA should focus on these cross-cutting issues?*

*Q7. Are there any other cross-cutting issues that you think are particularly important?*

*Q8. Do you agree with this methodological approach to determine the needs and priorities?*

*Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?*

*Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?*

*Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?*

*Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?*

*Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?*

32. We have no comments on these questions beyond those suggestions we have already provided. We believe the NIA is an important endeavour and we will be happy to continue to engage with the Commission as it undertakes its important work.

Civil Aviation Authority  
July 2016

5th August 2016

# National Infrastructure Assessment Consultation

ClientEarth Response





**Q1. The Government has given the National Infrastructure Commission objectives to:**

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

**What issues do you think are particularly important to consider as the Commission works to this objective?**

Firstly, it is important that 'sustainable economic growth' is understood in line with 'sustainable development' rather than as 'sustained economic growth'. In this regard, the Commission must take into account the environmental and social impacts of any infrastructure development, including any overseas environmental and social impacts. These impacts must not disadvantage future generations through endangering the resilience of the natural world and human populations. Such a definition would be in line with the definition of 'sustainable development' as adopted by the former Sustainable Development Commission.

As a starting point towards this, it is essential that the Commission ensures that infrastructure plans and policies are compatible with all environmental legal obligations. As such, the following must be central to the Commission's work in England (with the equivalent legislation similarly important in its work in the devolved administrations). It is important to note that all EU law remains applicable to the UK until it leaves the EU.

- The Natural Environment and Rural Communities Act 2006
  - s40 places a duty on all public authorities, which will include the Commission as it will be a body created by legislation, to have regard to the purpose of conserving biodiversity
- The Wildlife and Countryside Act 1981 and The Conservation of Habitats and Species Regulations 2010
  - These implement the important EU Nature Directives
- The Marine and Coastal Access Act 2009
  - Which provides the legal mechanism to help ensure clean, healthy, safe, productive and biologically diverse oceans and seas
- The Climate Change Act 2008
  - This puts in place a legally-binding carbon emissions trajectory to 2050 - ie over the full period which the Commission will be considering. As such, real consideration needs to be given to how full compatibility can be assured between the Commission's long-term vision (including the National Infrastructure Assessment) on the one hand and the statutory climate policy framework on the other hand.
- The Ambient Air Quality Directive
  - This sets legal limit values and target values for the concentration levels of a number of pollutants, which are harmful to human health and the environment. The UK is currently still breaching limit values for nitrogen dioxide, which should have been met by 2010 and is subject to an ongoing legal challenge. In 2015, the UK Supreme Court ruled that there was "the need for immediate action to

address this issue" and ordered the government to prepare new air quality plans to achieve nitrogen dioxide limits as soon as possible. These new plans are subject to a new legal challenge at the High Court for failing to comply with the Supreme Court order.

- The National Emission Ceilings for Certain Pollutants
  - This aims to improve air quality by reducing member states' overall emissions of harmful pollutants by 2030 against a 2005 baseline. Legally binding emissions reduction targets have been set for ammonia, methane, nitrogen oxides (NO<sub>x</sub>), PM<sub>2.5</sub>, sulphur dioxide and non-methane volatile organic compounds (NMVOCs). How this is achieved across the different economic sectors is left to individual member states to decide.

Secondly, the Commission should understand 'quality of life' in a holistic and realistic way. Quality of life is not measurable solely by economic indicators and should not be treated as such. For example, access to high quality natural green space and clean breathable air form an indispensable component of the quality of a human life.

The Commission could go some way towards meeting a number of these requirements by ensuring that the possibility of meeting the UK's needs through natural infrastructure (such as forests, wetlands and estuaries) is properly considered and emphasised in its deliberations. A prerequisite to this is an adequate definition of 'infrastructure', which includes natural infrastructure.

## **Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

Taking a 'whole system approach' necessarily means understanding that we live within natural ecosystems. That is, our society and economy are embedded in the natural world, which is itself replete with interdependencies, and it is crucial that National Infrastructure Assessments recognise this. We encourage the Commission to be forward looking, to challenge established thinking, by taking an ecological whole system approach. This involves developing projects that work with rather than against natural processes through, for example, analysing how natural infrastructure can meet society's needs, and ensuring that all infrastructure projects allow wildlife to thrive.

This, along with a forward-looking approach, also requires the Commission to fully account for the risks and opportunities of climate change and environmental change.

To this end, the Commission should not only understand its principles in an ecological way, but also include a fifth principle of being 'Ecologically informed and compatible with the natural environment' in order to do this.

Furthermore, built into a comprehensive and whole system approach must be safeguards to ensure that the NIA is not just compatible with the UK's binding carbon targets, the Aichi biodiversity targets and legal limits for harmful air pollutants but that it actively complements those targets and is systematically prevented from conflicting with them.

### **Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

In sectors such as flood defence, the Commission must have particular regard to the work of the Adaptation Sub-Committee of the Committee on Climate Change and ensure that its recommendations are consistent with the Risk Assessment and the Government's National Adaptation Programme produced pursuant to the Climate Change Act.

Furthermore, there is an opportunity here to re-orientate how we think about flood defence by having an emphasis on natural flood management. This is an effective, cost-efficient and low-carbon method for reducing the impact of floods, which will become more important as our climate changes. Pilots of this approach in have been successful (eg Stroud), and Cumbria's recent flood plan recognises the value of such an approach.

The use of natural infrastructure in achieving water quality and drainage goals should also be promoted as a key way to meet infrastructure needs. Defra's PES Pilot scheme in Winford Brook demonstrated how natural infrastructure can cost one sixth of the cost of the built infrastructure required to improve water quality. The use of waste in generating energy or biogas should also be considered.

The Commission is right to highlight the potential implications of transport electrification and to be "particularly aware" of energy issues in the context of the UK's carbon targets. A central concern for the Commission should likely be the development of Carbon Capture and Storage - essential for meeting future carbon targets - which requires long-term investment in a range of infrastructure. In this regard, it may be appropriate, if not necessary, for the Commission to include upstream energy extraction and processing within its remit (currently intended to be excluded).

On electrification, the Commission should consider the role of public investment in establishing new infrastructure networks necessary to support wide-scale roll-out and adoption of new technology. In this regard, the UK's need to come into compliance with legal air quality standards by reducing transport emissions as soon as possible is a key driver alongside carbon budgets.

More generally, policy frameworks developed pursuant to statutory carbon targets (required 11 years in advance) must dovetail with policies recommended by the National Infrastructure Assessment. Particularly where NIA-derived policy plans operate over longer time-scales, those plans must be careful not to foreclose policy solutions that may be required under the Climate Change Act's current or future carbon targets - and should, indeed, champion them when

needed. Pro-active consultation and co-operation with the Committee on Climate Change will be key in this regard.

In light of the Paris Agreement on climate change, the Commission's work, including NIAs, must also be consistent with a future move towards a tighter emissions reduction trajectory than is currently legislated for under the Climate Change Act, as countries pursue a 1.5°C global temperature target.

Adopting a multi-modal approach to the analysis of transport will be necessary to mitigate the sector's impacts on air quality. It also needs to take into consideration the need to reduce demand for both passenger and freight transport. This highlights the interdependency between transport and energy, digital and communications infrastructure. The electrification of transport to reduce air quality impacts will place huge demands on the energy sector. The development and roll out of digital and communications infrastructure should also seek to mitigate this problem by making transport infrastructure more effective and reducing the need to travel.

In looking at the energy system the Commission should also consider air quality impacts in addition to carbon for long term sustainable solutions. This is particularly important in the development of decentralised energy systems, for example district heating networks, that are based on biomass and energy from waste.

#### **Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

The NIA should focus on the ability of natural infrastructure to deliver multiple benefits at a cost-effective rate. For example, the Natural Capital Committee made the following recommendations in its 2015 Report:

- Woodland planting of up to 250,000 additional hectares. Located near towns and cities, such areas can generate net societal benefits in excess of £500 million per annum;
- Peatland restoration on around 140,000 hectares in upland areas. This would deliver net benefits of £570 million over 40 years in carbon values alone;
- Wetland creation on around 100,000 hectares, particularly in areas of suitable hydrology, upstream of major towns and cities, and avoiding areas of high grade agricultural land. Benefits cost ratios of 3:1 would be typical, with to 9:1 possible in some cases;
- Intertidal habitat creation to meet objectives set out in Shoreline Management Plans. These areas provide a wide range of benefits including coastal flood protection (and can reduce costs of maintaining concrete defences), carbon storage, areas for wildlife and the provision of nursery grounds for important commercial fish stocks.

Furthermore, the Natural Capital Committee has called for the Natural Infrastructure Plan to incorporate natural capital into each of the main infrastructure sectors, following the mitigation hierarchy for managing impacts (avoid, minimise, restore, offset). It has also recommended that an investment programme for natural capital should explicitly feature in the National Infrastructure Plan.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

Improving the UK's natural infrastructure almost always achieves multiple aims since the natural world is inherently interdependent. For example, wetlands provide a number of ecosystem services: water purification, flood defence, recreational benefits and so on. This is why the Natural Capital Committee has recommended the creation of 100,000 ha of new wetlands as a net positive economic gain for society.

As the consultation document acknowledges, policy areas like the electrification of transport and energy use are inextricably linked and cannot be considered in isolation. Much the same could be said of other sectors, for example energy and waste.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

Yes. There may well be ways that the Commission can improve how infrastructure is delivered to meet the UK's carbon and other environmental and public health commitments. The same can be said of many other of the cross-cutting issues identified, in particular 'Governance and decision making', 'Evaluation and appraisal methodology' and 'Performance measures'. Equally, the Commission will be able to learn from examples of current good practice where they exist.

Pursuant to the Climate Change Act, instructive examples of each of these issues exist - and ClientEarth would be happy to give detailed evidence on this if helpful, particularly on the important questions of accountability and transparency. There is also, as mentioned a need to properly integrate the Commission's approach to governance and decision-making with that of the Committee on Climate Change, as well as other related bodies like the Inter-ministerial Group on Clean Growth (or its successor) within Government.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

As the Commission will be taking a comprehensive, whole-system approach that challenges existing thinking, it will be necessary for the following cross-cutting issues to be at the forefront of National Infrastructure Assessments, rather than being tucked away under 'sustainability':

- The condition of biodiversity in the UK. In particular, whether we are heading towards the Lawton Review's recommendation of our network of protected sites being 'bigger, better, and more joined up'.
- Ecological resilience. Without functioning and resilient ecosystems, we will not be able to continue to meet our needs. This must therefore be of key concern to the Commission.
- Public health. Infrastructure should seek to improve public health and quality of life for the population it serves. In addition this will contribute to reducing the economic burden of poor health and premature deaths on society, the NHS and business from health risks such as air pollution.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

Models constitute an important part of planning how to meet legally-binding carbon targets, with the Committee on Climate Change and Government each using a number of modelling approaches. For example, on the economics of meeting the fourth carbon budget, independent modelling by Cambridge Econometrics, using an MDM-E3 macro-econometric model, was carried out in 2014 which predicted greater benefits of meeting the budget than did those used by Government. Models must take full account of the negative costs associated with a failure to tackle climate change and prevent other environmental degradation. It is also hugely important that the assumptions and methodologies underpinning these models are transparently disclosed and justified.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

There are also political and ideological drivers of our future infrastructure needs. That is, the type of society that we demand is dependent on our aspirations for ourselves and the future. Different ideologies about our future can lead to divergent infrastructure needs. This can be seen by considering the different conceptions people have of what a future city will be like. For example, the infrastructure needs of a society where cities are designed with natural space properly integrated into the built environment so as to improve people's physical and mental health will be very different to a society that opts for an increasing reliance on technological interventions.

Undoubtedly, 'climate change and environment' is a key infrastructure driver. However, the consultation document's description of this driver is entirely concerned with climate change. Whilst climate change certainly will affect our infrastructure needs, this category must be understood as considerably broader. The Commission must also consider the effects of soil degradation, invasive species, decline in ecosystem services such as water retention, and public health for example. Global environmental changes will also affect the UK's infrastructure needs and ability to meet those needs. For example, global food and natural resource markets may become unstable due to ecological degradation.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

It will be important for the Commission to work closely with the Natural Capital Committee in determining the portfolio of investments that best meet the demands of the UK in the future. Doing so will allow the Commission to best develop a portfolio that meets the UK's environmental, social and economic needs.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

As already highlighted, there will be a need to work closely with the Natural Capital Committee, and the Committee on Climate Change.

Finally, we believe that the best way to safeguard the sound functioning of the National Infrastructure Assessments, and the Commission as a whole, is through enshrining the recommendations made in this response in legislation.

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ClientEarth is a non-profit environmental law organisation based in London, Brussels and Warsaw. We are activist lawyers working at the interface of law, science and policy. Using the power of the law, we develop legal strategies and tools to address major environmental issues.

ClientEarth is funded by the generous support of philanthropic foundations, institutional donors and engaged individuals.

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**[name redacted]**

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**From:** [name redacted] [email address redacted]  
**Sent:** 14 August 2016 12:11  
**To:** NIA Evidence  
**Cc:** [names redacted]  
**Subject:** RE: National Infrastructure Consultation response

Date: as email

Dear Sirs,

Re: Response to the National Infrastructure Assessment Process and Methodology Consultation - 2016

Thank you for the opportunity to respond on this important consultation and to agreeing to accept it after the set deadline. The Network were keen to submit comments but were not aware of the consultation until three days prior to it closing.

The Coastal Groups were formed late in 2008 as part of the Environment Agency's Strategic Overview at the request of Defra with a broad remit, part of which is to influence national level policy and implementation. We have no statutory or executive function but represent a broad stakeholder/partner base around the coastline of England and Wales.

The Coastal Group Network would like to be included in any further discussion and consultation on this work.

This response should be read in conjunction with other key consultation responses that have been prepared across our Industry especially those from:

- Local Government Association (LGA) and the LGA Special Interest Group – Coastal Issues
- Individual Coastal Groups, Coastal Partnerships/Forums and individual Councils
- Professional Institutions such as the ICE (Maritime Panel) and CIWEM (Rivers and Coastal Group)
- Technical Advisors Group
- Regional Flood and Coastal Committees

We welcome the chance to be able to influence this issue. This response has been produced by the Chairman of the Coastal Group Network however views of individual Local Authorities and other stakeholder/partners may vary.

### **General Comments**

We welcome the commissions intention to set out a clear picture of future infrastructure and need, provided that it includes how this will be achieved and funded, otherwise the work will be just a marker in time with no substance.

Involvement of the appropriate individuals to provide the in depth assessments needed will be key and we volunteer our assistance in this complex area of work especially for the missing area of coast defence where much research and development with respect to climate change and its impacts on the deterioration of various commonly used assets is being completed.

The management and maintenance of coastal assets and hence the coast is complex with multiple owners and organisational responsibility. Although those responsible, generally the Environment Agency, Local Authorities or private owners have clear roles the differences in funding streams for maintenance and more importantly capital repair or replacement of major assets varies and causes confusion. In a recent State of the Nation survey assets within private and local authority responsibility were not surveyed as part of the surveys following major storms and thus effectively omitted from any potential additional government maintenance funding. Clarification of this should

be included in the assessment so that the situation in the future can be made clear and that all coastal assets are appropriately managed.

As this is a consultation on one possible approach to developing a national infrastructure assessment and only represents the initial views of the interim Commission, we offer the following comments in response to your questions and where we have not responded we have no strong views (responses in italic text after the question):

Q1. The Government has given the National Infrastructure Commission objectives to:

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

What issues do you think are particularly important to consider as the Commission works to this objective? *We believe that all these issues are equally important and recommend the addition of a further bullet point as follows to represent the environment which sadly seems to have been omitted but which we believe should be in this list: to continue to develop and enhance the natural environment.*

Q2. Do you agree that, in undertaking the NIA, the Commission should be:

- Open, transparent and consultative? - Yes
- Independent, objective and rigorous? - *This contradicts the above and we err more to the above.*
- Forward looking, challenging established thinking? – *Yes provided the challenge is based upon sound evidence and thinking.*
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks? – *Yes and where possible steps should be taken to incorporate a high level assessment of natural resources as a separate sector, recognising both the constraints and opportunities presented by natural resources and building on an "ecosystem services" approach.*

Are there any principles that should inform the way that the Commission produces the NIA that are missing? – *This is difficult to assess as the scope and detail is too wide at present but the direction is sound.*

Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on? *Yes the coast as an entity should be considered as sector with direction as to maintaining the current Shoreline Management Plan policies. Many of the 22 SMPs are now 10 years old or more and have had little or no revision or update. The importance of maintaining and refurbishing existing infrastructure should not be underestimated and the NIC should not focus entirely on the delivery of new projects but ensure existing infrastructure is fit for purpose – e.g. Coast defences (both flood defence and erosion control). It should be noted that erosion control and the prevention of the loss of land does not seem to feature and should therefore be included. Climate change adaptation for existing settlements also needs to be included.*

Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important? *Infrastructure needs to be considered as a whole regardless of function, ownership or responsibility – it should be looked at holistically.*

Q6. Do you agree that the NIA should focus on these cross-cutting issues?

Q7. Are there any other cross-cutting issues that you think are particularly important?

Q8. Do you agree with this methodological approach to determine the needs and priorities?

Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments? *The SMP model may be an example of strategic long term, up to 100 years, model that you may wish to consider as an example of strategic planning even though they are acknowledged as non-statutory.*

Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers? *The commission appears to include flood defence which will include both fluvial and coastal assets but appears to have omitted coastal erosion risk which results in the total loss of land so needs to be included and a generic term for coast including both these elements of risk identified as possible coast defence.*

Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio? *No*

Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach? *Yes - a clear direction/policy on the maintenance of the existing and planned management of the coast in its entirety. Steps should be taken to incorporate a high level assessment of natural resources as a separate sector, recognising both the constraints and opportunities presented by natural resources and building on an "ecosystem services" approach. Regionally important opportunities need to be supported in the methodological approach*

Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions? *No particular views on this.*

Should you have any queries or require clarification of any of the points raised please do not hesitate to contact us via the Chairman.

Yours sincerely

[name redacted]

[job title redacted] Coastal Group Network of England and Wales

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## Committee on Fuel Poverty

National Infrastructure Commission

2nd August 2016

### **CONSULTATION ON NATIONAL INFRASTRUCTURE ASSESSMENT PROCESS AND METHODOLOGY – RESPONSE FROM THE COMMITTEE ON FUEL POVERTY**

I am writing as Chairman of the Committee on Fuel Poverty (CFP) to submit our response to the National Infrastructure Commission's consultation on the National Infrastructure Assessment process and methodology.

The CFP is an advisory Non-Departmental Public Body. Our role is to advise the Government on policies aimed at reducing fuel poverty in England. The CFP's focus is on:

- the Government's [fuel poverty strategy](#);
- the Government's fuel poverty target, which is to ensure that as many fuel poor households as is reasonably practicable achieve a minimum energy efficiency rating of Band C by 2030;
- the interim milestones, to ensure that as many fuel poor households as is reasonably practicable are in Band E by 2020 and Band D by 2025.

The focus of the target and milestones is therefore on energy efficiency bands, and moving households in fuel poverty up through the bands. This will ultimately be achieved by improving the energy efficiency of millions of properties across the country.

We were launched as a new Committee in January this year, replacing the former Fuel Poverty Advisory Group, and will publish our first report September. Overall, we very much welcome the Commission's long-term focus, determining a vision up to 2050. Whilst we are aiming for early impacts in reducing fuel poverty, reaching the target is inevitably a long-term task. It is helpful that the Commission's work will lead to a stronger, strategic approach for the long-term, enabling co-ordination with infrastructure progress in other sectors so that benefits can be maximised.

Our key points on your consultation can be summarised in responses to two of your questions.

#### Question 1

*The Government has given the NIC objectives to:*

- *foster long-term and sustainable economic growth across all regions of the UK;*
- *improve the UK's international competitiveness;*
- *improve the quality of life for those living in the UK.*

- *What issues do you think are particularly important to consider as the Commission works to this objective.*

The third of these objectives is of particular interest to the CFP. In England there are nearly 2.4 million households in fuel poverty. This has numerous “quality of life” impacts. Foremost among these is the impact that living in a cold home can have on an individual’s health. This area has been well-researched, with the main impacts being respiratory and cardiovascular problems, and on mental health (rates of mental health problems are much higher among the fuel poor than the general population). Three groups are particularly vulnerable, these being elderly people, very young children and people with a long-term sickness or disability. Beyond health, there is evidence that cold homes affect educational attainment.

The case has been made by others that reducing fuel poverty can benefit the economy as a whole, addressing the first objective. There are also various estimates of annual costs of fuel poverty to the NHS, some in excess of a billion pounds per year.

We would therefore argue that fuel poverty, and more widely the low levels of energy efficiency across much of the country’s housing stock, are important issues to consider under these objectives.

### Question 3

*Do you agree that the NIA should cover these sectors in the way in which they are each described?*

Yes, we agree that the NIA should cover the energy system as a whole and we welcome the NIC’s statement regarding the “potentially important role that energy efficiency could play”. We agree with the recommendation made by the Energy & Climate Change Committee in its [report on Home energy efficiency and demand reduction](#), which said “the Government and the NIC should assess the benefits of designating energy efficiency as a national infrastructure priority”.

We are focussed on ensuring that there are sufficient programmes and activities in place to reach the fuel poverty target and interim milestones. This, of course, is our aim regardless of whether energy efficiency is designated as a national infrastructure priority. Clearly, however, if such a designation led to additional funding being directed to improving the energy efficiency of the housing stock, this could help address fuel poverty, accelerate progress against the targets, and prevent others from falling into fuel poverty.

Households in fuel poverty are defined by means of what is known as the “Low Income, High Costs” (LIHC) indicator. For a household to be in fuel poverty, it must:

- have an income after housing costs of less than 60% of the national median level (often referred to as living below the Poverty Line); *and*
- need to spend more than the national median amount on household energy costs for lighting, cooking, appliance usage, hot water and heating rooms to acceptable levels.

There are of course households who meet the second criterion but not the first. Some of these may be vulnerable to changes in income which would result in their falling into the LIHC definition.

As the CFP, our own focus is on LIHC households, but a large-scale programme which also addressed the energy efficiency of households not in fuel poverty would help to minimise the potential for further households to fall into fuel poverty. There would be other benefits from such a programme which could help in tackling fuel poverty, such as the scaling-up of an effective supply chain for energy efficiency.

We are in the relatively early stages of our existence as a full Committee, and our report in September will primarily set out our “direction of travel”. We will also be highlighting our wish – and indeed the need – to work closely with others, not least because of the complexity of the task of tackling fuel poverty and the numerous parties that need to be involved. We would welcome further engagement with the National Infrastructure Commission and would be happy to discuss our points further with you, at any stage.

[name redacted]

[job title redacted]

Poverty Email: [email redacted]

**National Infrastructure Commission:  
Process and Methodology Assessment  
Submission to Consultation**

5 August 2016

1. Community Support represents the interests of the community sector, from global to local and all in between. We also represent the interests of the community.
2. We welcome the initiative of the UK Government to plan for the year 2050.
3. We hope that the UK Parliament will agree the function and programme for the proposed National Infrastructure Commission in a form that complies with our aims.
4. However we are concerned that the proposed National Infrastructure Commission is currently being expected to ‘improve the UK’s international competitiveness’.
5. We are concerned that the Commission is expected to ‘improve the quality of life of those living in the UK’ without defining what is meant by ‘the quality of life’ or considering the effect on global society.
6. There is considerable evidence that society is being damaged by growth, industrialisation and urbanisation and policies which promote such illusory ‘progress’ must be reversed.
7. Predicting the condition of the world in 2050 CE is impossible without firm commitments, such as a commitment to reduce inequality.
8. It is essential, especially in the early stages, that the National Infrastructure Commission, and its Assessment, Process and Methodology are flexible and responsive.
9. We consider there has been no full discussion of whether Millenium Goals, set for 2015 were effective, or the success of policies emerging from the Rio Summit of 1992.

10. We propose to set up a Global Infrastructure 2050 Committee, which will be a sub-committee of this organisation, to monitor initiatives by individual governments and corporations and circulate information.
11. The Committee will develop its own definitions of infrastructure and make its own assessment of its historical impact.

Emailed to [NIAEvidence@nic.gsi.gov.uk](mailto:NIAEvidence@nic.gsi.gov.uk), 5 August 2016



## **NATIONAL INFRASTRUCTURE COMMISSION: CONSULTATION RESPONSE FROM *ConnectedCities***

The Office of National Statistics predicts the population of the UK to increase to almost 80 million by 2051 and possibly over 90 million by 2081. As a result between 15 and 25+ million extra people will have to be accommodated. Yet we have no agreed national housing strategy, nor any consensus on how it might be delivered.

ConnectedCities is a Global Sustainable Development Strategy which is particularly applicable to the UK. (See [www.ConnectedCities.co.uk](http://www.ConnectedCities.co.uk)) It draws its inspiration from Ebenezer Howard's Social Cities to integrate the most sustainable brownfield and greenfield locations. The vision is of groups of towns on rail lines voluntarily combining to form a ConnectedCity and plan future growth focused on compact, high quality, walkable developments around stations, both existing and new.

### **Response to consultation Question 5**

Paragraph 40 of the consultation document states:

*The Government have decided that the Commission's remit will not include housing supply directly. However, ..... the Government's remit envisages that "the Commission will consider the potential interactions between its infrastructure recommendations and housing supply. Information about the potential locations of strategically important housing allocations, such as new settlements and urban extensions when they come forward, will be an important component of the evidence base collected by the Commission..."*

ConnectedCities proposes that each local area has to choose whether or not to accommodate their pro-rata share of the national growth. Those that grant planning permission for more than their share are assisted with government funding raised in part from those that choose to provide less. Thus some localities will experience no or minimal growth by voting to assist those which wish to expand. Hence generally development location is locally led and consensual.

However, as Dr Nicholas Falk states in a forthcoming article in the Journal of the Town and Country Planning Association:

*As agreeing sites for growth is so controversial, we ... propose a Commission to arbitrate in situations of conflict. Only an outside body can resolve conflicts on local authority borders. We need to start with infrastructure capacity, existing or planned, and respond to market signals as Kate Barker proposed, instead of local authorities having to contend with whatever applications are submitted.*

ConnectedCities proposes that this arbitration role for new settlements and urban extensions of 10,000 dwellings or more be included in the remit of the National Infrastructure Commission.



# **The National Infrastructure Assessment - Process and Methodology**

**A National Infrastructure Commission  
consultation paper**

# The National Infrastructure Assessment - Process and Methodology

## Introduction

1. The Consumer Council for Water (CCWater) is the statutory consumer organisation representing water and sewerage consumers in England and Wales. We have four regional committees in England and a committee for Wales.
2. We welcome the opportunity to respond to this consultation on the National Infrastructure Assessment - Process and Methodology. We are pleased to note that the long-term challenges presented to the water sector, and their potential interaction with various sectors, are acknowledged in the consultation.

## General Comments

3. CCWater supports the principles that will underpin the development the National Infrastructure Assessment (NIA), specifically the aspiration of it being open and transparent, forward looking and comprehensive - taking a whole systems approach to looking at interdependencies between different sectors, including water and sewerage.
4. Furthermore, it is reassuring that, as part of the process to develop the recommendations identified by the NIA, the National Infrastructure Commission (NIC) 'will need to identify solutions which are good value for money for those who rely on, and ultimately pay for, infrastructure'. We agree with this proposal, as it is crucial that infrastructure is built (and paid for) at a pace that customers (regardless of the sector) find acceptable and affordable.
5. We support the proposals of the NIC to identify and explore the most important interdependencies and resilience implications, as well as the cross cutting issues that affect the delivery and performance of infrastructure. This 'systems approach' will be a key aspect to move towards a resilient water sector, as it relies on energy, telecommunications and transport to deliver the levels of service customers expect.
6. Some of the issues highlighted in the consultation (i.e. governance, sustainability, funding and financing costs, resilience, and performance measurement) are already being considered in the water sector for the five-year planning and investment cycle (Price Review 2019). These issues are important to the water sector which will have an impact on the level of service provided and ultimately the bills water customers (household and non-household) will pay.
7. Resilience in the water sector is crucial given the fundamental importance to society of having access to safe, affordable and reliable water and sewerage services. Future infrastructure requirements, in relation to resilience<sup>1</sup> and long-term planning, are currently being examined by the water industry , as part of two Water UK led projects.

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<sup>1</sup> Resilience is the ability to cope with, and recover from, disruption, and anticipate trends and variability in order to maintain services for people and protect the natural environment now and in the future. Ofwat task and finish Group Final Report. December 2015. Available at: <http://www.ofwat.gov.uk/publication/resilience-task-and-finish-group-final-report/>

8. For water resources, the *Long-Term Water Resources Planning* project<sup>2</sup> will assess the potential solutions required (up to 2065) to achieve a resilient water sector against a backdrop of increasing population, climate change and need for environmental protection. These solutions could include a combination of increased interconnectivity of water companies' existing resources; water trading; understanding the impact of these options on other sectors and the wider economy; and the development and use of new storage schemes. Some of these options are highly relevant to this consultation.
9. For sewerage services, the *21<sup>st</sup> Century Drainage* project is looking at a 50-100 year time horizon for improving drainage systems so that they are able to cope with future demands placed on them through population growth, urban creep and the intense rainfall that is predicted to occur because of climate change. The project has several work streams, foremost of which are to increase drainage capacity, remove surface water flows from sewers where feasible, improve storm overflows, and reduce sewer misuse through customer information campaigns and other means.
10. We welcome the inclusion of water and drainage as part of the NIA to ensure that long-term plans are consistent with the needs and expectations of water customers. This is a timely message, given that water companies in England and Wales are beginning the preparations for the next round of Water Resources Management Plans (WRMPs) to determine their water resources needs to ensure a safe, reliable and affordable supply to their customers over the next 25 years. In addition, Ofwat's upcoming Price Review for water companies in England and Wales will set out and approve further investment in maintenance and enhancements, so that they can achieve their statutory duties towards customers and the environment.
11. These plans will take into consideration projections for population growth, climate change and a commitment to deliver a more resilient water sector, as well as customers' preferences and willingness to pay. Furthermore, we expect water companies to take into consideration the findings of both Water UK projects referred to above to find the best combination of water resources and sewerage investments (including infrastructure assets) that improve resilience and deliver best value for customers.
12. It is also reassuring to see that flood defences are highlighted as an important part of the NIA. This will benefit water customers from different perspectives - not only from reduced risk of flooding to their homes, but also due to the protection of critical infrastructure, which could be crucial for maintaining water and sewerage services.

## Cross-cutting issues

13. We support the need to look at future infrastructure requirements in a multi-sector way, as identified in paragraph 48 of the consultation. However, where assets could be shared between the water industry and other sectors, it is important to establish sound governance and funding arrangements to ensure that water customers are not paying for more than their share of the costs and, that these arrangements can take place within

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<sup>2</sup> More information available at: <http://www.water.org.uk/news-water-uk/latest-news/planning-long-term-update>

the specific planning frameworks for the water industry. The sustainability component will also be of importance, considering the environmental, social and economic commitments water companies need to meet.

## Key Infrastructure Drivers

14. The Key Infrastructure Drivers identified by the NIC has identified, are relevant to the water industry and its customers.

- **Population Growth** - as identified in the consultation, this is also an issue relevant to the water industry. Population growth as well as consumer behaviour towards water usage will have an impact on the long-term planning of water resources and related infrastructure. It also places an increasing pressure on sewerage infrastructure.
- **Economic growth and productivity** - the availability and reliability of water and sewerage services is a critical enabling factor for economic growth and increased productivity, whether in respect of new development, both household and commercial, or in respect of the expansion of existing commercial activities. It is also directly linked to ensuring the sustainability of food production and security.
- **Technology** - this is also an important component of the infrastructure used in and by the water sector. Not only in terms of enabling more efficient processes (i.e. energy use, reduced carbon emissions, better value for money) but potentially, in influencing consumer behaviour. For example, the use of smart water meters could encourage customers to use water more wisely.
- **Climate change and environment** - the projections of extreme events leading to flooding and/or drought could impact negatively on the security of the water supply and on the effectiveness of sewerage services that customers have come to take for granted. This, in turn, will present a resilience challenge for the water industry, not only in terms of providing secure water supplies, but also in protecting the environment when abstracting water and discharging (treated) wastewater. The consultation also poses a key question as to the levels of resilience that will be acceptable to deal with potential future extreme events. The answer to this question would need to consider the levels of risk companies (and customers) are prepared to accept, as well as customer preference, in terms of levels of service to be provided, and how much they are willing and able to pay.

It seems that in relation to climate change, the consultation is only considering mitigation measures and their associated effect in reducing carbon emissions. We would expect the water industry to combine this with the use of adaptation measures given the uncertainties associated with climate change forecasts, with a view to delivering more flexible and resilient systems.

## Finalising the NIA

15. We welcome the intention to publish a document setting out the Commission's proposed long-term vision, the priority areas for action and the option to address the needs

identified. In addition, CCWater supports the additional tasks that are expected to reduce the uncertainty associated with the long-term horizon of the NIA.

- **Modelling and Analysis** - the Commission's proposals to model 'portfolios' of interventions, looking at the interaction of different options is broadly in line with the proposals currently being developed by the water industry which is looking to develop options and scenarios looking at least 50 years into the future. We will watch with interest to see if (and how) the results from the Water UK projects are considered within the wider modelling sought by the National Infrastructure Commission.
- **Sector and geographical evidence reviews and detailed analysis of specific issues** - although the NIA will be looking at cross sectoral issues, it is encouraging that the analyses will also consider sector-specific issues, which are relevant to understand and address sector specific needs as well as interdependencies within and between sectors.

## Enquiries

Enquiries about this consultation response and requests for further information should be addressed to:

[name redacted]

[job title redacted]

Tel: [phone number redacted]

Email: [email redacted]



## Copper Consultancy response to consultation on the National Infrastructure Assessment

5 August 2016

For the National Infrastructure Commission

Contact details:

[name redacted], [job title redacted], Copper Consultancy

Tel: [telephone number redacted]

Email: [email address redacted]

Web: [www.copperconsultancy.com](http://www.copperconsultancy.com)

## Copper response

Copper Consultancy welcomes the National Infrastructure Commission's (NIC) consultation on the National Infrastructure Assessment (NIA) and is pleased to respond on this important topic.

We particularly welcome the quality of life objective. We feel it needs to be explained to the public to bring about better understanding of the benefits infrastructure brings and how it contributes to our daily lives.

Our response has considered the information provided in the *Process and Methodology* document along with the questions you have set out. We've offered our thoughts on some of the questions asked. However, our specialism is in public engagement and using our own experience, and the findings of our research, we have primarily focused on your final question.

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- ***foster long-term and sustainable economic growth across all regions of the UK***
- ***improve the UK's international competitiveness***
- ***improve the quality of life for those living in the UK***

***What issues do you think are particularly important to consider as the Commission works to this objective?***

The first two objectives contribute to, but not exclusively, to the third objective.

The quality of life for those living in the UK is harder to measure than the other objectives as it is based upon personal perceptions and the factors that contribute to these perceptions. Please see our response to Q13 where we set out how an education and engagement strategy could help the Commission meet this objective.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- ***Open, transparent and consultative***
- ***Independent, objective and rigorous***
- ***Forward looking, challenging established thinking***
- ***Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?***

***Are there any principles that should inform the way that the Commission produces the NIA that are missing?***

We agree with the undertakings set out above. We also believe that the word 'proactive' should be added to the first undertaking. Our approach to how this could be achieved is set out in our response to Q13.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

Copper does not believe the engagement strategy – in its current form in Section 4 – will do enough to build the evidence base and test its conclusions in relation to the quality of life objective. We have set out our approach to strengthening the engagement strategy under Q13.



**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

## Open to infrastructure – engagement and education strategy

The National Infrastructure Commission has an opportunity to transform the way infrastructure is seen across the UK: delivering long-term and sustainable benefits which improve our quality of life.

Copper believes that the Commission would benefit from a strategic approach to engaging society which includes and builds on the methods set out in Section 4. Its aim would be to raise the standard of debate about infrastructure in the UK and to secure public buy-in to how infrastructure improves quality of life.

### Objectives

- Increase understanding of the role of infrastructure in improving the quality of life in the UK
- Promote the Commission and the concept of a 30-year vision
- Facilitate high quality feedback for the National Infrastructure Assessment from the public
- Set the tone and environment which allows the benefits of individual projects to be appreciated as they progress through the consent process, construction and ultimately to when they become operational.

### Rationale

In our 'Attitudes to infrastructure in Great Britain' we identified that only 6% of those polled had heard of the National Infrastructure Plan. Yet, 85% want world class or solid improvements to infrastructure in the UK. If that is indicative of the level of understanding of infrastructure issues in Britain, then the Commission must ensure that the public is properly equipped with a level of understanding to meaningfully take part in informed debate and to help shape future investment.

A 30-year infrastructure vision for the country is a complex and important endeavour, which deserves to be supported by a strong education and engagement campaign. Infrastructure development in general receives very little community buy-in, in part because its need is not effectively communicated outside of the context of individual projects.

### Audience

The Commission should consider tailoring its engagement and messages about the benefits of infrastructure to different age groups. Each group will have different perceptions and aspirations about what quality of life means to them, and could be broken down into:

- School children
- Young adults at college and university
- Working age adults and young families
- Baby boomers
- Retirees and older people.

### Approach

The Commission needs a common narrative about the benefits of infrastructure which explains how it helps people realise quality of life aspirations directly and for future generations. These aspirations could include access to a decent home and local facilities, affordable energy, a manageable commute to work, living near a good school or access to a job market.

A strategy and campaign must seek to raise the standards of debate about infrastructure over the long term across the generations. Educating people on the history of infrastructure and the benefits it has brought us in terms of quality of life is important. The Commission is in a position to do this with the support of industry.

The strategy proposes a segmented approach which reflects the aspirations of each generation and the methods they use to consume information.

- For school children - infrastructure needs to be explained in an engaging and informative way to arm them with an understanding which takes them into adulthood. Infrastructure could become a greater presence in the National Curriculum, focusing on tiny tots to teenagers
- For young adults at college and university – digital tools and engagement techniques such as online simulators could be used which encourage them to work out for themselves the implications of decisions and to participate in debate which will affect them now and in the future
- For adults of working age and young families – digital tools and engagement techniques will help them to engage and show how infrastructure can support their quality of life aspirations and for their children , such as a decent home, a manageable commute, access to good schools
- For baby boomers – a blend of digital and traditional methods and tools can help communicate how infrastructure will facilitate a modern retirement which maintains their chosen way of living into later life - for example how driverless cars could retain mobility and independence
- For older people – traditional communication methods will explain and encourage them to consider how their legacy can support younger generations’ meet their quality of life aspirations.

### Outcomes

The education and engagement strategy will draw evidence from a broader base which will allow the Commission to develop and evaluate the needs and priorities in its Assessment.

In delivering the education and engagement strategy, the infrastructure story can be told where the quality of life benefits are understood across the generations and to create a positive environment in which individual projects are presented to local communities.

## About Copper

Copper is a specialist stakeholder communications consultancy for infrastructure and development projects. We work in the built environment, transport, energy, resources and water sectors across the UK.

In 2015 we carried out an independent survey of ***Attitudes to infrastructure in Great Britain***. The results of the survey were launched in a report in December 2015 at an event hosted at the ICE where Sir John Armitt, President, ICE and National Infrastructure Commissioner sat on a panel with Copper and PBA.

# **THE NATIONAL INFRASTRUCTURE ASSESSMENT**

## **PROCESS AND METHODOLOGY**

### **CONSULTATION**

#### **Responses from Cornwall Council**

##### **Section 2. REMIT AND PLAN**

##### **Q1. The Government has given the National Infrastructure Commission**

###### **Objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

###### **What issues do you think are particularly important to consider as the Commission works to this objective?**

- Historically, due to location and lack of connectivity, some areas have been overlooked with regard investment in growth and infrastructure.
- Changes in technology and connectivity means that this has changed significantly. The 'unique selling proposition' for regions such as those in the South West are now more viable. This needs to be reflected in new ways of thinking about planning for future growth and the type of infrastructure that is needed.
- National priorities need to be developed in such a way that it does not exacerbate regional disparities, or overlook the contribution that can be made in peripheral regions.
- Infrastructure planning should be carried out in conjunction with skills and business initiatives.
- In peripheral regions this will mean that they can respond effectively to new opportunities and challenges which cannot reasonably be predicted over a 30 year time span.
- Planning around the environmental asset. Development in Cornwall can be an exemplar for other areas, delivering growth in post-industrial areas which is co-ordinated with environmental management and addressing market failures.
- The consultation reference to 'Climate change and environment' is noted. 'Sustainable growth' must be that be supported by a stable foundation, therefore, infrastructure for coastal protection and flood mitigation is critically important.

##### **Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

Infrastructure planning to consider where regions can become self – sustaining and reduce dependence on a single hub area. Research and development as to how this can be achieved will lead to greater national competitive advantage.

We welcome the notion that the NIA will be undertaken in a way that will challenge established thinking, with regard to environmental (green and blue) infrastructure.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

- These sectors are ‘Supply’ characteristics which need to be considered in relation to demand for growth and development.
- A 30 year vision and needs assessment requires some pre-determined views on where growth will occur or where it can be encouraged.
- Changes in technology and connectivity mean that peripheral areas are in a much stronger position to contribute to National growth and resilience – This should be borne in mind when planning for growth.
- Infrastructure alone will not be a driver of growth. Wider conditions for growth need to be considered.
- There will need to be corresponding developments in research/development, technology, education and skills training, as well as progressive planning policies and support for new business initiatives.
- It follows that a ‘pipeline’ planning approach is needed to ensure that infrastructure is developed in alignment with skills development, research, and business innovation so that regions can respond effectively to new opportunities and challenges that cannot be predicted over a 30 year horizon.
- New developments in technology, energy production and waste management need to be considered in relation to the potential of specific regions
- Cornwall is working on ‘Grid Low Carbon Energy Development’, a sector where Cornwall does have unique selling propositions, including marine renewables. It would be encouraging to see planning for infrastructure development which supports the business case and rationale for further research and development work in this sector.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

- Climate change adaptation for existing settlements is essential, enabling communities to withstand more uncertain climatic conditions needs to underpin all ambitions for growth. (Refer to UK Climate Change Risk Assessment 2016)
- Supporting infrastructure for regional circular economies also may require government investment, particularly in the modelling required to establish how systems can be optimally designed.

- Public transport initiatives have the potential to strengthen the viability of urban areas, Town and City Centres, ensuring that these become a focus for new investment and growth. This in turn, this makes infrastructure planning more effective
- This is particularly true regarding the rail network and developments in rail technology. This is anticipated to have a significant future impact in the south west.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

A 'needs' assessment should include assessment of areas where there are market failures, if infrastructure planning is aimed at fostering growth in all regions.

Sustainable economic growth has to be premised on the basis of a sustainable environment that then provides a high quality of life for people, that delivers equal opportunities and social inclusion.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

Agree with all of Cross cutting issues. Understanding the geographical potential for individual regions will be important. As indicated in para 37, it is anticipated that there will be further study and a task force to do more detailed work on this. It is hoped that there will be an opportunity to input into this work.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

In terms of economic growth, regionally and nationally, infrastructure support is not the whole case. This needs to be matched with skills and business initiatives.

There is a tendency for planning infrastructure investment to focus on capital expenditure. Planning for growth needs to consider revenue funding to deliver skills, R&D, jobs and business initiatives.

### **Section 3. METHODOLOGY**

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

On a national scale there will be a tendency to focus only on larger projects, and current areas of growth. If schemes are be assessed on the basis of benefit to all regions, and increasing disparities with more peripheral areas are to be avoided, it would be useful to see how 'national' benefits are assessed, criteria defined and measured

Although it is a difficult and speculative assessment, attention needs to be given to factors which impact on private sector demand, decisions for new investment and impacts on the locations of growth and the ability to adapt to changes in the market.

As indicated in the response to question 1, and above, infrastructure planning should be carried out in conjunction with skills and business initiatives. This will enhance the regional and national responsiveness to new opportunities and challenges which cannot reasonably be predicted over a 30 year time span.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

Cornwall is working on 'Grid Low Carbon Energy Development', a sector where Cornwall does have unique selling propositions, including marine renewables. It would be encouraging to see planning for infrastructure development which supports the business case and rationale for further research and development work in this sector.

Cornwall is also working on an innovative whole catchment flood reduction scheme in an industrial community, which could make some contribution to the NIA methodology for assessment. More details can be provided if required.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

With regard to population and demography, there needs to be an awareness of the importance of internal connectivity (public transport and digital) within regions and its importance in skills development, and a functioning competitive environment which can contribute to the competitiveness of the region in the wider market.

The relationship between these drivers and infrastructure is an iterative one. Where there is infrastructure, growth can take place; and vice versa; where growth takes place there is a measured need for infrastructure.

New technology and connectivity means that peripheral areas previously excluded from this loop can be seen to have new potential. It is hoped that the 30 year vision will recognise the new potential across all regions in its final assessment.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

It is anticipated that the success of the 30 year vision will be dependent on a clear assessment of need and deliverability of infrastructure, the capacity for future growth and adaptability in response to changes in the national/global market.

It is essential that account for natural capital is made in this portfolio assessment, work by Defra, its Natural Capital Committee and the ONS on bringing natural capital into the national accounts by 2020, should be reflected in assessments for long term infrastructure planning.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

- As indicated in the response to previous questions, planning infrastructure within a wider agenda for economic growth needs to consider skills and business development which enhances the ability to respond to (increasingly more frequent) changes in the global market.
- Historically, due to location and lack of connectivity, some areas have been overlooked with regard to investment in growth and infrastructure. Changes in technology and connectivity means the 'unique selling proposition' for regions such as Cornwall to accommodate growth should be reflected in new ways of thinking about infrastructure planning.
- Peripheral regions can more effectively respond to new opportunities and challenges which cannot reasonably be predicted over a 30 year time span.
- Cornwall's natural resources mean it has a broad range of renewables and low carbon energy potential. This needs to be taken into account with plans for growth and infrastructure provision.
- Planning around the environmental asset, in terms of potential benefits and risks. Development in Cornwall can be an exemplar for other areas, delivering growth in post-industrial areas which is co-ordinated with progressive environmental management and addressing market failures. Delivering sustainability will only be possible by taking proper account of our natural capital..

#### **Section 4. ENGAGEMENT: GETTING YOUR VOICE HEARD**

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

Cornwall Council would like assurance that there will be sufficient opportunity to for a considered input into the vision document.

#### **Contact reference:**

[name redacted]

[job title redacted]

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Environment

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5 August 2016

Your ref. URN 16D/224  
Our ref. NDD Consultation

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## **The National Infrastructure Assessment: Process and Methodology. A consultation.**

DONG Energy is one of the leading energy groups in Northern Europe. Headquartered in Denmark, we have an interest in several European markets and cover a wide range of energy sector activities. In the UK, we are the market leading developer and operator of offshore wind farms.

Since 2004, we have invested over £6 billion in the UK through expansion of our offshore wind portfolio, continued development of our oil and gas activities in the West of Shetland region and introduced new flexibility solutions for our business customers.

Addressing the government's so called 'energy trilemma', that is, the challenge of keeping the lights on, at an affordable price while decarbonising the power system should serve to foster long-term and sustainable economic growth across all regions in the UK. As it evolves, Electricity Market Reform is the ideal conduit to deliver this, supported by a holistic and long-term view of infrastructure needs.

Recent growth in offshore wind has improved the quality of life for many living in the UK, contributing to local job creation, local economic activity and the development of local supply chains. Moreover, when a large number of people are located in the area to work on the wind farm in the construction phase, these people need transportation, food and services. This creates jobs in other industries, and when the wind farm is in operation, people are needed to operate and maintain it. All of this has led to our UK wind farms now producing enough electricity for 4.4 million UK citizens, with more in the development and construction phases.



The UK is the clear world leader for offshore wind with more wind turbines deployed than any other country. In 2014, the Energy Minister at the time, Michael Fallon best described the benefits that offshore wind can provide for the UK:

'The UK is the world leader in offshore wind - with more deployed than any other country...The benefits that offshore wind can bring are clear: as costs fall it can enhance our long-term energy security, reduce our dependence on imports and help reduce our carbon emissions. And, crucially, offshore wind can play a vital role in driving growth - adding billions of pounds of value to the UK economy and supporting thousands of jobs.'<sup>i</sup>

DONG Energy agrees with the sectors the NIA will cover, building on the work of the 'Smart Power' report and considering how the energy system as a whole will function.

With respect to waste, DONG Energy's biosource facility, REnescience Northwich is currently under construction, which will recover resources from waste, recycle and generate renewable electricity. We would be happy to meet with the Commission to further explain this and to discuss any other issues relating to energy infrastructure.

DONG Energy welcomes the Commission's commitment to engage with external stakeholders more widely and the engagement strategy put forward in this consultation seems a sensible route to capture the expertise and opinions of a wide range of stakeholders.

We look forward to continued engagement with the Commission.

Yours sincerely

[name redacted]  
DONG Energy

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<sup>i</sup> <https://www.gov.uk/government/news/decc-and-industry-sets-out-plan-to-stay-world-leader-in-offshore-wind-and-boost-economy>



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# RESPONSE TO THE NATIONAL INFRASTRUCTURE ASSESSMENT CONSULTATION

## EXECUTIVE SUMMARY

The UK political landscape has shifted dramatically since a majority of voters chose, on 23<sup>rd</sup> June 2016, to leave the European Union. The result exposed deep divides within the country – most acutely between those who have benefited from, and those who have been left behind by, globalization and the modern British economy.

New Prime Minister, Theresa May, has responded by committing ‘to make Britain a country that works not for a privileged few, but for every one of us.’ To deliver on this, she has set out her administration’s commitment to regional regeneration and growth, to more – and better quality – jobs, to the UK’s carbon budgets and to an industrial strategy that not only delivers on these domestic priorities but can also ensure Britain’s place in a competitive and evolving global market place.

How the UK defines and responds to its infrastructure challenge will determine the success or otherwise of this ambitious agenda. The National Infrastructure Commission’s (NIC) National Infrastructure Assessment (NIA) will be vital to driving the solutions required.

There is much to commend in the NIC’s approach to the NIA as described in the consultation paper. Two of the most important aspects of this approach can be found on p21, at paragraphs 58 & 62 respectively:

*“Scenarios... can help answer ‘what if’ type questions and understand how the future might look based on different assumptions. In turn, this provides insight into questions of the form ‘what would you have to believe to prefer one choice over an alternative?”*

*“Given the level of uncertainty in predicting the future, the NIA will need to consider strategies which are sensible across a wide range of possible futures...”*

A successful methodological approach must meaningfully internalize these aims. In the specific recommendations that follow below, we have sought to advise both on how this could be done and what must be avoided. The following themes feature most strongly:

### **Internalize Aims:**

- > To fully expose and debate the beliefs and assumptions informing different perceptions of the future and the concomitant infrastructure choices and priorities for investment. This would reveal and make subject to scrutiny the priorities and trade-offs that we as a society are, or are not willing to make. In doing so, it would facilitate the NIC’s broader aim of



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developing national and political consensus around proposed solutions, and improve the ultimate choices that are made.

- > To prioritise strategies and infrastructure portfolios which are sensible across a wide range of possible futures, or in other words, 'low-or-no regret options,' and which provide benefits across economic, social and environmental objectives. Examples of such solutions include demand reduction, flexibility and resilience.
- > To ensure that the public are put at the heart of infrastructure decision making.

**The traps the NIA must avoid:**

- > Assuming that recent infrastructure demand is a good indicator of future infrastructure demand.
- > Over reliance on existing models which do not effectively account for whole systems costs or benefits, intergenerational equity or degrees of risk.
- > Taking a 'one shot' predict and provide approach to modeling needs out to 2050 that risks locking-in failure.
- > Failing to expose and extensively test beliefs and assumptions about the future or our exposure to future risk, which prevents political and national discussion from explicitly focusing on the trade-offs we as a society are, or are not willing to take.



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## RECOMMENDATIONS

### E3G's Key Recommendation and Response to Questions 8 & 10

**Question 8:** *Do you agree with this methodological approach to determine needs and priorities?*

**Questions 10:** *Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine?*

- ➔ Our key recommendation in response to this consultation is that the Commission should develop an 'Infrastructure Choice Framework' as part of the 'Building Blocks of the NIA'. This should fully expose the key drivers, the beliefs and assumptions informing different perceptions of the future and the concomitant infrastructure choices and priorities for investment. In doing so, it should facilitate public participation and scrutiny over these choices.

#### Key Drivers of Infrastructure Need

While much has changed since the EU referendum vote, many key drivers for the transformation of Britain's infrastructure remain constant. Critical drivers include the following:

##### Political Imperatives

- > Despite shifts in the political landscape, the imperative to drive investment and address inequalities across all of the UK's cities and regions has been bolstered by the creation of a new Department for Business, Energy and Industrial Strategy (BEIS) 'responsible for helping ensure that the economy grows strongly in all parts of the country, based on a robust industrial strategy'.<sup>1</sup>
- > Global and national commitments to decarbonisation, and to limiting the rise in global temperatures to well below 2 degrees Celsius above pre-industrial levels, continue to gain momentum, as demonstrated by the passing of the UK's Fifth Carbon Budget into law following the referendum, and the signing and imminent ratification of the UNFCCC Paris Agreement.
- > The political commitment to devolving more powers to city level remains, and remains a necessary component of delivering modern infrastructure.

##### International Competitiveness

- > The meaning of 'competitiveness' is evolving as the global market place is transformed.
  - > Renewable energy set new records in 2015 for scale of investment, the amount of new capacity added and the relative importance of developing and emerging economies in that growth.<sup>2</sup> These trends are often seen as risks and uncertainties, but facing them head on by investing in smart, low carbon and decentralised infrastructure in the UK

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<sup>1</sup> Deposited Paper - DEP2016-0638 - Prime Minister on Machinery of Government Changes, [http://data.parliament.uk/DepositedPapers/Files/DEP2016-0638/DBEIS\\_Explanatory\\_Note.pdf](http://data.parliament.uk/DepositedPapers/Files/DEP2016-0638/DBEIS_Explanatory_Note.pdf)

<sup>2</sup> Global trends in renewable energy investment 2016, UNEP & BNEF [http://fs-unep-centre.org/sites/default/files/publications/globaltrendsrenewableenergyinvestment2016lowres\\_0.pdf](http://fs-unep-centre.org/sites/default/files/publications/globaltrendsrenewableenergyinvestment2016lowres_0.pdf)



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brings potential for significant export opportunities for UK businesses as global leaders in the smarter and cleaner infrastructure that emerging economies need.

- > Global annual sales of electric vehicles jumped 60% in 2015, despite the large fall in oil prices.<sup>3</sup> The UK is well placed to be a global leader in the manufacturing of electric vehicles, due to a combination of expertise in high performance engineering, a relatively dense population compared to other countries (reducing need for long distance trips), and a high number of early adopters. However, fierce competition – including from China, which plans to increase electric vehicle deployment by a factor of 10<sup>4</sup> – threatens to outrun the UK in the global race.
- > The global market place is evolving and, as stated in the NIC’s Smart Power report: ‘the UK is uniquely placed to lead the world in a smart power revolution. Failing to take advantage would be an expensive mistake.’<sup>5</sup>

#### Technological Change

- > Global decarbonisation – accelerated by the recent Paris Climate Agreement – has stimulated new waves of technological innovation in clean energy, efficiency and storage which are converging with parallel trends in “smart systems” and big data to expand the best long-term value options available to the UK.
- > System Innovation driven by mobile technology, big data and clean tech is creating smarter infrastructure in cities across the world.<sup>6</sup> Deployment of these innovations is accelerating as new forms of electricity market governance are pioneered across the world, led by sub-national jurisdictions such as New York<sup>7</sup>.

#### Risk and Resilience

- > Climate change is having a material physical impact and increasing risks to our critical infrastructure. According to the Committee on Climate Change, 10-35% of infrastructure disruptions in the UK are already caused by extreme weather events. This will intensify as the climate continues to change. The number of assets in high flood risk areas is forecast to increase by at least 50% in 2050<sup>8</sup>. Growing global resource use is already increasing price volatility and supply constraints on a range of vital commodities, not just oil. As the UK becomes a growing net importer of oil and gas the economic impact of oil prices will steadily increase on macroeconomic growth and trade imbalances.<sup>9</sup>

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<sup>3</sup> Ibid.

<sup>4</sup> Pulling ahead on clean technology, China’s 13<sup>th</sup> 5 year plan challenges europe’s low carbon competitiveness, E3G REFERENCE

<sup>5</sup> NIC smart power report.

<sup>6</sup> BIS, 2013, The Smart City Market: Opportunities for the UK

<sup>7</sup> New York’s Reforming the Energy Vision

<sup>8</sup> Committee on Climate Change, 2015, Progress in preparing for climate change: 2015 Report to parliament.

<sup>9</sup> Office of Budget responsibility, 2010, Assessment of the Impact of Oil Price Fluctuations on the Public Finances

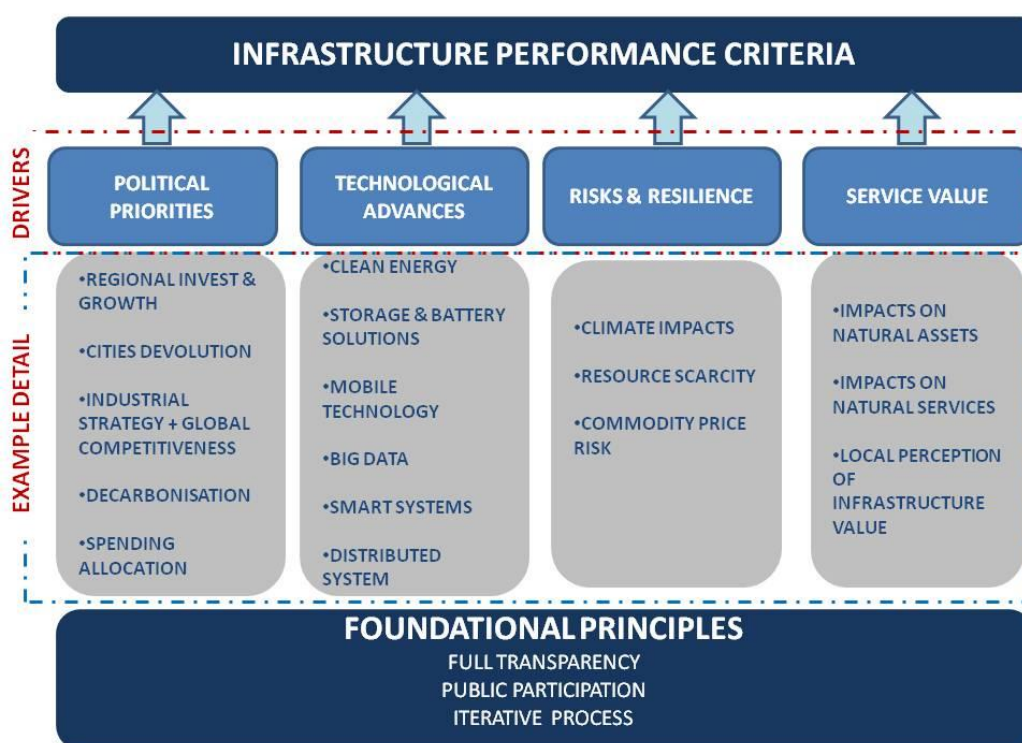
### Develop an 'Infrastructure Choice Framework'

While the key drivers set out above will inform some of the 'what?' – the content of the NIA – they also have significant bearing on the 'how?' – the right methodological approach to developing it. In particular they provide the key components in determining the best infrastructure choices for the UK.

- ➔ The Commission should develop an 'Infrastructure Choice Framework' as part of the 'Building Blocks of the NIA'. This should fully expose the key drivers, the beliefs and assumptions informing different perceptions of the future and the concomitant infrastructure choices and priorities for investment. In doing so, it should facilitate public participation and scrutiny over these choices.

This would provide both a guide to infrastructure choices and a measure against which they could be assessed. It would also aid critical understanding of where infrastructure choices can or should open up or preserve options, and where options may be foreclosed, or there may be a misallocation of investment.

### The 'Infrastructure Choice Framework'



(Figure 1. Infrastructure Choice Framework, E3G (2016))

In this vein, we have set out the key components of an example 'Infrastructure Choice Framework' (diagram above and narrative below). The principles set out below will be relevant throughout the NIA process.



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## FOUNDATIONAL PRINCIPLES OF THE INFRASTRUCTURE CHOICE FRAMEWORK

### *Full transparency*

Effective public scrutiny is essential to avoiding errors and a misallocation of resources. There must therefore be full transparency regarding the building blocks of the NIC's Infrastructure Choice Framework', the NIA and the '2050 Vision, Priorities and Scenarios'. This includes the models and methodologies, key drivers, the baseline and how it was established, key assumptions such as discount rates, and the method by which models are integrated.

### *Public Participation*

Effective public participation through a range of deliberative and participatory processes will be crucial to testing the basis on which infrastructure choices are to be made. This should consist of a much deeper level of engagement than top-down consultation processes. (See further Q13).

### *Iterative Process*

The aim of producing integrated infrastructure models rather than only looking at individual sectors is very welcome and key to understanding synergies and exposing trade-offs. However, there is a danger that without sufficient transparency, the complexity inherent in this approach either overwhelms decision makers or leads to gross simplifications which may bias the final recommendations. The NIA scenarios must therefore be part of an iterative process which updates and revises the models as we learn more about the future, and provides an opportunity to revisit infrastructure choices on a periodic basis.

Scenario planning is inherently weak at forecasting how new technology and business models can reshape infrastructure needs (e.g. personal computers, the internet, mobile technology). If the NIA produces a 'one shot' approach to modeling needs out to 2050 it will lock-in failure. It will be important to build in a process of update and review to revisit the assumptions and drivers behind infrastructure decisions on a periodic basis as new technology and business models are developed. As such the NIA should set out a clear process for reviewing and revisiting the basis on which infrastructure choices are made, at regular 3-5 year intervals.

## KEY ELEMENTS OF THE INFRASTRUCTURE CHOICE FRAMEWORK

The key vertical elements of the infrastructure choice framework reflect the critical drivers of infrastructure need and transformation set out in the section above. In summary:

**1) POLITICAL IMPERATIVES:** The NIA should take account of key political imperatives that will define future infrastructure systems as highlighted above. For example the UK government's commitment to regional investment and growth, cities devolution, decarbonisation, and an industrial strategy that delivers jobs and growth across the whole country whilst ensuring Britain's place in a competitive and evolving global market place.

**2) NEW TECHNOLOGICAL TRENDS:** System innovation driven by mobile technology, big data and clean tech is creating smarter infrastructure in cities across the world and has stimulated new waves of technological innovation in clean energy, efficiency and storage



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which are converging with parallel trends in “smart systems” and big data to expand the best long-term value options available to the UK.

**3) RISKS AND RESILIENCE:** The NIA should take full account of known risks and the cost of ignoring – or betting against – those risks. This should include an assessment of the impact of infrastructure systems choices on the resilience of the UK economy to climate change impacts and resource price shocks. To fully account for these risks the NIA should work closely with the Natural Capital Committee, the Environment Agency, the National Security Council and the Adaptation Sub-Committee of the Committee on Climate Change.

**4) SERVICE VALUE:** The NIA should integrate social and environmental service value into its appraisal of economic value. Infrastructure is ultimately built to meet the needs of the population. People value local benefits of infrastructure on a range of quality of life and environmental factors. Social value will be better reflected in decision making by considering environmental service provision as an interconnected system<sup>10</sup>. By looking at the natural environment as a system which provides services, it is easier to identify the full range of benefits the natural environment provides and manage trade-offs between the value of natural assets and new infrastructure assets<sup>11</sup>.

These elements of the infrastructure choice framework would both guide and measure the Commission’s decision making. It would ensure a comprehensive understanding and transparency of the drivers, assumptions and trade-offs involved. It would provide a basis against which to assess the performance of infrastructure choices taken after the first NIA.

The infrastructure choice framework could be inserted into the NIC’s ‘Pulling the NIA Together’ diagram proposed in the consultation document as in Figure 2 (below).

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<sup>10</sup> HM Treasury, Department for Environment, Food and Rural Affairs, Accounting for Environmental Impacts: supplementary Green Book Guidance (2012), [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/191500/Accounting\\_for\\_environmental\\_impacts.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/191500/Accounting_for_environmental_impacts.pdf)

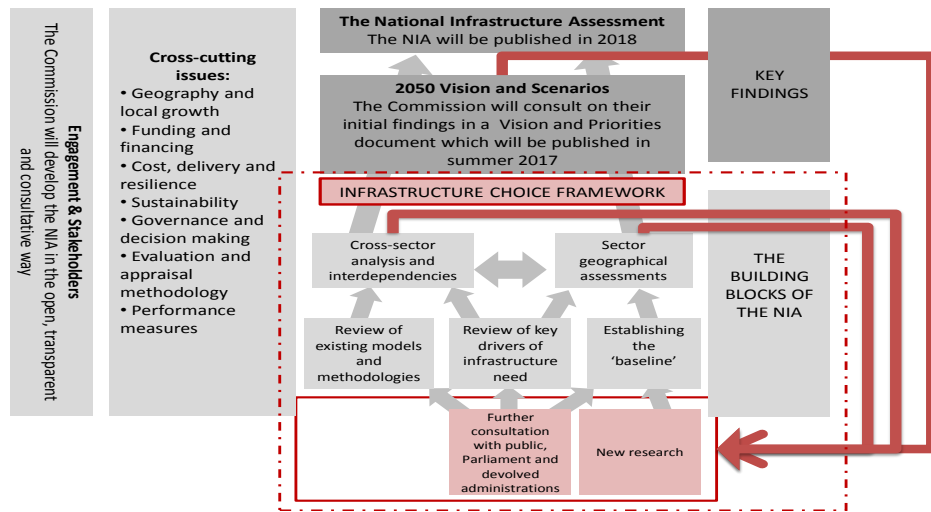
<sup>11</sup> UNEP, WCMC, Living With Environmental Change, National Ecosystems Assessment Follow On Project, <http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx>





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**PULLING THE NIA TOGETHER (E3G INFRASTRUCTURE PATHWAY APPROACH)**





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**Q1. The Government has given the National Infrastructure Commission objectives to: foster long-term and sustainable economic growth across all regions of the UK; improve the UK's international competitiveness; improve the quality of life for those living in the UK. What issues do you think are particularly important to consider as the Commission works to this objective?**

**Recommendations:**

- ➔ Devolution of Infrastructure powers to cities and regions.
- ➔ Priority portfolio of infrastructure investments which are sensible across a wide range of futures. To include:
  - Prioritizing demand reduction and response over new power generation capacity
  - Ensuring new infrastructure compatibility with increase in global temperatures and flooding risk
  - Ensuring compatibility with carbon budgets and net-zero carbon economy by 2050
- ➔ Including investment in Consumer Premises as a key infrastructure investment choice.

**(a) Devolution of Infrastructure Powers to Cities and Regions**

There are clear benefits to co-designing demand and supply together at city and city-region level. Realizing these benefits requires that decisions on certain types of strategic infrastructure investments are shifted nearer to those who can understand and control the level of demand. This will deliver value for money for taxpayers and consumers and ensure that investment can better respond to risks and uncertainties, which requires an ability to understand and manage demand, integrate across infrastructure systems, build-in flexibility and preserve optionality.

In many cases, this can only be done at the local level where demand for services, infrastructure systems and use of public finance can be combined. However, most local governments lack the capacity and resources required for adequate needs assessment for smart infrastructure projects.

Though devolution should not be seen as a panacea, it is a necessary component of delivering modern infrastructure. Comparisons with more federal countries such as Germany and the US show that the current system of centralised decision-making is resulting in the UK falling behind in delivering sophisticated, responsive and integrated systems. Even improved national-level coordination between Whitehall and the economic regulators would fail to unblock the UK's ability to deploy smart infrastructure.

We recommend that the Commission should set a time-bound target for the devolution of infrastructure powers to English cities and regions, setting out the steps that must be taken by Government Departments and local authorities. A target date of 2025 should be set to bring powers to English cities in to line with Scotland and Wales. The Commission should also encourage a competition for 2-3 city regions to become "smart infrastructure zones," pioneering



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new infrastructure management systems which can promote local jobs and growth as well and develop new high value export opportunities.

**(b) Priority portfolio of low-or-no-regrets infrastructure options**

The Commission should prioritise a portfolio of infrastructure investments which are sensible across a wide range of futures, and which provide benefits across economic, social and environmental objectives.

New behaviors and technologies have undermined forecasted infrastructure needs. As the *Transport for a World City* and *High Speed North* reports pointed out, the Department for Transport is taking decisions today that risk preventing cities from designing infrastructure systems that fit with changing future demand and technology.

As the *Smart Power* report showed, this is also true in the energy sector where the development of the demand side of the energy market and the use of digital technology to build efficient and innovative markets, services and technologies has undermined the business case for a large share of the energy infrastructure pipeline, leading to a misallocation of resources.

In this context of changing future technologies and changing demand, it is a priority to identify a portfolio of ‘low-or-no-regrets’ infrastructure options – in other words, infrastructure options that are sensible across a wide range of futures – and which provide benefits across economic, environmental and social objectives. Examples of key priorities include:

**(i) Demand Reduction and Response**

Investing in demand reduction measures benefit consumers improve productivity, increase resilience against a wide range of future scenarios, and reduce the need for expensive ‘supply side’ investments.

The *Smart Power* Report demonstrated that distributed, smart energy infrastructure choices are likely to significantly reduce the cost of delivering secure, clean and affordable energy. The rising cost of the energy capacity market<sup>12</sup> demonstrates the importance of making systems choices; it shows that the current energy system is forcing the Government to approach security and affordability as contradictory policy goals with a zero-sum relationship. The energy system has reached a crucial decision point; intervention is essential because policy failure has become inevitable and risks undermining UK growth, competitiveness and quality of life.

Any solution to this energy system challenge will have a high investment cost but it is clear from work commissioned to the *Smart Power* report that a flexible system has significantly lower costs in the medium and long term:

operational flexibility can significantly reduce the integration cost of intermittent renewables, to the point where their whole-system cost makes them a more attractive expansion option than CCS and/or nuclear [...] the analysis shows that gross benefits of flexibility for reaching the 50 g CO<sub>2</sub>/kWh intensity level are between £7.1-8.1bn per

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<sup>12</sup> Skillings, Simon 2016



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annum, while the corresponding benefits for the 100 g/kWh target amount to £3-3.8bn annually.

The Commission should ensure that infrastructure choices are based on judgements about the energy system we need in order to address predictable future demand, whilst meeting political priorities and preserving the optionality required to address technology risk.

**(ii) New infrastructure resilient to increase in temperatures and flooding risk**

Ensuring the resilience of all new infrastructure to climate impacts will improve the quality of life and well-being for those living in the UK and improve productivity. It also provides a solution which is sensible across a wide range of future scenarios.

The risk of a catastrophic flood over the next two decades, causing in excess of £10 billion in damage, currently stands at 10 per cent<sup>13</sup>. That is ten times more flood damage than the combined impact of the tidal surge and storms across the winter of 2013/14, and three to four times more damage than the widespread flooding of 2007 - the largest civil emergency since the second world war. As the burning-embers diagram below – produced for the Climate Change Risk Assessment 2017 by the Adaptation Sub-Committee of the Committee on Climate Change<sup>14</sup> – demonstrates, there is a high risk that UK climate change impacts will exceed the resilience of the majority of our critical infrastructure assets.

The Commission should work closely with the Committee on Climate Change to develop a means of appraising the value of resilience against the kinds of cascade infrastructure failure witnessed during the 2013/14 Winter floods in the UK. Analysis of the lessons of Hurricane Sandy by the Committee's Adaptation Sub Committee demonstrated that the value of resilience is not captured in current infrastructure decision making.

This highlighted how the magnitude of impacts of disruption are highly non-linear and that a 1-in-200 year event inundating key resource infrastructure (e.g. fuel and food depots) can lead to a cascade of resource disruption, depleting stocks across the region within a few days. This is broadly supported by Pant et al., (2016) that shows the indirect impacts of infrastructure disruption from a 1,000-year extreme event are 15 times larger than those from a 100-year event<sup>15</sup>

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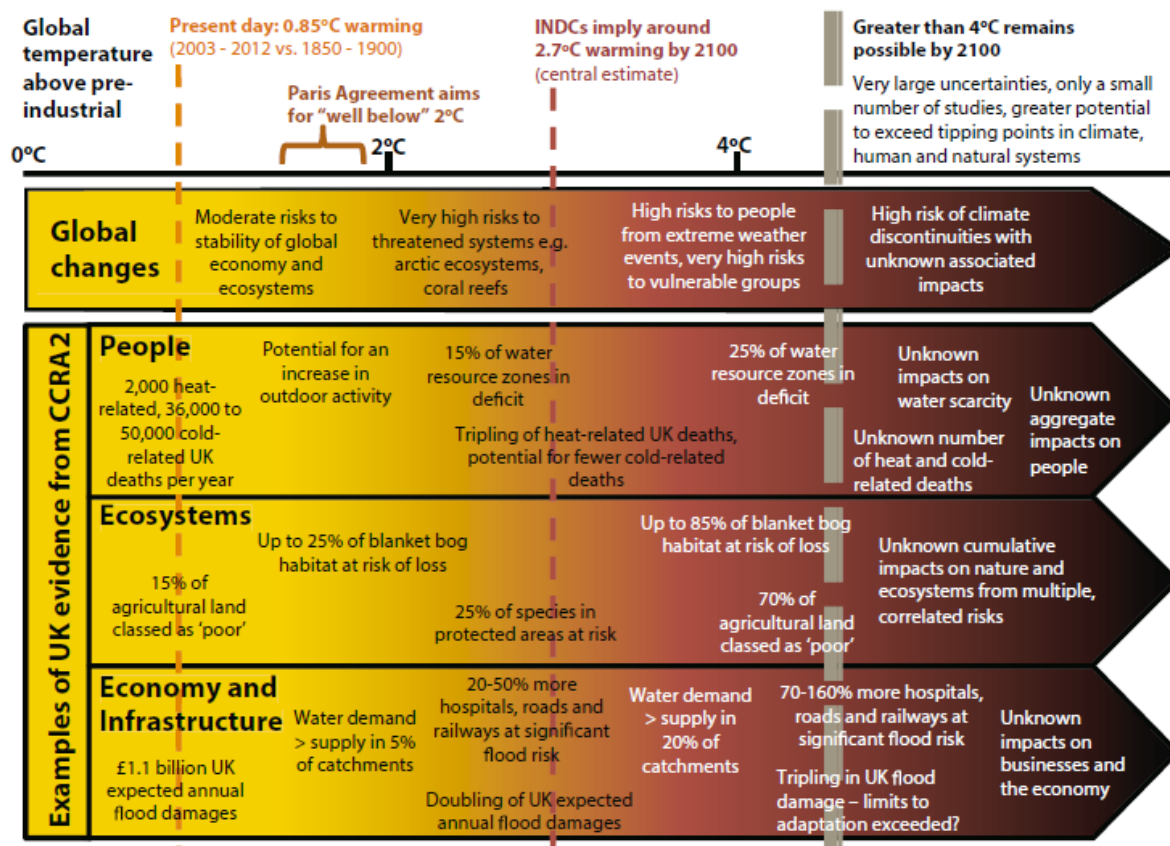
<sup>13</sup> Committee on Climate Change Adaptation Sub Committee progress report (2014) [http://www.theccc.org.uk/wp-content/uploads/2014/07/Final\\_ASC-2014\\_web-version-4.pdf](http://www.theccc.org.uk/wp-content/uploads/2014/07/Final_ASC-2014_web-version-4.pdf)

<sup>14</sup> Committee on Climate Change Adaptation Sub Committee, Climate Change Risk Assessment 2017 (2016), <https://www.theccc.org.uk/publication/uk-climate-change-risk-assessment-2017/>

<sup>15</sup> *ibid*



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**Source:** Warren et al. (2016) for the ASC.  
**Notes:** This chart shows a selection of impacts drawn from the CCRA2 chapters for different degrees of global temperature increase above a pre-Industrial baseline. The methodology, references and precise temperature estimates for each of the impacts shown can be found in Warren et al. (2016) for the ASC, including for a wider range of impacts than shown above. Colours in bars denote changes in global temperature only, and do not indicate the magnitude or severity of the impacts shown (and therefore this should not be compared to the 'burning embers' diagram in IPCC (2014, Assessment Box SPM.1, Figure 1)). The temperature scale refers to the possible changes in global temperature by the end of the century but not the rate of change. Many impacts will be sensitive to the speed, as well as the magnitude, of global temperature change.  
 Water resource zones (WRZs) are those used for the public water supply.  
 Intended Nationally Determined Contributions (INDCs) towards reducing global greenhouse gas emissions are as proposed by countries in advance of the Paris Conference of the Parties (Götschow et al., 2015).

(Figure 3. Committee on Climate Change Adaptation Sub Committee, Climate Change Risk Assessment 2017, Figure SR.7: Magnitude of UK climate change impacts for various degrees of global warming)

The Commission should integrate the recommendations of the Climate Change Risk Assessment, that the impacts of climate change must be considered and where the asset is to last for >60 years then the 2080 high emissions scenario (50% level) should be applied<sup>16</sup>.

<sup>16</sup> The Climate Change Risk Assessment 2017, Committee on Climate Change Adaptation Sub-Committee, Chapter 4, p97, <https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/ccra-chapters/infrastructure/>



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The urgent public need for new flood defense infrastructure is matched by overwhelming public support for the additional investment required to build it<sup>17</sup>. Yet current flood infrastructure investment plans have allowed flood risk to increase<sup>18</sup>.

Current flood defense infrastructure planning is inconsistent across different administrative areas, industries and infrastructure types. In most areas projected climate change impacts are not properly considered. Expected annual flood damages today stand at £1.9bn and this is expected to rise to £2.1-£3.2bn over the next 10 years.

Our homes, businesses and critical infrastructure are not resilient to existing flood risk let alone the expected increase from climate change: over five million homes are at risk of flooding; a quarter of all bridges in England have a medium risk of collapse over the next decade and 5% have a high risk; and 10 – 14% of emergency service stations and 6 – 8% of hospitals, care homes and surgeries are located in areas that are susceptible to river and coastal flooding<sup>19</sup>.

The risk to these critical pieces of service infrastructure is amplified by the growing risk of cascade-failure as transport and power infrastructure assets are increasingly vulnerable. Power stations (41%, 6% and 18% of all power stations in England are at risk of river and coastal flooding, surface water, and groundwater flooding respectively), proportions of railway track (17, 9 and 17%) and railway stations (14, 3 and 16%), A-roads and motorways (9, 6 and 9%) and clean and wastewater treatment sites (33, 12 and 24%).<sup>20</sup>

As a priority, the Commission should therefore address interdependencies and the risk of cascade infrastructure failure and encourage Government departments, the devolved administrations, regulators and infrastructure operators to work together to address vulnerabilities using the risk assessment framework for infrastructure developed by the Committee on Climate Change for the 2017 Climate Change Risk Assessment<sup>21</sup>.

### **(iii) Consistency with the Carbon Budgets**

Ensuring that all new investment is consistent with our carbon budgets and the goal of a net zero carbon economy by 2050, is both important to the well being of those living in the UK but will also have significant competitiveness and export benefits if the opportunities are grasped swiftly enough.

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<sup>17</sup> Public Attitudes to Infrastructure Survey, Copper Consultancy for the National Infrastructure Commission, [http://www.copperconsultancy.com/wp-content/uploads/2015/12/20151203\\_Attributes-to-infrastructure-in-Great-Britain-2015\\_FINAL-PDF.pdf](http://www.copperconsultancy.com/wp-content/uploads/2015/12/20151203_Attributes-to-infrastructure-in-Great-Britain-2015_FINAL-PDF.pdf)

<sup>18</sup> Adaptation Sub Committee progress report (2014) [http://www.theccc.org.uk/wp-content/uploads/2014/07/Final\\_ASC-2014\\_web-version-4.pdf](http://www.theccc.org.uk/wp-content/uploads/2014/07/Final_ASC-2014_web-version-4.pdf)

<sup>19</sup> HR Wallingford, 2014 for the Adaptation Sub-Committee, <http://www.theccc.org.uk/wp-content/uploads/2014/07/5-MCR5195-RT003-R05-00.pdf>

<sup>20</sup> Committee on Climate Change Adaptation Sub-Committee, Climate Change Risk Assessment 2017, Chapter 4, Infrastructure, p7, <https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/ccra-chapters/infrastructure/>

<sup>21</sup> Committee on Climate Change Adaptation Sub-Committee, Climate Change Risk Assessment 2017 (2016), Chapter 4, Infrastructure, p13, <https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/ccra-chapters/infrastructure/>



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The UK is on track to meet the Second (2013-17) and Third (2018-2022) Carbon Budgets but recent policy changes have undermined investment security<sup>22</sup> and confidence in the Government's plans to meet the Fourth (2023-2027) and Fifth (2028-2032) Carbon Budgets<sup>23</sup>. The Committee on Climate Change (CCC) have demonstrated that the lowest-cost trajectory to meet the UK's legally binding carbon targets requires that the carbon intensity of power generation decreases from around 450 gCO<sub>2</sub>/kWh in 2014 to 200- 250 g/kWh in 2020, and to below 100 g/kWh by 2030<sup>24</sup>. Under this lowest-cost trajectory low-carbon generation reaches a total share of around 75% of generation by 2030.

The NIA should be informed by the CCC's conclusion that the 2020s are a crucial decade for the future of the power sector. Their findings show that onshore wind and ground-mounted solar deployment should be the priority in the first half of the decade, and nuclear, offshore wind and potentially carbon capture and storage (CCS) in the second half of the decade. The Commission should address the risk that, instead of delivering this essential transformation, current policy will result in no deployment of additional onshore wind and CCS and only a limited deployment of offshore wind<sup>25</sup>. A CCC review of Department of Energy and Climate Change *Energy Trends* data shows that this risk to low carbon deployment could present a significant barrier to balancing supply and demand as a generation gap of over 100TWh is set to open up in the mid 2020s rising to 200TWh by 2030 (see Figure 3 below).

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<sup>22</sup> Ernst&Young warned in September 2015 that "The lack of clarity and direction around UK energy policy may undermine investment" and concluded that "At best it may be a case of misguided short-term politics getting in the way of long-term policy. At worst, however, it's policymaking in a vacuum, lacking any rationale or clear intent." (EY, Renewable Energy Country Attractiveness Index -Issue 45 - country focus – UK, p35-37 [http://www.ey.com/Publication/vwLUAssets/RECAI-45-September-15-LR/\\$FILE/RECAI\\_45\\_Sept\\_15\\_LR.pdf#page=35](http://www.ey.com/Publication/vwLUAssets/RECAI-45-September-15-LR/$FILE/RECAI_45_Sept_15_LR.pdf#page=35))

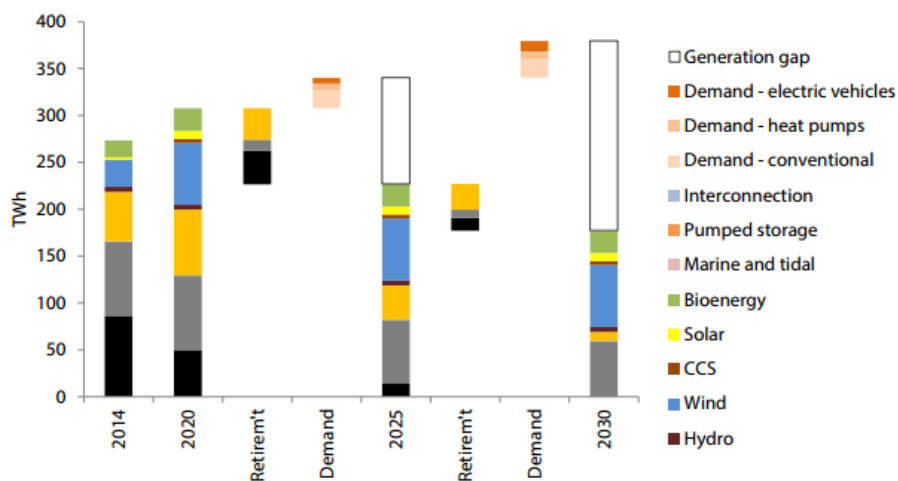
<sup>23</sup> The Committee on Climate Change warned in September 2015 that "[t]he uncertainty created by changes to existing policies and a lack of replacement policies up to and after 2020 could well lead to stop-start investment, higher costs and a risk that targets to reduce emissions will be missed." (A letter from Lord Deben, Chairman of Committee on Climate Change, to The Rt. Hon. Amber Rudd MP, Secretary of State for Energy and Climate Change, 22 September 2015, <https://www.theccc.org.uk/publication/letter-clarifying-the-direction-for-low-carbon-policy/>)

<sup>24</sup> Committee on Climate Change, Sectoral scenarios for the fifth carbon budget – Technical report, November 2015, <https://www.theccc.org.uk/publication/sectoral-scenarios-for-the-fifth-carbon-budget-technical-report/>

<sup>25</sup> PWC warned in May 2015 that 'Policymakers must be mindful of industry's need for sufficient long term certainty to support the investment decisions necessary to maintain an appropriate balance between security of supply, decarbonisation and affordability' State of the renewable industry: Investment in renewable electricity, heat and transport, May 2015, <http://www.pwc.co.uk/industries/power-utilities/insights/investment-in-renewable-energy.html>



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(Figure 6. Committee on Climate Change (2015) Power Sector Scenarios for the Fifth Carbon Budget, p32)





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**(c) Including investment in Consumer Premises as a key infrastructure investment choice**

Delivery of a wide range of policy objectives, for example around efficiency, digital technologies, low carbon heating, cooling and transport, requires huge investment in consumer premises. There is no evidence that the current ‘price and pray’ approach will deliver the wide consumer engagement needed. New thinking is required to ensure:

- > A body (or bodies) is responsible for delivering investment in consumer premises
- > *There is an equitable allocation of resources between consumers and other infrastructure priorities*

Markets must be designed to allow this to happen.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be: Open, transparent and consultative; Independent, objective and rigorous; Forward looking, challenging established thinking ; Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks? Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

It will be important to ensure real public engagement (not just consultation and presentation), and therefore to add engagement and consensus expressly to the NIC’s principles, as they should go to the heart of the NIC’s work. In addition, when taking a comprehensive whole system approach it will be important that this is a whole and ecosystems approach. This should also be clearly set in a spatial context.

In order to deliver on these principles the NIA must be both accountable to the UK Parliament and to the devolved administrations in Scotland and Wales.

- ➔ A Parliamentary Joint Committee on Infrastructure should be established to hold the Government and the National Infrastructure Commission to account and scrutinize all aspects of related work.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

The stated focus sectors are welcome, however the NIA should retain a primary focus on infrastructure systems and the interaction between different infrastructure sectors rather than focusing on specific projects within sectors. The Commission should also ensure that the NIA does not adopt a narrow definition of infrastructure that forecloses options that can deliver significant cost reduction.

- ➔ The Commission should adopt broader definition of infrastructure to explicitly include new housing/buildings, energy efficiency retrofitting in the existing building stock, distributed energy systems, electrical efficiency and – “green” infrastructure such as forests and natural flood defenses.

To effectively deliver a whole systems approach, the Commission must:



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- Collaborate on integrated demand and risk scenarios with the Committee on Climate Change, Economic Regulators Network, National Audit Office and Natural Capital Committee.
  - Avoid the constraints of current policy orthodoxy.

#### **(a) Definition of infrastructure**

Infrastructure systems cannot be effectively designed, assessed or managed when major elements of enduring investment which determine future demand levels and which can substitute for supply side options are ignored. The working definition of infrastructure should be expanded to explicitly include new housing/buildings, energy efficiency retrofitting in the existing building stock, distributed energy systems, electrical efficiency and – based on advice from the Natural Capital Committee – include “green” infrastructure such as forests and natural flood defences.

Current Government plans will see two-thirds of existing power stations closing by 2030<sup>26</sup> by which time virtually all power will be zero carbon<sup>27</sup>. Current energy policy is failing to deliver the smart power system that we need to secure zero-carbon power<sup>28</sup> whilst reducing costs for consumers<sup>29</sup>.

#### **(b) Collaborate on integrated demand and risk scenarios**

Design of future infrastructure systems requires coherent and up to date scenarios of the technological, demographic, environmental and policy landscape the UK faces. These scenarios must cover both domestic and international forces and potential shocks over the lifetime of infrastructure investments.

To improve management of performance and resilience the National Infrastructure Commission should collaborate with the Committee on Climate Change, Economic Regulators Network, National Audit Office and Natural Capital Committee to produce consistent forward demand and risk scenarios for the UK covering all major infrastructure systems and their interactions. All UK regulators and decision makers should be required to take account of these scenarios in their work and justify deviations. The aim must not be to try to predict the future but to ensure that the impact of predictable trends is not being willfully ignored in order to simplify decision making.

#### **(c) Avoid the constraints of current policy orthodoxy**

With Government choices continuing to shape the energy market the current narrow focus on competition is increasing the cost of managing a rapidly changing energy system<sup>30</sup>. In order to

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<sup>26</sup> National Infrastructure Commission, Smart Power, March 2015, <https://www.gov.uk/government/publications/smart-power-a-national-infrastructure-commission-report>

<sup>27</sup> Committee on Climate Change Fifth Carbon Budget advice [REVISE TO: Government SI]

<sup>28</sup> Committee on Climate Change, 2015 Progress Report to Parliament

<sup>29</sup> Simon Skillings, E3G, Response to Competition and Markets Authority Energy Markets Investigation, April 2016, <https://www.e3g.org/library/cma-energy-market-investigation>

<sup>30</sup> *ibid*



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make choices that are in energy consumer's best interests Government must take account of the mix of demographic shifts, an efficiency revolution, new digital technology, decarbonisation and the need for resilience against the changing climate and global resource pressures<sup>31</sup>.

Unless energy policy can account for the challenges of the 2020s public money will continue to be wasted on expensive short-term fixes increasing the costs for bill payers today and for taxpayers in the future.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

- Energy Efficiency, Demand Reduction and Demand Response
- Natural Infrastructure; Water and Drainage, Flood Defenses
- Decarbonising Heat

**(a) Energy: energy efficiency, demand response**

New behaviours and technologies have completely shaken up the established energy markets. Taking advantage of the opportunities that increased use of digital technology and enhanced demand-side participation is critical to meeting energy security and decarbonisation policy objectives at lowest cost. Treating domestic energy efficiency and demand side response as infrastructure, and developing smart buildings, grids and cities should be priority recommendations of the NIA.

A report by Cambridge Econometrics found that there is a strong economic case for the decision to reclassify energy efficiency as a national infrastructure priority. They found that a programme of domestic energy efficiency improvement could deliver:

- £8.61 billion per annum in total energy bill savings across housing stock, after comfort take (including energy price inflation)<sup>32</sup>.
- Net benefit of £4.95 billion per annum from the total energy bill savings across the housing stock (after able-to-pay energy efficiency loans have been repaid)<sup>33</sup>.
- 23.6MtCO<sub>2</sub> reductions per annum by 2030, after accounting for direct, indirect, and economy-wide rebound effects. This is roughly equivalent to cutting the CO<sub>2</sub> emissions of the UK transport fleet by one third<sup>34</sup>.
- A more resilient economy, less at risk of shock changes in gas prices, as the economy becomes less reliant on fossil fuels. Investment in energy efficiency in the domestic sector could result in a 26% reduction in imports of natural gas in 2030, worth £2.7bn in that year<sup>35</sup>.

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<sup>31</sup> Mabey et al., E3G, Faster, Smarter, Safer, Cleaner: Making Britain's Infrastructure Systems Fit for the Future, April 2016, <https://www.e3g.org/library/making-britains-infrastructure-systems-fit-for-the-future>

<sup>32</sup> Cambridge Econometrics, Building the Future, Oct 2014

<sup>33</sup> *ibid*

<sup>34</sup> *ibid*

<sup>35</sup> *ibid*



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#### (b) Water and drainage/flood defences: natural infrastructure

Natural ecosystems have a critical role to play in increasing resilience to climate change. Also called green infrastructure or ecosystem-based adaptation<sup>36</sup> this refers to the farmland, woodland, wetlands or other natural ecosystems that provide services like flood protection, carbon storage or water purification. Importantly ecosystem management is an option that is often more readily available to the most vulnerable communities and the rural poor.

Evidence suggests that investments in ecosystems, or “natural capital”, are competitive with the returns generated by more traditional heavy infrastructure or technological investments that are made to reduce vulnerability to extreme weather events or other natural disasters<sup>37</sup>. The UK National Ecosystem Assessment (NEA) for example placed the value of coastal wetlands at £1.5 billion annually in terms of the role they play in buffering the effects of storms and in controlling flooding<sup>38</sup>. The Economics of Ecosystems and Biodiversity (TEEB) study showed that loss of land-based ecosystems has already cost around €500 billion over the last ten years globally.

Ecosystems have an important relationship with climate change. They can manage increased flood risk and regulate water flow, and can also act as climate regulators through local cooling and carbon capture by trees and management of areas of high carbon stock, such as peatland. Coastal habitats such as mangroves can guard against storm-surges. Sustainable management of grasslands and rangelands can increase resilience to drought and flooding<sup>39</sup>. On the other hand, poorly designed engineered solutions can have significant negative impacts to natural systems<sup>40</sup>.

The UK National Ecosystem Assessment (UK NEA) in 2011 was the first analysis of the UK’s natural environment in terms of the benefits it provides to society and the economy. The NEA found that over 30% of the services provided by the natural environment in the UK are in decline. It argued that the economic and social benefits of the natural environment are not properly valued and insufficient money is being allocated to improving natural capital infrastructure in the UK.

The Natural Capital Committee (NCC) has called for the Government to develop a strategy and corresponding 25-year plan. The Government accepted this recommendation in their 2015 manifesto and the Department of Environment, Food and Rural Affairs has begun developing the plan. Amongst the recommendations made by the NCC is a call to integrate an investment programme for natural capital into the National Infrastructure Plan, and to identify priority investments to incorporate into the NIP:

*“The National Infrastructure Plan should incorporate natural capital into each of the main infrastructure sectors, following the mitigation hierarchy for managing impacts*

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<sup>36</sup> The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people and communities adapt to the negative effects of climate change at local, national, regional and global levels.

<sup>37</sup> Costanza et al., 2008, The Value of Coastal Wetlands for Hurricane Protection; and The World Bank, 2009, Convenient Solutions to an Inconvenient Truth: Ecosystem Based Approaches to Climate Change

<sup>38</sup> NEA, 2011, UK National Ecosystem Assessment

<sup>39</sup> International Union for Conservation of Nature, 2009, Eco-system Based Adaptation: A Natural Response to Climate Change

<sup>40</sup> UNEP, Building Resilience of Ecosystems for Adaptation

*(avoid, minimise, restore, offset). An investment programme for natural capital should also explicitly feature in the National Infrastructure Plan.”<sup>41</sup>*

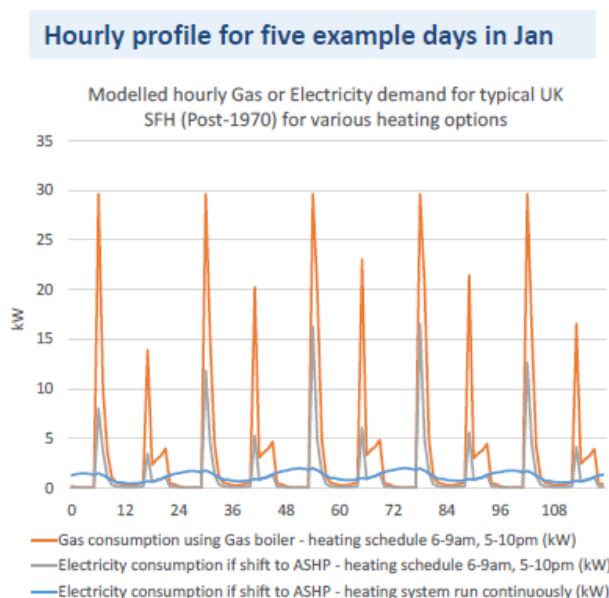
The UK has made important progress in improving the management of ecosystem services. A recent good practice review of 101 Ecosystem-Based Adaptation (EBA) projects across 17 European countries found that roughly half were based in the UK.

**(c) Decarbonising heat**

Electrifying heat in the 2020s can not only ensure that the UK remains on the lowest-cost pathway to our legally-binding emissions reduction targets. It can also ensure that the country develops the expertise and supply chains that create jobs at home and compete in new markets abroad. Unlike decarbonising electricity this transformation of UK energy infrastructure will require end consumers to make significant choices about how they heat their homes.

The decarbonisation of heat will require significantly higher demand flexibility and energy efficiency than electricity decarbonisation to capture the full value. The NIA should ensure that a roadmap for the decarbonisation of heat is matched with the market reforms, targets, and new regulation required for the successful delivery of efficiency improvements and demand response.

A transformational reduction in system balancing costs could be achieved by combining the electrification of heat with domestic energy efficiency and demand response (see Figure 7, below).



(Figure 7. Element Energy for CCC – Research on district heating and local approaches to heat decarbonisation<sup>42</sup>)

<sup>41</sup>The third state of natural capital report, the Natural Capital Committee, January 2015, <https://www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report>

<sup>42</sup> Element Energy for CCC – Research on district heating and local approaches to heat decarbonisation



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The current market is based on the presumption that consumer engagement should be driven by price and price alone. However experience of supplier switching market suggests that the majority of customers will not engage, despite low levels of effort required and benefits that are far greater than are likely through offering demand flexibility or heat electrification.

The Commission should aim to transform domestic heating from a primary contributor to peak energy demand to a virtual battery by combining heat electrification with demand reduction and demand response infrastructure.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

- There are four infrastructure nexus challenges that are urgent and which the Commission is well placed to address through the NIA: electric vehicles and energy demand; water and flood infrastructure; heat and power; and power and digital (so-called 'smart') technology.

The first of these is addressed in detail below whereas the final three are covered in the answer to question four above.

**(a) Transport and energy**

Car battery prices fell 35 percent in 2015. Plug-in electric vehicles (PHEVs) are on a trajectory to make unsubsidized electric vehicles as affordable as their petrol and diesel counterparts in the next six years<sup>43</sup>. The scale of the global shift from petrol and diesel to EV is expected to significantly alter the oil price as demand for the most valuable part of the barrel – petrol and diesel – collapses with little prospect of recovery<sup>44</sup>.

During the Fifth Carbon Budget period zero-emissions vehicles are expected to reach a 60% market share. The rapidly declining cost of plug-in electric vehicles suggests that the majority of these vehicles will be electric. This could add 31TWh to annual electricity demand (or 12% of today's total annual use) by 2030 and increase peak demand by 28GW; an increase in peak demand equivalent to the generation potential of 4,000 7MW offshore wind turbines.

With overnight home charging expected to account for the vast majority of EV passenger vehicles and c. 60% of EV vans smart charging has the potential to reduce the demand from EVs at peak time to zero, by spreading EV demand over times of low demand<sup>45</sup>.

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<https://www.theccc.org.uk/publication/element-energy-for-ccc-research-on-district-heating-and-local-approaches-to-heat-decarbonisation/>

<sup>43</sup> Bloomberg New Energy Finance (BNEF), 2015, <http://www.bloomberg.com/features/2016-ev-oil-crisis/>

<sup>44</sup> Cambridge Econometrics, Poyry, ICCT Oil Market Study, 2016

<sup>45</sup> Transport Energy Infrastructure Roadmap to 2050 - electricity, Element Energy for the Low Carbon Vehicle Partnership, June 2015, <http://www.lowcvp.org.uk/projects/fuels-working-group/infrastructure-roadmap.htm>

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The Commission should aim to transform electric vehicles from a likely contributor to peak energy demand to a virtual battery by combining the roll out of domestic vehicle charging infrastructure with demand reduction and demand response infrastructure.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

Yes, but the Commission should in addition consider:

- ➔ Resilience to the Impacts of Climate Change
- ➔ UK competitiveness in a rapidly decarbonising world

**(a) Resilience to the impacts of climate change**

To address the risk to UK infrastructure from climate change the NIA must address cross-cutting risks relating to the capacity of communities, businesses, infrastructure providers and national and local government across the UK to act early and effectively. The true magnitude of risks and opportunities may be underestimated because each tends to be considered in isolation but in practice will act in combination. Actions to address risks need to be co-ordinated amongst the various responsible bodies to be effective. The adaptive capacity of organisations will be constrained by the knowledge, skills and resources available within key functions, and the level of understanding and appetite for risk amongst decision makers.

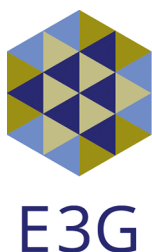
Vulnerability to climate change impacts is changing and these changes are likely to become less predictable and more extreme (see Figure 3). Changes in the size and demography of the UK population will influence the scale of future impacts. The location and design of new buildings and infrastructure could either increase vulnerabilities or help to address them.

As such the Commission should:

- Address interdependencies and the risk of cascade infrastructure failure and encourage Government departments, the devolved administrations, regulators and infrastructure operators to work together to address vulnerabilities.
- All critical infrastructure assets and assets that are expected to last for >60 years should be resilient to the full range of climate impacts in a high emissions scenario.
- Prioritise low-regrets natural infrastructure and policy or regulatory changes that permanently increase resilience or reduce flood risk.

**(b) UK competitiveness in a rapidly decarbonising world**

In a growing and increasingly competitive global market for clean and smart energy, electric vehicles, and other low carbon goods and services, the UK's only option is to lead the low carbon transition. Reforms to incentivize delivery of smarter, cleaner and more resilient infrastructure systems will underpin UK productivity and well-being at home, and lay the foundation for UK



competitiveness abroad, supplying solutions that fast growing, emerging economies actually want<sup>46</sup>.

The Paris Climate Change Agreement commits the UK and its competitors to deep, whole-economy decarbonisation. The global market place is evolving and, as stated in the NIC’s Smart Power report: ‘the UK is uniquely placed to lead the world in a smart power revolution. Failing to take advantage would be an expensive mistake.’

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

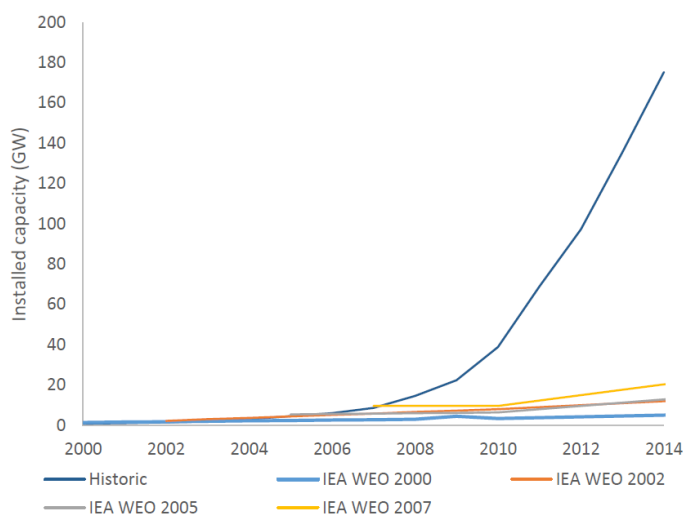
This question is answered in full at the beginning of the document, as E3G’s key recommendation. Included below are some common mistakes the NIC must avoid.

**(a) Overreliance on Forecasting**

The Commission must be wary of repeating the mistakes of the past. Forecasting in the Commission’s chosen infrastructure sectors is notoriously unreliable. For example:

**Power**

Historical evidence suggests that many forecasts for new technology (e.g. renewables) have understated the rate of potential deployment. In particular mainstream models such as the IEAs forecasts for renewables have consistently underestimated actual deployment by several orders of magnitude. In the IEAs 2001 World Energy Outlook 15 years ago the prediction for total renewables supply in 2020 was 697 Mtoe (up from just over 400). In 2012 the IEA reported renewables supply broke through 13,000 Mtoe, beating the 2020 forecast 8 years early by a factor of 18. This was not just a one off forecasting error. As shown in figure 9 below for solar PV, repeated revisions of the model 2000 and 2007 did not come close to matching actual deployment, although there was a small upwards adjustment.



SCENARIO	IEA WEO 2000	IEA WEO 2002	IEA WEO 2005	IEA WEO 2007
<b>% DIFFERENCE TO ACTUAL IN 2012</b>	-87.2%	-76.5%	-54.1%	-41.5%

<sup>46</sup> Mabey et al., E3G, Faster, Smarter, Safer, Cleaner: Making Britain’s Infrastructure Systems Fit for the Future, April 2016, <https://www.e3g.org/library/making-britains-infrastructure-systems-fit-for-the-future>





E3G

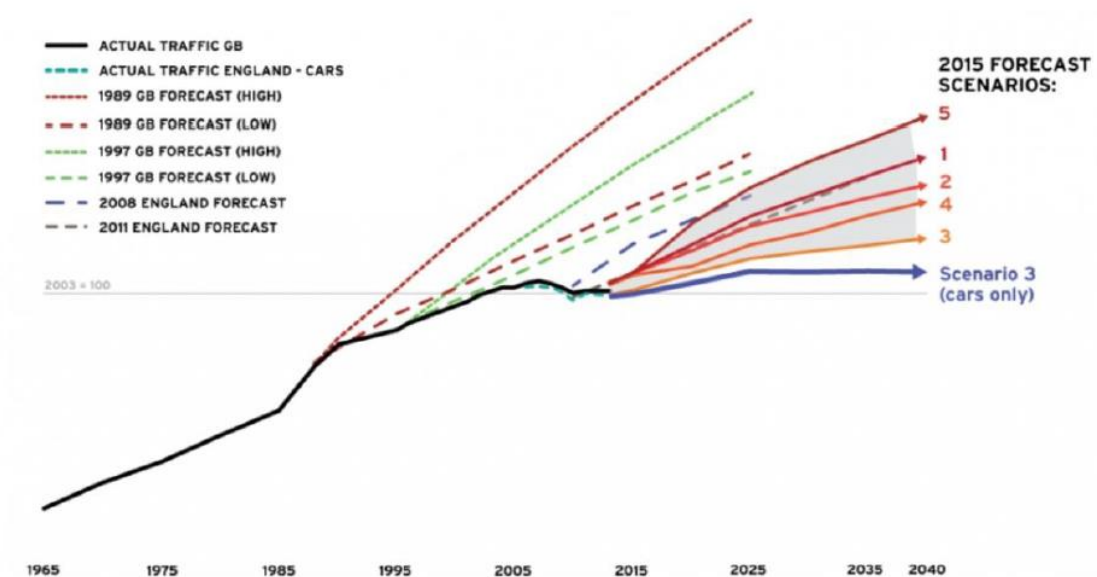
(Figure 9. IEA solar PV forecasts against actual (source: Carbon Tracker, 2015))

An assessment of IEA forecasting methodologies finds that a key reason for the deviation between predictions and reality is an incorrectly applied growth pattern:

*“The WEO reports assume linear growth, whereas history shows an exponential growth for the new renewable energy (RE) technologies. The current exponential growth is part of long-term logistic growth of new RE technologies. Furthermore, a model proposed regarding RE technologies shows that to satisfy the world’s needs with sustainable technologies in the decades to come, the approach of the WEO reports needs to be substantially reworked.”<sup>47</sup>*

### Transport

Road transport was 50% lower in 2010 than DfT predicted in 1990 (See figure 10 below). Forecasts of congestion growth on the national strategic road infrastructure have large ranges: 6% to 26% for 2020 and 22% to 67% for 2030<sup>56</sup>. This analysis does not take into account demographic changes and the impact of information technology on transport demand by 2030. Planning road investment against such ranges makes cost-benefit analysis practically meaningless as a project selection tool.



(Figure 10, Department for Transport)

<sup>47</sup> Metayer, M. Breyer, C. & Fell, H.-J. (2015) *The projections for the future quality in the past of the World Energy Outlook for solar PV and other renewable energy technologies*



E3G

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**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

**The UK Climate Change adaptation regime**

There is evidence that significant adaptation steps have been implemented, or are underway, across most infrastructure sectors as a result of the UK's adaptation regime. Climate change adaptation delivery is split into four components with strong Parliamentary scrutiny through annual adaption reporting to Parliament:

- Climate Change Risk Assessments produced jointly every five years by the Department of Environment, Food and Rural Affairs and the Adaptation Sub-Committee of the Committee on Climate Change.
- National Adaptation Programme (5 year) produced by the Department of Environment, Food and Rural Affairs with and reviewed every five years. The Adaptation Sub-Committee of the Committee on Climate Change reviews the success of the programme in its annual Progress Reports to Parliament.
- Adaptation Reporting Power requiring certain organisations to outline the current and future predicted impacts of climate change and their proposals for adapting to climate change (made voluntary in 2013).
- Annual statutory adaptation reports to Parliament from the Adaptation Sub-Committee of the Committee on Climate Change assessing Government progress on the National Adaptation Programme.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

This question is answered in the key recommendation at the beginning of this document.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

In the context of changing future technologies and changing demand, it is a priority to identify a portfolio of 'low-or-no-regrets' infrastructure options; in other words, infrastructure options that are sensible across a wide range of futures. Furthermore, it will be crucial that the Commission prioritizes infrastructure which meets economic, environmental and social objectives simultaneously, and rules out infrastructure which trades-off one objective against another.

Examples of infrastructure investments that satisfy these criteria include: Energy Efficiency, Demand reduction and response (Smart power); Climate Resilience – primarily natural infrastructure/flood defenses; and heat decarbonisation. These are covered extensively in the answer to question 1 and question 4.



E3G

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**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

We have highlighted a missing element in our key recommendation at the beginning of this document, namely the infrastructure choice framework.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

Today's complex infrastructure challenges require a significantly different response from those of the past, and must include wide-spread engagement and support from the public, industry and civil society. This will be fundamental if the Commission is to succeed in developing public and political consensus on the UK's future infrastructure needs. Achieving this will require the Commission to address the following:

- > Engaging the public, industry and civil society will be crucial to success. This in turn requires an analytical approach that is more flexible and transparent. It is necessary to develop shared assumptions about the future and to understand which matter the most and how they might change. The models must be capable of demonstrating our exposure to future uncertainty such that the national debate can focus on the trade-offs society is, or is not willing, to make. Above all, the models must allow us to understand the whole range of policy levers that are available – across the value chain, geographical borders and sectors – such that least cost options can be identified. It is important that analytical results are widely accepted and they should be reproducible by independent analysts using a variety of models.
- > As such, the Commission should give an undertaking that all methods and assumptions underpinning technical analysis, and the entirety of the evidence base used by the Commission, should be subject to public scrutiny before any advice to Government is finalized. These should be extensively discussed with relevant interested parties and the public as part of a deliberative process to ensure that any conflicting views about need, data, methods, system boundaries and optimizations are resolved and do not undermine the quality of the debate or sustained consensus.
- > Furthermore, the Commission's full assessment, analysis and conclusions should be subject to public scrutiny before the advice to Government is finalized.
- > Engagement of the wider public, in particular, will be vital. Issuing a series of top-down consultation documents will not be sufficient to do this. The NIC should employ participatory appraisal techniques in a wide-selection of different geographical areas with a wide cross-section of different sectors of society to look at public need for infrastructure across the sectors identified. It is critical that the NIC's recommendations start from a strong understanding of what UK citizens need.
- > The proposals in the consultation suggest that the only public engagement will be this consultation and the consultation initiated by the Vision and Priorities document next year.



E3G

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If the efforts to involve the public on this consultation is a guide to the future, it falls far short of what is required.

- > There should be a parliamentary element to the engagement. Relevant select committees have scrutinised draft National Policy Statements, but because the NIA will cut across departmental competencies, a Joint Committee on Infrastructure should be formed for the purpose of providing scrutiny and challenge on the NIA.

**[name redacted]**

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**From:** [email address redacted]  
**Sent:** 19 July 2016 14:25  
**To:** NIA Evidence  
**Cc:** [name redacted]  
**Subject:** National Infrastructure Assessment - consultation

**Categories:** Red category

Feedback for the National Infrastructure Assessment consultation.

I note with some concern that “The NIA will not focus directly on ‘social’ infrastructure, such as schools, hospitals or prisons which are outside the remit that the Commission has been given by the Government.” I consider the NHS Estate across the country to be an integral part of the Commission’s stated objective to “Improve the quality of life for those living in the UK” and as such should be included in the assessment. I assume the same argument could be made by professionals serving the Education and Prison sectors.

As Lord Carter’s efficiency programme gathers pace and Clinical Commissioning Groups with their provider organisations begin to re-design services then the NHS Estate will need to change to accommodate those services. I believe the NHS Estate is hugely important to the quality of life of the public and helps provide a workforce fit and able to allow the country to prosper. It therefore warrants inclusion in the National Infrastructure Assessment.

Kind regards,

**[name redacted]**  
**[job title redacted]**  
**East Lancashire Hospitals NHS Trust**  
**Tel:** [phone number redacted]  
**Email:** [email address redacted]

**Website:** [www.elht.nhs.uk](http://www.elht.nhs.uk)  
**Twitter:** [www.twitter.com/EastLancsHosp](http://www.twitter.com/EastLancsHosp)  
**Facebook:** [www.facebook.com/EastLancashireHospitals](http://www.facebook.com/EastLancashireHospitals)

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5<sup>th</sup> August 2016

Lord Adonis  
Interim Chair of the National Infrastructure Commission  
National Infrastructure Commission  
1 Horse Guards Road  
London  
SW1A 2HQ

Dear Lord Adonis

### **Consultation on the National Infrastructure Assessment**

We welcome the establishment of the Commission and the opportunity to inform the development of a long term approach to infrastructure investment in the UK.

As the National Infrastructure Commission takes forward its work on maintaining and improving our national infrastructure, it is important that the Commission engages with sub-national bodies such as EMC, and its constituent local planning authorities, to ensure that infrastructure plans meet the requirement of local communities, businesses and investors across the whole of the UK.

EMC has worked on a collaborative basis to identify key infrastructure priorities over a number of years, and led the campaign to secure the delivery of the Midlands Main Line upgrade and electrification. EMC is a key partner in the Midlands Connect and Midlands Engine initiatives, and in developing the East Midlands proposition for HS2.

As the representative organisation for councils in the East Midlands, EMC recognises the importance of wider infrastructure provision to the future prosperity of the region, including investment in flood defences, broadband and energy generation and supply. This work was informed by a regionally agreed prospectus, [‘Investing in Opportunity’](#) that provides an overview of many of the infrastructure challenges and enabled the agreement of a set of five infrastructure priorities as part of a more strategic approach to regional infrastructure investment.

We would value the opportunity to meet with the Commission to discuss opportunities for mutually beneficial co-operation.

Yours sincerely

**[name redacted]**

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**From:** [e-mail address redacted]  
**Sent:** 05 August 2016 11:45  
**To:** NIA Evidence  
**Subject:** National Infrastructure Assessment Consultation response

**Categories:** Red category

Good morning,

Regarding the National Infrastructure Assessment consultation currently running, I believe that the NIA should consider the risk to infrastructure from coastal erosion alongside that of flooding. In some areas coastal defences perform a similar duty to flood defences in protecting key pieces of infrastructure (including rail, road and nationally important energy infrastructure), therefore it is equally important that a strategic, long-term approach is taken to their maintenance and management.

Kind Regards,

[name redacted]

[job title redacted]  
JG11a  
Economic Development  
Planning and Economic Regeneration  
East Riding of Yorkshire Council  
County Hall  
Beverley  
East Riding of Yorkshire  
HU17 9BA

Tel: [phone number redacted]  
Mob: [phone number redacted]

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National Infrastructure Commission,  
1 Horse Guards Road  
London  
SW1A 2HQ

or by e-mail to: [NIAEvidence@nic.gsi.gov.uk](mailto:NIAEvidence@nic.gsi.gov.uk)

Q1. The Government has given the National Infrastructure Commission objectives to:

- Foster long-term and sustainable economic growth across all regions of the UK;
- Improve the UK's international competitiveness;
- Improve the quality of life for those living in the UK.

What issues do you think are particularly important to consider as the Commission works to this objective?

*The objectives described above are entirely sensible; indeed noble. But to deliver these objectives by the provision of infrastructure is seriously hindered by the constraints inherent in the planning procedures imposed on delivery agencies.*

*The alternative is to determine the scope and level of infrastructure deemed necessary to meet a democratically elected government's strategic policy objectives and legislate appropriately such that the projects are delivered as a matter of policy without being subject to time wasting bureaucratic public inquiries. This could be supported by a Promoter still being required to undertake consultation with stakeholders and affected parties with the final authorisation and approval of the project being judged against a satisfactory consultation report.*

*Regional Strategic Alliances, and before that the Regional Assemblies – demonstrate the ability to 'join up' strategic infrastructure planning and delivery in a way that Governments have singularly failed to do. Strategic priorities may be better determined by sub-national partnerships working in partnership with the NIC to ensure a strategic, national perspective*

2. Do you agree that, in undertaking the NIA, the Commission should be:

- Open, transparent and consultative;
- Independent, objective and rigorous;
- Forward looking, challenging established thinking;
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks.

*We certainly agree that you should challenge established thinking, particularly in the way major infrastructure projects are developed, funded and delivered. Specifically with regard to the delivery of major rail enhancement projects,*



*Network Rail are not structured appropriately or sufficiently nor are their staff sufficiently experienced to deliver major infrastructure projects. Their primary expertise is and their primary role should be restricted to the maintenance and management of the existing national network*

*Delivery of major rail infrastructure should be enabled by the establishment of Rail Infrastructure Delivery Units not unlike the Road Construction Units that used to operate in the latter part of the 20<sup>th</sup> century when motorway construction was at its height.*

*There is also the potential of statutory Sub-national Transport Bodies (STB), which would be a body corporate, as offering an alternative to using traditional delivery mechanisms. For instance: so imagine a situation where the STB is working with 'delivery partners' such as an alliance between contractors and the STB.*

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

*Whilst noting that the Commission's remit specifically excludes the housing supply, there is an inextricable link between the delivery of new housing and necessary infrastructure which if not in place makes the viability of the new housing very much less attractive if not impractical. Thus it will be worth the NIA noting in the strongest possible terms that the housing supply and the current inability of government to meet the demand for new houses is in no small measure due to the failure to supply infrastructure. The supply of new housing is equally affected by the laborious and inefficient planning regime which, as previously mentioned, constrains delivery of new transport infrastructure in particular but also constrains new housing developments.*

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

*The NIA should concentrate on the mechanisms of infrastructure delivery and consider what might be the most efficient procedures for delivery of the infrastructure and precisely what organisations, whether existing or new, are best placed to deliver. A driver for establishing a Strategic Alliance – and for pursuing the STB – is the desire by political leadership to simplify processes and remove duplication in the approval/delivery processes that currently exist.*

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?**

*Housing Supply and Transport Infrastructure;  
Housing Supply and Energy Supply;  
Housing Supply and Water, Drainage and Flood Defences.*

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

**Yes**

Q7. Are there any other cross-cutting issues that you think are particularly important?

*No*

Q8. Do you agree with this methodological approach to determine the needs and priorities?

*Yes*

Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

*Road Construction Units;  
Development Corporations*

*In particular - London Docklands Development Corporation (LDDC), Milton Keynes Development Corporation. Both were well led and autonomous, able to overcome significant difficulties quickly and deliver high quality infrastructure efficiently and economically*

*The way the East West Rail project has been promoted and delivered demonstrates best practise in the context of joint working between local government and the delivery agency, in this case Network Rail. Local Government (East West Rail Consortium) developed the initial design and the business case which was presented to the DFT. Subsequently thorough agreeing that the Consortium made a substantial contribution toward the cost of the scheme DFT agreed to fund the project. The Consortium as highway and planning authorities are working in partnership with Network Rail to deliver aspects of the project in advance of statutory planning requirements.*

*It has to be said that the overall delivery of this scheme and indeed many other rail schemes in the recent past have been frustrated by the planning regime. Phase 1 of the East West Rail project was subject to two public inquiries and one (spurious) judicial review.*

Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?

*Yes but the most important driver is economic growth.*

Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

*The methodology should be designed to understand which investments will deliver the greatest benefits, economic growth, new jobs and new housing. Oftentimes the smaller infrastructure projects can deliver enormous benefits punching well above their individual weight.*

Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

*No comment*

Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

*The NIC has a small team with a large remit. To engage with all parts of society will be a challenge. People can be cynical about consultation. Make information accessible, relevant and understandable, use 'traditional' media to communicate, but recognise social media, the role of face-to-face meetings and events, to reach the growing number of people that do not read newspapers or relate to politicians messages on TV and radio. Do not let communication / consultation be an afterthought - develop your plan for engagement early and dedicate sufficient resources to achieve this. Commission research that explores the appropriate methods of engagement, relating back to the NIC's overarching objective to foster growth, improve UK competitiveness and improve quality of life for UK residents.*

**[email address redacted]**

---

**From:** [name redacted] [email address redacted]  
**Sent:** 28 July 2016 12:29  
**To:** NIA Evidence  
**Subject:** NIA consultation feedback

To whom it may concern,

I would like to comment in response to the NIA consultation. I would like to point out what I believe to be a huge omission from this NIA – an emphasis on Green Infrastructure and the natural environment and their current and potential role in providing a wide array of benefits to people and businesses.

Many studies from around the globe have found that green infrastructure is cheaper and better at delivering storm water management than traditional grey infrastructure. See reports published by the US Environmental Protection Agency (including but not limited to docs available here: <http://www.epa.illinois.gov/topics/water-quality/surface-water/green-infrastructure/index> and for NYC [http://www.nyc.gov/html/dep/html/stormwater/nyc\\_green\\_infrastructure\\_plan.shtml](http://www.nyc.gov/html/dep/html/stormwater/nyc_green_infrastructure_plan.shtml) ). Not only can they provide the functions delivered by traditional infrastructure, they also provide many other benefits including air quality regulation, temperature regulation, biodiversity, and aesthetic values.

Other global cities have been developing devoted Green Infrastructure Plans (see NYC's Green Infrastructure Program [http://www.nyc.gov/html/dep/html/stormwater/using\\_green\\_infra\\_to\\_manage\\_stormwater.shtml](http://www.nyc.gov/html/dep/html/stormwater/using_green_infra_to_manage_stormwater.shtml) ) to huge benefit – NYC's (fairly) newly implemented green infrastructure Program has resulted in estimated annual combined sewer overflow reduction of 1.68 billion gallons per year, or 8.1% of NYC's total CSO events (NYC's Green Infrastructure Performance Metrics Report, 2016 – available here: [http://www.nyc.gov/html/dep/pdf/green\\_infrastructure/gi-performance-metrics-report-2016.pdf](http://www.nyc.gov/html/dep/pdf/green_infrastructure/gi-performance-metrics-report-2016.pdf) ).

It is not enough to have green infrastructure and the natural environment added on as a sub-section – there needs to be a devoted section and it needs to feed throughout the NIA in a cohesive way. Green infrastructure is integral to being a sustainable society and must be recognised as such within the NIA.

Kind regards,

[name redacted]

[name redacted]

**eftec**

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Ecotricity Group Ltd  
Unicorn House  
Russell Street  
Stroud  
GL5 3AX

11<sup>th</sup> August 2016  
Ecotricity Reference No.: 588B

## **Ecotricity Response to the Consultation on the National Infrastructure Assessment**

Dear National Infrastructure Commission,

Thank you for the opportunity to respond to this consultation. We welcome the establishment of the National Infrastructure Commission and the overall strategic approach that it is taking.

Ecotricity is an independent renewable energy generator and supplier, with around 180,000 gas and electricity customers. We have been generating renewable electricity since 1998, with 80.72 MW of renewable electricity generation from wind and solar and 80.72MW in the pipeline. We also own and operate a small scale wind turbine manufacturer, Britwind, which has customers across the country and around the world. This experience as a vertically integrated renewable energy company makes us well placed to comment on electricity infrastructure needs.

Ecotricity have been supplying gas since 2010 and our gas mix includes green gas certified by biomethane certificate schemes. We are in the process of developing our own green gas mills and currently have 9 sites in the development process. Once up and running, these sites will use grass cuttings as a feedstock. This grass will come from the following sources: management arisings (grass cuttings) from nature reserves, where grass management is necessary to maintain the quality of nature habitats; local farms that use grass as a break crop in crop rotation; and grass grown on land that is not suitable for food cultivation. The method that we propose will have benefits for farming, soil, water quality and flood defence. Therefore, it is a solution that has the potential to answer multiple problems that the National Infrastructure Assessment (NIA) will be addressing.

We believe that our experience in the market makes us well placed to respond to the questions posed. Indeed we have already set out our own vision for a Green Britain in 2030<sup>1</sup>, which we enclose in Appendix A.

## The Missing Infrastructure Sector: Soil

There is one major area of infrastructure missing: soil. As a nation, our ability to produce our own food is dependent on maintaining healthy soils, but degradation in soil quality is already hitting crop yields<sup>2</sup>. Arable farming in the UK is contributing to in top soil dereliction to the point that climate change could rapidly create desertification, followed by high rainfall induced soil erosion. The Countryside Survey of 2007<sup>3</sup> found significant decreases in soil carbon concentrations between 1978 and 2007. Numerous surveys including in arable and horticultural broad habitats in the UK have had similar findings. Most worryingly, recent studies by Sheffield University suggest that the UK has only 100 harvests left<sup>4</sup>. Relying on imports to replace this is not an option as the UN predicts that if current practises continue, the global average could be just 60 years of farming left<sup>5</sup>.

Such dereliction is not inevitable and with the correct policies and practices these problems can be reversed. Just as the development of our electricity infrastructure benefits from appropriate policies, so too does soil health. Furthermore, the practices that help restore soil health are also instrumental in flood defence and improving water quality and, as we will demonstrate below, can also be incorporated into the energy infrastructure. It therefore makes sense that soil maintenance should be seen as an infrastructure priority and form a part of the National Infrastructure Assessment (NIA).

<sup>1</sup> The 2030 Vision and the Econometrics report, on which much of the work was based is available on our website: <https://www.ecotricity.co.uk/about-ecotricity/our-eco-credentials/our-2030-vision-for-a-green-britain>

<sup>2</sup> Allison, R. 2014. UK Soil crisis hitting crop yields, warns experts. *Farmers Weekly*. 10<sup>th</sup> February, available [Online] at: <http://www.fwi.co.uk/arable/uk-soil-crisis-hitting-crop-yields-warns-expert.htm>

<sup>3</sup> Emmett, B.A., Reynolds, B., Chamberlain, P.M., Rowe, E., Spurgeon, D., Brittain, S.A., Frogbrook, Z., Hughes, S., Lawlor, A.J., Poskitt, J., Potter, E., Robinson, D.A., Scott, A., Wood, C., Woods, C. 2010. *Countryside Survey: Soils Report from 2007*. Technical Report No. 9/07 NERC/Centre for Ecology & Hydrology 192pp. (CEH Project Number: C03259). Available [Online] at: <http://www.countrysidesurvey.org.uk/content/uk-results-2007>

See also: Jones, A., Panagos, S., Barcelo, F., Bouraoui, F., Bosco, C., Dewitte, O., Gardi, C., Erhard, M., Hervas, J., Hiederer, R., Jeffery, S., Lukewille, A., Marmo, L., Montanarella, L., Olazabal, C., Petersen, J-E., Penizek, V., Strassburger, T., Toth, G., van Den Eeckhaut, M., van Liedekerke, M., Verheijen, F., Viestova, E., and Yigini, Y. 2012. *The State of Soil in Europe*. European Environmental Agency. Available [Online] at: [http://eussoils.jrc.ec.europa.eu/ESDB\\_Archive/eussoils\\_docs/other/EUR25186.pdf](http://eussoils.jrc.ec.europa.eu/ESDB_Archive/eussoils_docs/other/EUR25186.pdf)

Environment Agency's 'State of Soils' publication from 2004, links organic matter losses and arable cultivation practices: [http://www.adlib.ac.uk/resources/000/030/045/stateofsoils\\_775492.pdf](http://www.adlib.ac.uk/resources/000/030/045/stateofsoils_775492.pdf)

Walling, D.E. & Quine, T.A. (1991), 'Recent rates of soil loss from areas of arable cultivation in the UK, sediment and stream water quality in a changing environment: trends and explanation' (Proceedings of the Vienna Symposium, August 1991) IAHS Publ. no. 203.

<sup>4</sup> Case, P. 2014. Only 100 harvests left in UK farm soils, scientists warn. *Farmers Weekly*. 21<sup>st</sup> October, available [Online] at: <http://www.fwi.co.uk/news/only-100-harvests-left-in-uk-farm-soils-scientists-warn.htm>

<sup>5</sup> Arsenault, C. 2014. Only 60 years of farming left if soil degradation continues. *Scientific American*. 5<sup>th</sup> December, available [Online] at: <http://www.scientificamerican.com/article/only-60-years-of-farming-left-if-soil-degradation-continues/>

**Question 1: The Government has given the National Infrastructure Commission objectives to:**

- Foster long-term and sustainable economic growth across all regions of the UK
- Improve the UK's international competitiveness
- Improve the quality of life for those living in the UK

**What issues do you think are particularly important to consider as the Commission works to this objective?**

We have combined our response to questions 1 and 2 below.

**Question 2: Are there any principles that should inform the way the Commission produces the NIA that are missing?**

It is not clear from the consultation whether environmental sustainability is already a key objective or whether the reference to sustainability is only in relation to economic sustainability.

It is essential that the National Infrastructure Commission prioritises environmental sustainability and greenhouse gas reduction. As a body charged with taking a long term view of multiple infrastructure issues it is important that its assessments and recommendations do not "lock-in" polluting industries and practices. In order to be meaningful, recommendations should meet and exceed the UK's National and International targets and enable the UK to meet the carbon reduction commitments recommended by the Committee on Climate Change. A failure to take the Committee's recommendations on board, would not only risk deprioritising climate change as a national concern, but will also undermine the Commission's remit of taking a long term view.

**Question 3: Do you agree that the NIA should cover these sectors in the way in which they are each described?**

Yes, we believe that transport, energy, water and drainage, flood defence, waste and digital communications are all important areas. As currently presented, sustainability and climate change prevention do not appear to be central concerns in the way that these will be addressed. As noted above, these should be central concerns for all sectors.

**Question 4: Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

We have combined our response to question 4 and 5 below.

**Question 5: The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?**

## **Electricity Networks**

With respect to electricity, one key area that needs to be investigated is that of the distribution and transmission networks. In their current state, the networks are not able to accommodate additional generation, particularly distributed generation. In short, the grid was not designed with distributed, intermittent generation in mind and must now be upgraded to enable renewable generation to come on line.



Under the current framework developers frequently need to pay significant sums for network upgrades as a condition of connecting to the grid. Lines are upgraded separately in response to individual connection requests. In our view, a far more efficient approach would be for whole regions to be upgraded together in anticipation of additional generation connected. We provide more detail on this and other problems we have experienced in the attached response to Ofgem's consultation on Getting an Electricity Connection when the network is constrained in Appendix B.

## **Credit for Onsite Generation**

One way to reduce demand on the distribution networks is to encourage generation on private wires that directly supply an end customer. This reduces demand on the network by replacing electricity that would otherwise flow across the distribution network to supply that customer. By reducing the load on the network, onsite generation is effectively reducing the costs of maintaining it. We would suggest that the Commission should explore ways of incentivising such onsite and private wire generation. The primary way in which the cost of carrying electricity over the distribution network is met is through Distribution Use of System (DUoS) charges, paid for by suppliers and passed on to energy consumers. One means of recognising the benefit from distributed generation could be via a form of DUoS credit to the onsite generator, which would reflect the benefit that this brings to the system.

## **Green Gas: Heat**

The fact that the electricity network is already stretched to meet the requirements of new forms of generation must be taken into consideration when assessing renewable heat solutions. When addressing the issue of how to decarbonise heat, there has long been an assumption that it can simply be electrified. As noted by the Energy Networks Association<sup>6</sup>, to do so would require a complete overhaul of the electricity networks as, even with upgrades already scheduled, the network as it currently stands could not support the additional demand. A far more efficient approach would be to use the existing gas infrastructure to look at making gas sustainable through the use of biomethane, also known as green gas.

As well as assessing interdependencies, the NIA should consider solutions that address multiple infrastructure priorities. Biomethane for grid injection is one example of such a solution. Not only does it have the advantage of using existing pipeline infrastructure, but when grass is used as the feedstock and grown through the method we are proposing, it also contributes to soil improvement; carbon reduction, flood defence and reduces chemical run offs into waterways. This is detailed below.

## **Green Gas: Improvements in Soil Quality**

A major factor in soil dereliction referred to above has been the over concentration of single crops. Low grade arable areas have become extremely dependant on chemicals from herbicides, pesticides and fertilizers, due to their low quality. Although this chemical input improves short term production, in the long run it simply compounds the problem of soil dereliction.

<sup>6</sup> Energy Network Association (ENA) response to Scottish Parliament. ENA. [Undated]. *Submission from Energy Networks Association*. Available [Online] at: [www.parliament.scot/.../Inquiries/Energy\\_Networks\\_Association.pdf](http://www.parliament.scot/.../Inquiries/Energy_Networks_Association.pdf)

On their own, annual arable crops, do not create sufficient soil organic matter to replace the losses from long term arable farming. However, this lost organic matter can be recreated by alternating crops with deep rooted mixed species grasses. This contributes to improved soil health, structure and texture; and both provides an alternative to chemical input and counteracts the impact of its historical use. The benefit of this change of land use can be extended by growing medium to long term grass leys. If managed for silage production, grass leys enable a change of agricultural practice, which over a period of time removes the requirement of added agrichemicals and artificial fertilizers.

Restoration of soil organic matter levels results in major improvements in soil health and texture. This has the following key benefits: improved surfactant adhesion of chemicals within the soil, which provides a natural method of controlled release when conditions for plant growth are at their best; a reversal of top soil dereliction and soil erosion; an increase in soil fertility; and a reduced dependence on chemical fertilizers. Together, all these factors increase the long term ability of the soil to support food production.

### **Green Gas: improvements in drinking water quality**

The improvement of soil organic matter not only increases long term food production; it can also have wider benefits to reducing chemical run off (leaching); improving drinking water quality; and improving flood defences.

Common practice arable farming (using oilseed rape as a break crop in rotation with wheat) relies on specific herbicides and molluscicides such as carbitamide and metaldehyde. In certain places these are exceeding legal limits in drinking water, which causes severe problems at certain times of the year. Replacing bare arable land with a managed turf slows the flow of water and reduces the speed of percolation into the rocks, increasing the opportunity for chemicals to breakdown before entering waterways.

This reduction in speed of flow also provides for increased rainfall absorption, better runoff impedence, downstream flash flooding reduction and better soil moisture retention. This enables the soil to hold and breakdown herbicides and molluscicides, preventing them from contaminating reservoirs; significantly reducing the cost of making water fit for human consumption. A 2015 study<sup>7</sup> into the use of vegetation buffers to retain pesticides in water saturated zones found that grass contributed to reduced pesticide content. A similar study conducted in Southern Quebec<sup>8</sup> in 2009 found that that grassed buffer strips reduced runoff water by 40%; phosphorous reduced by 86%, NH<sub>4</sub> by 47%, NO<sub>3</sub> by 33% and e. Coli by 48%.

Ecotricity has been working on a pilot project with Thames Water and local farmers in the Cotswolds. This is being achieved through DEFRA funding for the Upper Thames Catchment Payment for Ecosystem Services Pilot. The Pilot is based on evaluating the impact of arable farming in a confined part of the Thames catchment and then evaluating the impact of reversion of arable practice to grow mixed species grassland on water body quality improvement. A proposed associate anaerobic digestion plant will consume the production from the grassland created, giving the pilot commercial support.

<sup>7</sup> Aguiar Jr, T.R., Bortolozzo, F.R., Hansel, F.A., Rasera, K. and Ferreira, M.T. 2015. Riparian buffer zones as pesticide filters of no-till crops. *Environmental Science and Pollution Research*, 22 (14): pp.10618-10626.

<sup>8</sup> Duchemin, M., and Hogue, R. 2009. Reduction in agricultural non-point source pollution in the first year following establishment of an integrated grass/tree filter strip system in southern Quebec (Canada). *Agriculture, Ecosystems and Environment*.

Preliminary results from this pilot show a significant reduction in the chemical run off from the land and therefore an improvement in the drinking water in the area. We enclose a copy of this report as evidence in Appendix C.

### **Green Gas: Flood Prevention**

As noted above, grass matt reduces the speed of water flow and retains water reducing flash flooding. This relationship has been well documented in numerous studies. For example, a 2011 study<sup>9</sup> compared runoff and sediment across conditions in which grasses (used for biomass) were either removed or not removed and found that grass removal increased sediment run off by average of 15%.

### **Water Companies as Energy Consumers**

With respect to the relationship that energy has with waste, it is important to consider that water management companies are significant users of energy as well as being potential contributors to renewable solutions.

### **Aviation and Wind Turbines**

Another area that should be looked at is the relationship between wind turbines and aviation: specifically the way in which wind turbines can interfere with radar. Wind farms that are built near airports frequently need to put in place radar mitigation technology as a condition of planning permission. This is currently done on a case by case basis due to the different radar systems at different airports. The cost and length of time taken to develop this technology can be prohibitive, which means that otherwise viable consented projects do not get built. We would urge the Commission to include an overall assessment of this and explore ways of standardising air traffic systems and the radar mitigation technology in order to bring down costs and facilitate more generation.

### **Question 6: Do you agree that the NIA should focus on these cross-cutting issues?**

We have combined our response to questions 6, 7 and 8 below.

### **Question 7: Are there any other cross-cutting issues that you think are particularly important?**

### **Questions 8 Do you agree with this methodological approach?**

We believe that all the cross cutting issues listed should be considered. However, it is not clear from the consultation document how the Commission would weight these different priorities, although it appears that cost will be prioritised. Our view is that, given the urgency of the threat that is posed by climate change and the additional strains it will place on infrastructure; it is climate change that needs to be given the highest weighting.

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<sup>9</sup> Wilson, H.M., Cruse, R.M. and Burras, C.L. 2011. Perennial grass management impacts on runoff and sediment export from vegetated channels in pulse flow runoff events. *Biomass and bioenergy*, 35 (1): 429-436.

## **Sustainability and Climate Change**

In addressing climate change commitments, the commission should look at both replacing polluting technologies and improving the capacity of the natural environment to sequester (capture) carbon. This is another area in which soil is critical. As well as enabling plant growth, soil itself is a key carbon sink and the maintenance of soil organic matter is essential for long term carbon sequestration. Again, the method of green gas production which we propose, through improving soil organic matter, will also improve its ability to sequester carbon.

With respect to bodies that should be consulted, we would suggest that the Committee on Climate Change should be included.

## **Finance and Funding**

In relation to energy, it is important to note that no new build technology is currently viable without subsidy. The Government's recent cuts to renewables subsidies have created a reduction in confidence and stalled a lot of investment. In order to regain confidence and ensure the necessary energy infrastructure can be built, it is essential that this be addressed. Therefore, the Commission should look at the role of Government in relation to finance and funding and how it can encourage rather than discourage investment.

## **Demand Management and Storage**

We support the Commission's inclusion of demand management as an area to consider. With respect to energy, demand pricing as an incentive to encourage home storage solutions. In particular, how home scale storage can work with smart meters to encourage load shedding (demand reduction) at peak times.

We would also advocate an investigation into the current barriers to deployment of storage. Ecotricity are exploring possibilities for using home scale storage to balance the local network: home scale batteries would import electricity at times of low demand and high generation and export at times of high demand and low generation. One specific barrier we have come across is the way in which Distribution Network Operators (DNOs) treat storage as if it were generation. For example, generators (and batteries) with a capacity of up to 3.8kW need to perform a G83 test and notify the DNO of the installation. There is a limit to the number of G83 installations that a single developer can have in one area. The rationale for this limit is that DNOs do not want generation flooding onto the network at the same time, which makes sense for generation; however, it does not make sense for storage, which balances the network rather than overloading it.

The role of grid scale storage on reducing demand on the network, and how this can be combined with intermittent generation, should also be explored. Storage technology is still not commercially viable on a grid scale without subsidy and; the Commission should make exploring how it can move to full commercialisation a priority.

### **Question 9: Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

We do not currently have any such models that we would recommend.

**Question 10: Do you believe the Commission has identified the most important infrastructure drivers?**

We agree that economic growth and productivity, population and demography, climate change and environment, and technology are all important drivers.

In addition we would add constitutional, policy and legislative change. This is particularly relevant in light of the recent vote to leave the European Union. The Commission should consider both the direct impact of any EU regulations that cease to apply to us and the impact that the vote to leave has on investor confidence.

**Question 11: The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

We have combined our response to questions 11 and 12 below.

**Question 12: In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

The methodology used should include the whole cost of a given option including all direct and indirect subsidies and externalities such as pollution. With respect to energy, this would include tax breaks; the costs of disposing of nuclear waste; air pollution and its consequential health problems; and, critically, carbon emissions.

In addition, the Commission should explore the indirect benefits that each option brings such as job creation in rural deprived areas, displacing subsidies for other goods and reducing dependence on imports. In relation to our green gas proposal, the fact that it can provide an additional income for farmers and therefore reduce the need for agricultural subsidies should be factored in. Under Defra's Catchment Sensitive Farming Project<sup>10</sup>, farmers could earn between £182/ha and £253/ha for growing and maintaining grassland. This grass would need to be cut or grazed, but there was not necessarily any use for the grass cuttings. If farmers could receive an income by selling the grass cuttings as AD feedstock then this subsidy could be reduced.

In relation to energy, Ecotricity has outlined a methodology for calculating the total cost and benefits of different technologies. We have labelled this the Integrated Net Cost of Energy (INCOE): this would combine all costs and benefits that each technology has for society overall. Please see pages 10- 12 of our 2030 Vision in Appendix A.

**Question 13: How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

In addition to publishing the consultation documents on its website, the Commission should proactively email copies to all relevant businesses, civil society groups, academic institutions

<sup>10</sup> Natural England. 2016. *Countryside Stewardship: Higher Tier Manual*. Available [Online] at: <https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-environmental-land-management#higher-tier> [Last accessed: 3/08/2016]

Also see - Natural England. 2014. *Catchment Sensitive Farming: reduce agricultural water pollution*. Available [online] at: <https://www.gov.uk/guidance/catchment-sensitive-farming-reduce-agricultural-water-pollution> [Last accessed: 3/08/2016]

and local authorities. It should also contact relevant trade press and encourage them to write about the consultations.

## Conclusion

In summary Ecotricity supports the broad approach that the Commission proposes to take with the NIA and we agree that the areas identified should be examined. We believe that there is one additional infrastructure area that needs to be included: soil. Soil preservation is critical in ensuring a secure food supply and in removing carbon from the atmosphere.

Ecotricity urges the Commission to explore the opportunities presented by biomethane from grass feedstock. When grown with the appropriate method, this can provide solutions to the requirement for: renewable energy, flood defence, water treatment and carbon reduction. In addition, it makes sense economically to use the significant gas pipeline infrastructure that we already have in place.

Additional areas that we believe should be the focus of the Commission's attention include: how the electricity grid is upgraded; the role of storage and how aviation radar mitigation technological development can be made more efficient.

Ecotricity welcomes the opportunity to respond and hope you take our comments on board. We also welcome any further contact in response to this submission. Please contact [redacted] on [redacted] or [redacted]

[contact details redacted]

[name redacted]

Yours sincerely,

[redacted] [name redacted]  
[redacted] Compliance & Projects  
[job title redacted]



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4 August 2016

### **National Infrastructure Assessment – Consultation on Process and Methodology**

EDF Energy is one of the UK's largest energy companies with activities throughout the energy chain. Our interests include nuclear, coal and gas-fired electricity generation, renewables, and energy supply to end users. We have over five million electricity and gas customer accounts in the UK, including residential and business users.

EDF Energy welcomes this opportunity to respond to the National Infrastructure Commission's consultation on its plan for producing a National Infrastructure Assessment.

We support the creation of an independent National Infrastructure Commission to consider the UK's long term infrastructure needs. Large scale projects are often affected by the political life cycle and the independent NIC should help facilitate timely decisions and provide greater certainty for both the public and investors.

Should you wish to discuss any of the issues raised in our response or have any queries, please contact me on [phone number redacted].

I confirm that the attachment to this letter may be published on the NIC's website.

Yours sincerely,

**[name redacted]**  
**[job title redacted]**

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## Attachment

### National Infrastructure Assessment – Consultation on Process and Methodology

#### EDF Energy's response to questions

##### Q1. The Government has given the National Infrastructure Commission objectives to:

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

##### **What issues do you think are particularly important to consider as the Commission works to this objective?**

The impacts of climate change are already being felt in the UK and the Committee on Climate Change (CCC) warns that urgent action is required to prepare for the inevitable consequences. EDF Energy believes that climate risks and the need to decarbonise the economy should be included as an overarching consideration in the National Infrastructure Assessment process and methodology. This is because the UK needs to ensure that all new infrastructure is resilient and environmentally sustainable as well as economically sustainable.

In 2008 the UK adopted the Climate Change Act which sets out the goal of reducing UK 2050 carbon emissions by 80% compared to 1990 levels. Five year carbon budgets will be set to progressively curb emissions in all sectors of the UK economy, especially electricity generation, heating and transport sectors. The Government has reiterated its commitment to the Climate Change Act by setting the fifth carbon budget based on the CCC's recommendation. The decarbonisation of the energy sector will require a shift from fossil-fuelled generation to low carbon technologies such as offshore wind and nuclear which typically have high upfront capital costs but lower ongoing operational costs.

The UK electricity sector faces a significant investment challenge over the coming decade in order to decarbonise electricity generation while maintaining security of supply and ensuring electricity remains affordable for customers. The UK has ageing electricity generation infrastructure which will need to be replaced over the coming years. Since 2010, 23GW (25% of the UK's electricity generation capacity) has closed or is expected to close by end 2016. By 2030 further capacity is expected to close, including all coal and all but one of the existing nuclear power stations.

DECC has estimated that the investment challenge to achieve the transition to a low carbon electricity system while maintaining security of supply will be substantial (over



£100bn investment required by 2020 and a similar level needed throughout the 2020s). However, the electricity market is not able to bring forward this investment on its own for the following reasons:

1. The cost of carbon is not fully reflected in the market price as it does not take into account the impact carbon has on the environment. The carbon price in the European Union's Emissions Trading System (ETS) is insufficient to incentivise investment now and hard to predict in the long-term making investment decisions difficult. This disadvantages low carbon technologies.
2. Low carbon technologies are at different stages of development and typically more expensive than unabated fossil fuel technologies such as gas-fired generation.
3. Low carbon plant is capital intensive and tends to require higher revenues to cover fixed costs than those achievable in the energy market today, where prices are set by the marginal cost of fully depreciated coal or gas plants.
4. Very high prices at times of peak demand would be needed to bring forward new firm capacity, and this volatile world would risk energy security and cause problems for customers.

As a solution to these issues, in 2013 the Government implemented a package of measures under the title Electricity Market Reform to bring forward investment to drive a secure and affordable transition to a low carbon generation mix. The measures included:

- A Carbon Price Floor (CPF) to tax the purchase of carbon-emitting fossil fuels by electricity generators –acting as “top up” to the cost of carbon emissions through the EU ETS. The aim of the CPF is to increase the cost of carbon-emitting generation to provide an incentive to decarbonise electricity generation.
- Contracts for Difference (CfD) to incentivise new low carbon investment by guaranteeing a minimum price for electricity generated (typically higher than the wholesale market price), ensuring investors could secure a reasonable return on investment. If the market price is higher than the strike price the generator has to pay back the difference.
- A Capacity Market to offer payments for reliable capacity to be available when needed, helping to maintain security of supply and avoiding very high peak prices.
- Emissions Performance Standard to rule out new build coal without Carbon Capture and Storage (CCS) abatement.

These policy measures have helped to ensure continuing investment in new electricity generation capacity while wholesale prices remain significantly below the cost required to incentivise construction of these assets on their own.

We feel that Electricity Market Reform is broadly the right set of measures to enable low carbon infrastructure to be developed in the long term. We welcome the clarity provided in the March 2016 budget, which set a clear budget of £730m for the next three CfD auctions. This will provide visibility for investors in 'less established' technologies.

We believe that a key priority for the Government should be to reaffirm its commitment to Carbon Price Support and to further strengthen the price signal beyond 2020. There has been a great deal of progress in the decarbonisation of the UK's electricity sector, which must continue with supporting policies. However, the Government must also introduce policies to tackle the long-term decarbonisation of vehicles and heating, in order to remain on the cost-effective path to decarbonising the UK economy. Sources of low carbon electricity are essential to deliver the decarbonisation of these sectors in a cost-effective manner and the Government needs to consider the increased demand for low-carbon electricity as a result of the electrification of these sectors.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

EDF Energy agrees with the listed overarching principles which are intended to inform the way that the Infrastructure Commission produces the NIA. We are not aware of any further principles that are missing. We welcome the proposal that the NIA intends to take a whole system approach considering system interdependencies and feedbacks. We believe that this is an essential criterion to understand the demand and supply of infrastructure services critical to securing infrastructure investment. Key interdependencies for the energy sector are with climate policy, water, transport and overall industrial strategy.

The NIC must draw its conclusions based on sound analysis of evidence, and its members must have broad experience and experience in the relevant sectors of the economy. We would also highlight that the independence of the Commission is important but it must also be clear how its recommendations square with the responsibilities of Government departments responsible for specific activities.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

EDF Energy believes that NIA should cover the listed sectors in the way in which they are each described. We also agree that the National Infrastructure Commission should look at the energy system from a whole system view and pay attention to the interrelated nature of heat, transport and electricity. It is important to consider, for example, the impacts which major transport infrastructure projects such as new railways can have on energy demand as well as on where transmission is sited.

EDF Energy welcomed the publication of the Smart Power Report earlier this year and believe it is important for the Government to look at innovative ways of balancing supply and demand through emerging technologies including energy storage, demand-side response and smart technology. However, we also believe that the National Infrastructure Commission must ensure that future ambitions are technically feasible and sustainable, especially for innovative technologies, and must be founded on robust and rigorous engineering and economic analysis.

As noted by the National Infrastructure Commission, the electricity sector has made good progress towards decarbonisation over the last twenty years. It is important that other sectors including the heat and transport sectors make similar progress in order that the UK can meet its greenhouse gas emission reduction targets. Indeed, the recent Committee on Climate Change report looks at scenarios where the combination of plug-in hybrids and battery electric vehicles reach 9% of new car and van sales in 2020 and around 60% in 2030. This anticipated increase in the amount of electric vehicles on Britain's roads would have a major impact on electricity demand which must be considered when making government policy.

EDF Energy believes that the most appropriate way to ensure a "whole systems approach" in specific topic areas is to establish a taskforce to consider key interactions within specific remits.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

EDF Energy agrees that the NIA should not restrict its focus to specific areas as the NIA has set the objective of taking a whole system approach, understanding and studying interdependencies as a priority.

EDF Energy believes that there must be a diverse energy mix which encompasses all types of electricity generation including gas, onshore and offshore renewables, and nuclear, connected by a resilient, secure network to customers, as well as technologies to help balance supply and demand such as demand-side response and energy storage. We believe that all of these technologies have a role.

Energy UK recently published a report on Pathways to 2030 for the GB Electricity Sector, which found that the electricity sector is increasingly moving towards a more decentralized system from that which occurred in the past. This shift in the way that electricity is produced and consumed has implications for the GB's electricity transmission network and the way in which it is paid for. We are aware that Energy UK has been studying the issue of transmission and distribution network charges and it believes that this is an area that the National Infrastructure Commission should be interested in.

Additionally, there are a number of interdependencies that affect the future development of electricity and gas infrastructure, including the transition to electric vehicles and the growth in housing, commercial development and wider infrastructure.

We also firmly believe that the NIA should ensure that identification of the UK's future infrastructure needs should ensure resilience is a priority. This is because the impact of extreme weather events such as flooding, drought and extreme temperatures can result in certain infrastructure failing, and new infrastructure should be planned to avoid such failures.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

EDF Energy believes that a key role for the NIC is to take a holistic view to energy policy which cross-cuts sectors and traditional government departments. Energy efficiency is an important tool to reduce the UK's carbon emissions but it has suffered from disjointed policy in recent years. We understand that the NIC will not have a remit over housing supply but would like to stress the importance of energy efficient homes and buildings which can help lower demand for heating and electricity.

Detailed consideration should be given to the interdependencies between the competition for vital resources such as water between energy, public water supply and agricultural uses. There should be a long-term plan to manage these interdependencies which is consistent with the future needs of people, businesses and the environment. A forecast increase in UK population with its dependency on resources, energy and water are key considerations which must be carefully addressed in the assessment.

Additionally, both offshore and onshore energy infrastructure needs to be considered during the NIA development process.

To ensure joined up delivery we believe that there is a need for a forum of interested parties and experts to help discuss, focus and advise the NIC on sectoral interdependencies. EDF Energy would welcome involvement with such a group.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

EDF Energy agrees that the listed cross cutting issues should be the focus of the NIA. With regards to electricity, we feel that Electricity Market Reform is broadly the right set of measures to enable low carbon infrastructure to be developed in the long term. However, we also believe that the NIA should be able to assess whether the mechanisms are fit for purpose to ensure effective delivery of cost effective low carbon electricity infrastructure and to support the necessary levels of dispatchable generation required for integrity of the market and the grid.

The NIC is uniquely placed to consider the cross-cutting issues of the present day and the future. Government departments understandably tend to focus on policies within their remit and as a result do not always coordinate and link across other sectors to the fullest

extent possible. The NIC should play a leading role in ensuring an economy wide approach.

We understand that once Government and Parliament have scrutinised and approved the NIA, any proposals will become 'Endorsed Recommendations', which will be fed into Government policy. It is vital therefore that Government Departments have early sight of likely recommendations to ensure that reviews of the Energy National Policy Statements (NPSs) and the National Planning Policy Framework are undertaken without delay post the publication of the final NIA, in order to avoid further periods of uncertainty.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

See answers to Q5 and Q6.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

EDF Energy agrees that the proposed methodological approach to determine the UK's infrastructure needs and priorities is sound. When gathering evidence, it is important that the NIC has robust processes to ensure that vested interests are identified and their evidence critically assessed.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

It is important to use a scenario-based approach when considering uncertain futures, rather than a forecasting model based on a single set of assumptions.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

EDF Energy agrees that NIC has identified the most important infrastructure drivers. However, we believe that the next priority should be to determine how the NIC intends to prioritise the importance of each of the drivers identified in order to deliver a robust assessment. We feel that electricity infrastructure should be high on the list of priorities. EDF Energy would welcome the opportunity for further engagement with the NIC on this particular point.

We also welcome the Commission's recognition of the need to consider climate change and the environment when making infrastructure decisions. The NIC should ensure that any proposals complement the work done by the Committee on Climate Change to progress the UK's carbon budgets. We also highlight the points we have set out in our

answer to Question 1 concerning climate and decarbonisation as an overarching consideration for the NIA process.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

EDF Energy believes a diverse energy mix made up of a full range of electricity generation technologies, infrastructure for gas demand and ancillary services to help manage the system are required for the future. We believe that any methodology to determine the investment portfolio should be based on a foundation of technology neutrality. Furthermore, in order to achieve this at least cost to consumers, no technology should be excluded from participating in Contracts for Difference allocation rounds.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

EDF Energy believes that a further set of factors that should be addressed by the NIC in its methodological approach are the potential barriers to successful project delivery. There are a number of consented projects that do not reach the development stage for a number of reasons. We feel that these reasons should be identified and addressed. In addition, we believe that the methodology should address the need for consultation with stakeholders by the NIC in developing the NIA and especially with infrastructure developers and operators. This is because the NIA may identify a range of options, but these need to be critically reviewed to ensure they are feasible before the NIA is finalised and published. Infrastructure developers and operators are well placed to do this. If options are proposed which are subsequently shown not to be feasible in practice, this would not be an effective outcome for UK infrastructure. EDF Energy would welcome further correspondence on this particular point.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

EDF Energy believes that the suggested engagement tools for deriving an evidence base highlighted in paragraphs 78 to 82 are the right ones. We believe that engagement and communication is the key to delivering a robust proportional representation. The evidence base should deliver a proportionate representation of views from which conclusions may be drawn.

**EDF Energy  
August 2016**

Written evidence from EEF – the manufacturers' organisation to the National Infrastructure Commission on

## **The National Infrastructure Assessment – Process and Methodology**

June 2016

### **About EEF**

1. EEF, the manufacturers' organisation, is the representative voice of UK manufacturing, with offices in London, Brussels, every English region and Wales. Collectively we represent 20,000 companies of all sizes, from start-ups to multinationals, across engineering, manufacturing, technology and the wider industrial sector. We directly represent over 5,000 businesses who are members of EEF.
2. Everything we do – from providing essential business support and training to championing manufacturing in the UK and the EU – is designed to help British manufacturers compete, innovate and grow.
3. In this submission we set out our response to the National Infrastructure Commission's (NIC) consultation on the process and methodology for a National Infrastructure Assessment (NIA).
4. This response builds on our own study<sup>1</sup> which highlighted the challenges with the current institutional framework for infrastructure and outlined a way forward that would best support strategic, long-term, decision making.

### **Summary**

5. EEF is strongly supportive of the establishment of a National Infrastructure Commission, having called for the setting up of an independent infrastructure body for many years. Progress on delivering an effective institutional arrangement through an NIA is therefore a positive step.
6. One of the main challenges now is putting in place the right foundations to ensure the National Infrastructure Commission is independent and transparent enough to be trusted for decades to come while also ensuring its processes are robust enough to withstand any accusations of bias. Our response to this consultation therefore focusses on the limited changes that should be made in the process and methodology of the NIA to deliver on this.

### **Objectives and principles of the NIA**

7. The objectives set out by government are sound. As the Commission works to these objectives it will be important to focus on ensuring maximum scrutiny of its work not just after the process is completely, but during. This requires three changes, a clear appraisal framework, a draft NIA and a clear outline of the pitfalls of inaction.
8. An appraisal framework should be set out and consulted on prior to a portfolio of projects being developed. The purpose of this framework would be to ensure a consistent evaluation and assessment methodology is used to appraise each project and proposal.
9. The framework would outline the factors which would be used in assessment such as how costs are calculated, environmental considerations, economic impacts etc. along with how the project would impact on the needs outlined in the National Infrastructure Assessment.
10. Additionally, an initial NIA should be published and consulted on in draft form to allow scrutiny before the final NIA is published. By allowing for these 'break points', the NIC will

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<sup>1</sup> A UK Infrastructure Authority: streamlining the infrastructure debate, EEF, July 2014

ensure that any alternative views are highlighted well in advance to allow this to inform the final NIA, where these views are valid.

11. Lastly, the NIA when setting out challenges and the range of project portfolios, should also set out clearly the outcomes of inaction. Not making a decision is a decision in itself which comes attached with its own implications and challenges. These should be presented as a clear alternative to allow an informed debate and decision.

### **Cross-cutting issues**

12. The consultation sets out a range of cross-cutting issues which are all relevant. Alongside recent changes in government departments another cross-cutting area which should be included is support for the government's industrial strategy.
13. As part of its work the NIC should assess the existing domestic infrastructure supply chain against the portfolio of projects and outline the requirements that will be placed on that supply chain.
14. This will allow those in the supply chain to consider the necessary investment in skills and capital that would be needed to allow them to better gain access to contracts, as well as drive up efficiency and drive down costs within the construction supply chain.

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### **For further information contact**

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# National Infrastructure Commission: Assessment Methodology

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The Electricity Storage Network, formed in 2008, is the UK's industry group for the promotion of electrical energy storage. Current members include electricity storage manufacturers and suppliers, developers of electricity storage projects, users, electricity network operators, consultants, academic institutions and research organisations.

The Electricity Storage Network works on behalf of its members to respond to and address issues affecting the development and utilisation of electricity storage within the UK power system. This includes special interest meetings, liaising with the media, responding to consultations, providing a unified point of contact for those interested in electricity storage and promoting the value of storage within the UK power system.

We strongly support UK energy storage solutions for the UK electricity system and by promoting local innovation in electricity storage we support wider UK industry.

## Introduction

The National Infrastructure Commission are required to perform a National Infrastructure Assessment that will help direct Government efforts to upgrade, develop and deliver UK infrastructure. The National Infrastructure Commission seeks views on whether the proposed methodology for carrying out the assessment is appropriate.

## General comments

We have some concerns that without a very complex approach that looks at all the issues and drivers it will not be possible to deliver options that create a response that delivers resilience and reliability at least cost and in the most efficient way. Focus is given to climate mitigation, but with the exception of flooding, climate adaptation is not covered. Heat has been poorly addressed in the UK to date, but cooling may become increasingly important, as will managing the stormier weather (a more energetic atmosphere delivers stronger winds and heavier rain, often in short bursts) and ensuring that our energy and transport system is resilient to such events will become more critical.

## Hydrogen Economy

Hydrogen, either power-to-gas or vehicles, may be viewed as an important contributor to decarbonising transport and/or heat. However, the combustion (oxidation) of hydrogen in a fuel cell or directly produces water vapour, and water vapour is NOT a climate neutral gas. Water vapour is the primary greenhouse gas, with the ability to absorb more infra-red than CO<sub>2</sub>. Increased water vapour in the Stratosphere leads to cooling and an increase in the number of ice clouds, which catalyse the reactions of halogens with ozone, resulting in increased destruction of ozone. In the troposphere, increases in water vapour will lead to warming and so the impact of anthropogenic water vapour emissions on climate change needs to be assessed carefully.

## Response

### **Q1. The Government has given the National Infrastructure Commission objectives to:**

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

What issues do you think are particularly important to consider as the Commission works to this objective?

It will be important to define the measure of "improvement" in growth, competitiveness and quality of life., so that any improvements can be directly attributed to infrastructure development. That is, how will the National Infrastructure Commission know it has delivered its objectives? Quality of life may be more difficult to assess quantitatively. There are many existing parameters and well-established methods around national economics, but what parameters will be used to assess quality of life?

### **Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Yes, the latter point is especially critical but challenging to deliver.

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

No.

### **Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

The approach seems reasonable. However, care is needed to ensure that all interdependencies are captured. For instance: Does reducing the return commuting time between the north and London by a total of 40 minutes per day result in an improvement in quality of life? If communication infrastructure was improved to create localised super-fast business hubs in each town (village), so workers could "telecommute" (hot desk) for 2-3 days a week (and physically commute 2-3 days a week), would that facilitate better quality of life and family life? Would that deliver reduced CO<sub>2</sub> emissions due reduced use of transport? Would it reduce overcrowding on roads and trains as there are fewer to carry every day, perhaps minimising the spending on new transport infrastructure? Would it develop business centres outside the main cities, spreading business opportunities more uniformly across the UK and developing local growth? This means that improved communication and a policy that actively promoted "telecommuting", could lead to reduced spending on transport infrastructure and reduced emissions.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

Education is not covered. Provision of buildings and educators is one way to improve economic prosperity and quality of life.

There is a great deal of focus on water, but not on the impact of wind or storms, which will impact on the delivery of energy and impact on transport.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?**

See Question 3.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

Yes. Although mitigating and \_adapting\_ to climate change may be an over-arching issue – so all infrastructure issues should be addressed to ensure that mitigation commitments are achieved.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

No.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

Yes, with the caveat that some interactions between sectors and cross-cutting issues, may not be immediately obvious.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

Climate modelling using Global Climate Models, which link multiple systems, such as ocean, atmosphere, biosphere and human activities (scenarios), may have useful parallels with analysing the multi-sector infrastructure need.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

What about policy? Presumably Government policy will not be static between now at 2018, so this will have an impact. What about devolved Government policies?

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

No.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

No comment.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

The approach suggested seems appropriate. A broad technical committee, with experts from all the sectors of interest should assess the progress of work. Specific workshops with individual sets of stakeholders would be helpful, with focus/expert groups put together to address specific multi-sector issues as required.

Engaging with consumers, the people we expect to use the infrastructure and change behaviour, will be critical.

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# The National Infrastructure Assessment: Initial consultation

## Energy and Utility Skills Response

5<sup>th</sup> August 2016

### Energy & Utility Skills: Our role and recommendation

Energy & Utility Skills is the sectors skills body, with a membership comprising of the major infrastructure companies within water, power, gas and waste management and their top tiers of delivery partners.

The energy and utility sector is pivotal to the delivery of the UK Government National Infrastructure Plan and also those for each of the devolved nations. Around two thirds of the plans to deliver the economic and social outcomes of governments, rely on the energy and utility sector having the right people in the right roles, with the right skills at the right time for a sustainable cost.

As highlighted in the National Infrastructure Plan for Skills however, the sector is struggling in respect of workforce recruitment. It has the highest proportion of employers who are experiencing skills shortages, with more than one-third (36%) of employers in the sector having experienced skills deficits over the past 12 months, compared to a UK average of 23%. Energy and utility employers continue to find it difficult to attract new entrants to the sector and currently a fifth of employees are aged over 55, even higher than the one sixth across the whole of the UK workforce.

Through this consultation we **recommend that the National Infrastructure Assessment explicitly recognises the importance of workforce renewal and the skills availability challenge right from the outset, and requires the industry, its delivery partners, regulators and policy makers to take collective action to secure a sustainable future.**

This is critical enabler of infrastructure delivery, and without the right workforce in place at the right price, the outcomes will be unachievable and unsustainable.

## Consultation

### Context: overarching issues

Our sector plays a pivotal role in the objectives of the National Infrastructure Delivery Plan (March 2016) and plays a day to day role ensuring provision of vital services for all of society.

The Sector provides energy and power to homes and businesses, supplies clean water and disposes of waste. **During 2015, the energy sector alone accounted for 60% of the value of all the planned projects included in the infrastructure pipeline** (66% if waste, recycling and water are included<sup>1</sup>). To achieve the National Infrastructure Delivery Plan targets, the existing workforce will need to be reskilled and upskilled as well as supplemented by apprentices and a range of other workforce resources.

The National Infrastructure Plan for Skills (September 2015), which outlines the results of HMT modelling and data analysis, highlighted a range of critical skills challenges which are set to have a growing impact on the UK energy and utility sector. However, **there is as yet no action plan or strategy for the most important delivery area, the utility sector.**

Our Energy and Efficiency Industrial Partnership, programme managed by Energy and Utility Skills, features as a case study in the National Infrastructure Plan for Skills, and the organisation has contributed extensively to this document. With a significant proportion of the projects in the National Infrastructure Pipeline falling to our sector, we are keen to see the industry, its delivery partners, regulators and policy makers all take collective action to secure a sustainable future for UK plc. We are currently working in close partnership with the Infrastructure and Projects Authority to get collective action underway, and the National Infrastructure Assessment encouraging and recognising that activity would increase the pace of change.

### Consultation questions

EUSG supports the proposed approach in general, but wishes to bring the following points to the attention of the National Infrastructure Commission.

**Q5: The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

Many asset owners in the energy and utility sector face skills gaps and shortages and draw increasingly on the same contractor or supply chain workforce. A significant increase in demand for skilled workers in one industry inevitably affects others. As skills become increasingly transferable, the 'ripple effect' will become more acute.

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<sup>1</sup> Infrastructure Policy, 2016

An immediate example of interdependencies for core skills, is the volume of workforce needed to deliver the energy and utility company requirements in the National Infrastructure Plan and all the commitments of the Ofgem and Ofwat determinations. This comes at the same time as HS2, HS3, Crossrail and Crossrail 2 require almost exactly the same competencies. Should Hinkley Point go ahead, the issues will be further compounded. Significant infrastructure delivery and affordability risks exist if excessive strain is placed on the available talent pool.

It is widely recognised that the age profile of the UK's engineering workforce is an issue that needs addressing urgently, and this is certainly the case for asset owners in the energy and utility sector. For asset owners in the gas sector, 1-in-5 employees is aged over 55, as are 1-in-4 of the power and water industries' workforce; these are all higher than the 1-in-6 across the whole of the UK economy's workforce.

The sector is also still dominated by a white, male workforce. Just 20% of the entire sector's workforce is female, with the majority of women working in non-technical areas such as customer service/ call centres and admin and secretarial roles – females make up less than 5% of the core craft, technical and engineering workforce. Equally, only 5% of the sector's workforce are from a black or minority ethnic (BME) background; compared to more than 10% of the entire workforce. Unless addressed, this will severely limit potential to scale up the workforce rapidly to meet increased demand.

Widening the talent pool requires urgent action so that inadequate supply of skilled workers does not limit capacity to deliver. Between April 2015 and April 2016, the number of vacancies amongst gas and power asset owners increased by 8%, and in the waste sector it increased by 16% - compared to a UK all-sector average of just 2%. In April 2016, there were 3.7 vacancies per 100 workers in the power and gas industries, compared to 2.6 per 100 workers across the UK economy. This is the joint second-highest ratio of any industry, and level with the information and telecoms industry, which will impact directly on power over coming years as smart grid technologies are rolled out.

Also, analysis undertaken by Energy & Utility Skills suggests that if more than 1-in-10 leavers through voluntary staff turnover do not remain in the sector (e.g. move to another asset owner or contractor), we could face increased skills shortages as employers will find it difficult to source experienced, "fully-competent" workers in the external labour market.

This increasing demand for skilled labour is outstripping supply. The energy and utility sector contains the highest proportion of employers who are experiencing skills shortages – more than one-third (36%) of employers in the sector report having experienced skills shortages over the past 12 months, compared to a UK average of 23%.

**Q10: Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?**  
We agree with the drivers of demand for new infrastructure that have been identified.

However, it is also important to understand the future impact of a number of other drivers on the workforce that will be required to *deliver* the eventual infrastructure production programme in the energy and utility sector up to 2050. These will also be important in terms of the characteristics and type of new infrastructure that will be needed. We would suggest that these should include:

**Climate change and environment: Resource scarcity**

Resource scarcity will trigger a range of different skills needs across the sector. A growing population, rising standards of living, exhaustion of ‘low hanging fruit’ and geopolitical threats will accelerate diversification of energy and water sources, as well as more extensive value reclaim from ‘waste’ materials. Broader workforce implications will span from greater awareness of water efficiency solutions amongst those working at the consumer interface to increased demand for data scientists with the analytical and modelling skills to master huge volumes of data, but also the capacity interpret commercial implications and apply learnings in a business context.

These change drivers will also feed demand for specific behavioural competencies, including those relating to social and process engineering. In the example of online network security, for example, energy and utility companies will need more sophisticated supervisory systems to facilitate containment and rapid management of any security breach. It will also be important to have clear processes in place – and understood and implemented in practice - to manage any emergency situation.

**Technology/ social dimension: Trend towards greater consumer engagement**

Consumer engagement is not a new process, but it will become increasingly important for the day to day operations and longer term strategies of energy and utility companies. With advances in technology, combined with the increasing importance of promoting sustainability, consumer engagement will become a core business activity for the sector. The sector will need to fundamentally change its attitudes towards customers and be in constant communication with them, rather than being the traditional ‘silent service.’

Whilst there will be a need for technical skills, such as those required for smart meter installation and developing apps, the most significant change in skills will be to make customer service a fundamental part of all customer facing roles. Consumer engagement will be a key part of all business activity, rather than just being the preserve of customer service staff. One of the EU interviewees ‘all staff must be able to talk to customers; it must be a formal part of in-house training for all.’ There is a need for staff with a depth of knowledge in particular skills, yet having the breadth to cover customer service.

**Within ‘Technology’: “Big data”**

Big data analytics is on the horizon and through smart technology, demand management, predictive maintenance and improved efficiencies it has the potential to transform the way in which the energy and utilities sector operates. Analytics will no longer be the preserve of IT



departments and high level technical skills will be required across management, operations, asset management and marketing occupations. Increasingly, there will be a common requirement for ‘hybrid skills’ – skills of greater breadth and depth - combined with industry knowledge.

With demand for big data analytics staff predicted to soar across the UK, shortages of graduates with the essential skills are already becoming evident. Numbers of undergraduates in computing and electrical engineering are declining overall, and it will be especially important for the industry to play its part in encouraging more students to study relevant subjects, particularly computing.

**Q13: How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

The Energy and Utility Skills Group would be pleased to support the engagement process via its employer groups, spanning the energy and utility sectors and including contractor companies. We facilitate efficient and effective dialogue between sector employers and wider stakeholders, including Government and its agencies, in a range of formats including round tables and webinars.

4<sup>th</sup> August 2016

## **The National Infrastructure Assessment – Process and Methodology**

**Evidence submitted by: [names redacted]**

**Energy Policy Group, University of Exeter**

### **Introduction**

The University of Exeter's Energy Policy Group (EPG) is very pleased to submit to the Consultation on the National Infrastructure Assessment (NIA) – Process and Methodology.

The EPG submitted [evidence](#) to the National Infrastructure Commission's (NIC) Inquiry into Electricity Interconnection and Storage, which subsequently led to the very good NIC [Report](#) on Smart Power.

The EPG has a project: Innovation and Governance for a Sustainable Economy ([IGov](#)). This has a small team working on the politics and decision-making processes of governance which fits squarely within the NIC remit.

At root, IGov argues that GB energy governance (including of interconnection and storage) is not fit for purpose. We have developed a DRAFT institutional framework for what we would argue is a fit-for-purpose GB energy governance structure. This is attached as an Annex to this submission.

In general, the NIC thoughts and ideas have mirrored many of those developed within IGov. IGov supports greater direction from Government with respect to its energy policy, and attendant infrastructure. For us, there are two central issues:

The first is the near-absence of meaningful debate and consent in choices about infrastructure (and energy policy) needs. As you say in Para 20 / page 10, 'the provision of new infrastructure has historically relied on an often fragile and incomplete political and public consensus'. We think a robust and transparent means of enabling a meaningful debate, identifying a consensus, and then acting upon it is at the heart of UK's decision-making problems.

In countries with different electoral systems, for example [Denmark](#), the political system is more able to produce stable societal consensus for large-scale long-term investments. This is essentially because political parties directly represent key societal constituencies. The UK's majoritarian system produces more short-termism, the response to which has been the delegation of long-term strategy to technocratic bodies, of which the NIC, alongside others such as the Commission on Climate Change, is one. The weakness of this approach is that it does not, by itself, produce consensus, and decisions about politically controversial investments are not necessarily resolved through this route. This can be seen, for example, in the case of the Davies Commission on the expansion of airport runway capacity.

This situation suggests that the need for such bodies, including the NIC, to put a particular premium on not only being open and consultative, but actually helping to facilitate greater consensus between societal groups. In the past, something of this role was played by Royal Commissions, especially standing Commissions such as that on Environmental Pollution, which existed for over 30 years.

In our work on the energy and climate policy, we have proposed that this function needs to be taken more seriously in the UK because of the large costs, landscape effects and implications for the changing role of households that will be involved. One option would be a body specifically for this sector, but this could be part of the NIC's role or incorporated into other institutions. The key thing is the function. A possible approach to this would be to work with leaders of groups representing different constituencies, facilitating dialogue on trade-offs, supported by information. Others, for example, the [Green Alliance](#) and the [Centre for Sustainable Energy](#), have also put forward ideas of how this 'meaningful consent' can be developed, maintained and incorporated. We would urge more thinking about this in the Methodology adopted in the NIA, which currently seems to focus on scenarios, and is vague on how 'engagement' will actually take place.

Our second point, relates to energy and climate change in particular, our Group focus, but is relevant to all sectors which require transformation. We argue that the current governance framework of energy is not fit for purpose. This is because it continues to provide value (or payments) to enable the current system to operate in the ways it has broadly done since gas and electricity privatisation in the 1980's and 1990's. If a sustainable, 'smart and flexible energy system' is wanted, then the way the energy system provides value has to change. It has to give value to those dimensions that provide a flexible and smart operation, and it has to stop giving value to those things which undermine it. This is a transformational process that requires a strategic framework for energy – and this will require institutional change. Whilst we do not work on water or waste, we imagine the same argument holds true. Until value within the sector matches what is wanted, the sectors will continue as they currently are.

We think the IGov framework attempts to meet both these issues. Please do contact us if you would like to talk about this in more depth.

This short note: Section 1 answers your questions; and then Section 2, explains why we think the IGov framework is an important dimension of fit for purpose energy infrastructure.

## Section 1: Answering the Consultation Questions

The Consultation questions are broadly:

- Related to principles in undertaking the NIA
- Whether the NIA is covering the appropriate sectors
- Whether the NIA has got its cross-cutting issues right
- Whether the NIA has got the right methodology for interrogating the issues
- Whether the NIA has identified all the important infrastructure drivers
- How the NIC should engage to build its evidence base and test its conclusions

### The objectives and principles in undertaking the NIA (page 11-15, Q1 and Q2)

With respect to the remit and scope of the NIC and the boundaries of the NIA, we think that UK would benefit from having a powerful, progressive Vision or narrative of how UK infrastructure is expected to develop over the next 30 years. IGov has undertaken research in Denmark, Germany and various States of the US (i.e. California and New York) and has been struck by the power of those countries Vision to maintain consensus on governance and societal decision-making.

We support the NIA identifying and exploring the most important interdependencies and resilience implications, as well as identifying what we would consider to be the all-important cross-cutting issues, including governance – our own focus.

We broadly agree with the case for an independent NIA, given the problems and solutions set out on page 11.

- We do think that some of the solutions the NIA would deliver are more important than others – ie the wide engagement and meaningful consultation would be central to the NIA's legitimacy. We also think in a sense this is 'bigger' than the NIC. Improving transparency of policy-making and wider engagement of civil society should be a major Government policy, and requires significant resources to enable. This is discussed later on.
- We also think that lack of capacity is a problem for delivering the NIA; we worry about incumbents and inertia; and we think that flexibility is important. These are also discussed later.

With respect to objectives of the NIA as set out on page 13, this is an 'apple pie' question. Yes, most would agree that 'improv[ing] the quality of life for those living in the UK' is important. What matters is making sure that the NIC and the NIA place UK civil society, people and their everyday lives at the centre of this. Meaningful engagement about what civil society wants in terms of infrastructure needs to be much deeper before the objectives of the NIA can be agreed.

We have one specific issue related to the second bullet of 'improving the UK's international competitiveness'. We would prefer this to be changed so that it links with Theresa May's Economic Principle [speech](#) about a UK industrial strategy which brings prosperity to all.

We agree with the principles as set out on page 14, although we think a fifth – flexibility – should be added:

- As said above, the key principle has to be that the NIA is based on meaningful discussion and consent. The NIA outcomes will be no more acceptable to UK society than any past efforts with respect to infrastructure planning unless it is legitimate and transparent, and genuinely does reflect societal wishes. The UK is not known for being good at this, and it is no small undertaking transforming the UK from its current state to one of much wider civil society involvement. However, we would argue that this is a vital step that the UK has to take.
- We also support the principle of being forward looking and challenging established thinking. With respect to this and the energy area, it is important to recognise barriers to transformation. One dimension of this will be those who stand to lose from a change in infrastructure. IGov has argued [elsewhere](#) that transformation can only occur when the challenges / problems of the current system are understood and confronted by policy makers – including recognising the issues of incumbents, and dealing with them. However, incumbents, because of private reasons, cannot be allowed to undermine the societal endeavour to capture new opportunities which will emerge from fostering long term and sustainable economic growth<sup>1</sup>. With respect to challenging established thinking, this also includes thinking that the energy system can be run in a different (and preferable) way, provides value to new actors and practices, and needs new institutions to run it more efficiently. The New York Reforming the Energy Vision ([NY REV](#)) is explicit in its challenging of the accepted norms of energy system operation and regulation
- The energy system is transforming radically, and at the same time we know from the CCC that we have to meet certain budgets at certain times. We support having a framework to enable this, and therefore broadly support the NIC in its efforts to do this. But that framework has to balance meaningful civil society engagement; flexibility to the changing technological and social / cultural environment; and an understanding of the real barriers to change. For example, one of the problems with the recent concerns about whether to continue to support Hinkley Point C has been the way that the Government has [refused to review the situation](#) – when most of the factors originally in place had changed. Thus we would argue that ‘flexibility in the face of change’ has to be added to the principles.

### **Whether the NIA has the right drivers, cross-cutting issues and is covering the appropriate sectors (page 15+)**

The NIC drivers on page 15 are broadly correct but we think that another ‘changing social preferences’ should be added. We think this is a different issue from population and demography. Social preferences change and are a vital part of societal legitimacy, and the NIC needs to incorporate this into the NIA.

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<sup>1</sup> On the whole, incumbents want to carry on doing what they have always done, and if that is not possible, then they want to slow down the process of change so that their stranded assets are minimised. IGov has a number of case studies to reflect this. Another example is the implementation of the Large Combustion Plant Directive (LCPD) in 1989<sup>1</sup>. This was a Directive to cut emissions and it was due to kick-in 25 years later – thereby giving emitters a chance to move from one source of generation without having any stranded assets. However, as that time came nearer so efforts were made to put off the LCPD requirements until later. Its requirements were incorporated within a new Industrial Emissions Directive which did just that.

With respect to the sectors that the NIA will cover (page 17), we accept with the following comments:

- We wonder where food (as opposed to agriculture) comes in to infrastructure.
- Under the transport section, there is no mention of public transport: the bringing together of all aspects of transport which together make people's lives easier (happier and healthier). Living and working in a city such as Berlin is completely different from than living in London – and one major aspect of this is the centrality of its public transport to everyday lives. We think the NIA should think more about public transport, and its 'whole system' benefits.
- With respect to the energy section, we support the whole system approach – meaning that (1) we think that the energy system works as a whole system. If a house becomes more energy efficient, it will need less heat for space heating. If an energy system, has more solar which generates at peak time, it will bring down the peak price of electricity, which will in turn effect the energy economics of the system; and (2) we support integrating the energy sectors (heat, electricity and transport) to improve overall emission reductions and cost to customers.
  - The NIC report Smart Power was very useful, and we support its broad thrust and agree that integrating heat, electricity and transport is essential for maximising whole system efficiencies. The NIC has also explicitly said it is excluding the supply of new housing from their remit. We, however, argue that energy system efficiency in general, including energy efficiency in the housing stock, is an infrastructure issue. This is because energy efficiency in houses is about condition; and because an energy efficient system in general has major implications for the total requirements of the energy infrastructure (because an inefficient energy system requires far more pipes and wires and capacity, and is far more expensive).
  - However, to enable an efficient, whole system operation requires institutional change – as set out in the IGov framework. As said above, this requires enabling rules and incentives within networks and markets to provide value to enable that integration; to capture efficiencies; and to stimulate innovation and doing things differently. However, this is a necessary condition but will not necessarily lead to desired outcomes if customers do not want to do it; and / or do not see the relevance of it to their everyday lives etc. One aspect of this is [thinking about customers in a new way](#). They have to be the centre of energy system decisions, and to do this the system has to be optimised from the bottom up. This is the only way to connect customers; to capture heat efficiencies and the demand side. See the Annex below for Introduction to the IGov Energy Governance Framework.

With respect to cross-cutting issues (page 19):

- As an energy group focusing on governance and decision-making, we are very pleased that you have highlighted an assessment of whether the current institutional framework is fit-for-purpose. Part of this 'fitness' is placing customers at its centre – and this fits with the wider aspect of NIC and the NIA of wide engagement with civil society and meaningful public consent.
- Also, with respect to funding and financing, we are pleased that you have noted that you will consider other alternatives which could deliver infrastructure in a more affordable way. We

believe, for example, that there is a case for financing climate related infrastructure investment through [long-term public borrowing](#).

IGov argues that a sustainable, affordable and secure energy system could be delivered in a more cost-effective way, were the governance framework reset. Much of the current institutional framework needs limited change – but some real changes are needed – as in a move to an integrated and independent system operator; new value propositions added such as a move from passive distribution network operators to active distribution service providers as a result of performance based regulation; and a refocusing of mind set from supply to demand, from centralised to decentralised, and from top down to bottom up optimisation (see Annex at end).

### **Whether the NIA has got the right methodology for interrogating the issues (page 21- 26), Q8-12**

As a general point, we worry that the UK does not have [sufficient capacity](#) – within and without Government – to deliver an evidence based, transparent, widely engaged NIA, which could then be put in place. This has to be confronted.

Page 21 discusses at length scenarios and models. These are only as good as their assumptions and inputs. We have worried for a long time about ‘group think’ in UK energy models. They often include an acceptance that government policies will be met, when they patently are not being so. We do support a much more critical and [‘what if’ attitude to models](#).

We do support building on the evidence base (page 23). In our view, UK is much too parochial in its attitude to energy policy. So much can be learnt from evidence-based case studies in other parts of the world. Please see our [website](#) for publications about innovation and governance in Denmark, Germany and various US States.

The Para 65 and page 24-25 set out the key drivers as a way to break down and interrogate the need for an NIA:

- As said above, we add another drive of changing social preferences. We agree with the technology and the climate change and environment drivers.
- We are less convinced about the box on page 25 about the economic growth and productivity driver. Yes, obviously we want the UK to have a vibrant and sustainable economy. We want UK citizens to be happy and comfortable, in their meaningful lives. How this is delivered is an enormous question with huge distributional and infrastructural implications. This is a central question for national conversations and meaningful public consent. At the moment this box is written almost with no reference to the rest of the consultation document. Whatever comes out of the NIA, has to have meaningful consent from UK civil society – and therefore the path, and type, of economic growth has to come from that. We could imagine this could be the basis of a ‘green’ industrial policy – which would fit with the wider document, but there is not even a hint of this in the box.

### **How the NIC should engage to build its evidence base and test its conclusions (page 29-31).**

We welcome the NIC placing wider engagement as an important aspect of the NIA. The extent to which there is meaningful engagement will make or break the NIA, and its legitimacy. We recognise

the document cannot include many details but at the moment it is not clear how this engagement will occur.

## **Section 2: Proposed and draft IGov institutional framework as a first step towards a Fit-for-Purpose UK Energy Infrastructure**

The annex below includes an overview of the IGov Framework. This has developed over the last few years and has been very widely discussed. We continue to support its substantive parts but will change some aspects of it following several meetings in London recently.

Broadly, however, we support the NIC energy vision in Smart Power. We think customers have to become the centre of the energy system – since their involvement is central to its ‘smartness’ and decarbonisation. We think the system has to become far more energy efficient – in terms of the way we use energy and how we operate our system. This has to be the primary focus, and again customers are central to that. If the system is to change, new values have to become available to encourage efficiency, flexibility, smartness and customer involvement – and the old ‘stupid’ ‘inflexible’ values have to go. We think this can be best undertaken by adding in a new value proposition of distribution service providers – as explained below. They will provide value to where value for smartness and flexibility should be; they are close to customers – so can capture demand side response; they can match supply and demand, including heat, in local markets; they can integrate and coordinate the distribution areas for efficiency and smart operation across heat, electricity and the electrical aspects of transport; and they enable bottom-optimisation.

Other aspects of an institutional framework are important, as set out below: e.g. policies for energy efficiency; an integrated and independent system operator; the re-organisation of Codes, access to data, market monitoring and so on.

Nevertheless, the key is that the energy system ‘mind set’ alters to being demand side and energy efficiency focussed; to accept decentralisation as a welcome improvement to cost-effectiveness, system efficiency and improved security; to wanting innovation (whether in operation, new entrants, customer practice and services); and to recognise that these changes add an element of control and choice to people’s lives.

We are very happy to discuss this with you in more detail.

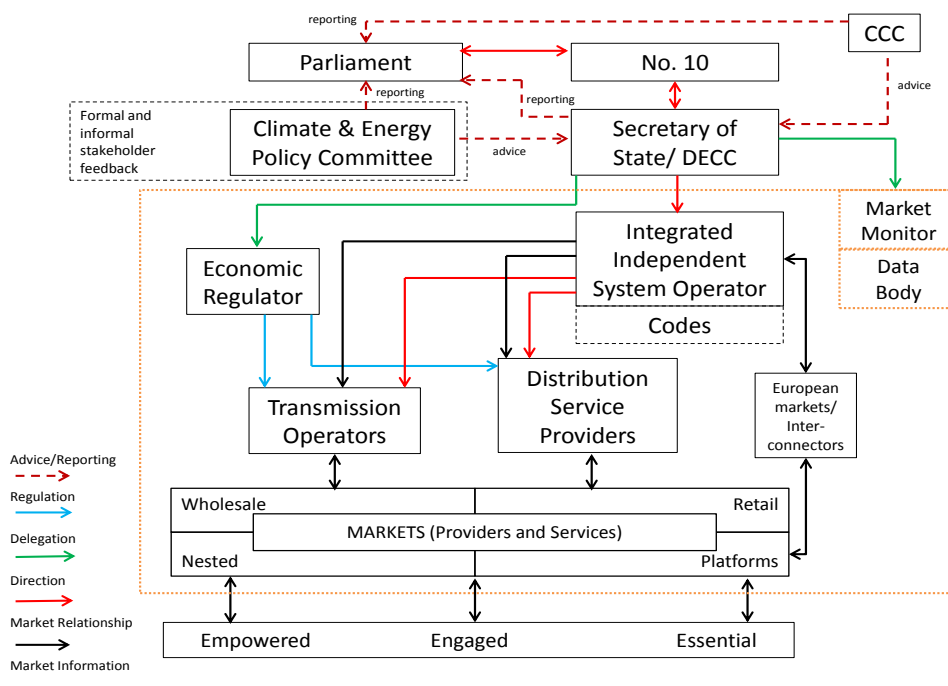


# DRAFT IGov Fit-for-Purpose Institutional Framework for the GB Energy System

## 1. Introduction

Energy systems around the world and in GB are undergoing fundamental and rapid change due to a wide range of different drivers, from technology through to social, environmental and businesses innovations. Much of this change is currently being experienced within the electricity sector, with new technologies and business models competing for space within our markets and networks (for example, options for demand side response (DSR), virtual power plants, storage and other ways to provide capacity and manage constraints). Nationally, the Department of Energy and Climate Change (DECC) and the Energy and Climate Change Committee (ECCC) have raised the possibility of creating an independent system operator and many distribution network operators (DNOs) are already moving towards becoming more active distribution system operators (DSOs). The recent reports from the National Infrastructure Commission (NIC) and the ECCC have highlighted the challenges and opportunities for creating a low carbon network infrastructure, and suggested that the challenges can only be met with appropriate governance, regulatory and operational framework. Transforming to this framework is vital because of the risk that as technology races ahead, infrastructure and regulations lag behind thereby undermining (or even blocking) its use. If this continues, the lack of governance change will potentially increase costs, undermine security and threaten the low carbon transformation itself.

Figure 1: IGov Fit-for-Purpose Institutional Framework for the GB Energy System<sup>2</sup>



<sup>2</sup> There is a full-page version of the framework at the end of this briefing note.

This briefing note sets out a new approach to governance<sup>3</sup> based on a proposed new institutional framework that IGov argues is more fit-for-purpose for the challenges and opportunities that the GB energy system faces, including the ongoing blurring of boundaries between heat, power and transport, and the new roles of consumers. The framework has been developed over the 4 years of the IGov research and this Briefing Note only provides a headline summary of the institutions and their role, and a brief rationale for thinking. However, we have written a number of blogs, working papers and journal articles about the governance needs of the GB energy system in general, and its constituent parts. All of this information can be accessed via the IGov [website](#); and we have included a few links to specific resources in the sections below.

## **2. Summary of institutions and their role**

Within this new framework we have set out changes to some existing institutions as well as the creation of some small, new institutions. What we are suggesting does not constitute significant or disruptive change. More, it is a combination of what we already have and governance already in place in Denmark and New York State in the US. Below is a brief summary of the main institutions and the role we envisage they will play.

### **Committee on Climate Change (CCC)**

Currently, the CCC provides advice to Government on the science (and state) of climate change, recommends carbon budgets, and provides analysis of ways to reduce emissions to meet the GHG budgets, as set out in the Climate Change Act, as well as reporting on progress. We think that the CCC should continue as the body which keeps track of the state of climate change and establishes the GHG budgets which have to be met, and by when. However, in respect to the energy system we think some of its functions should be passed to the CEPC.

### **The Climate and Energy Policy Committee (CEPC)**

The Climate and Energy Policy Committee (CEPC) is a new, but small, institution that would be a parallel body to the CCC. The basic function of the CEPC would be to provide a stable political consensus on how the UK can decarbonise. It would provide an intellectual coordination of GB energy governance, including enabling a 'national conversation', involving all major political parties and social and economic constituencies, supported by expert input on technologies, behaviour change, costs etc. This would include gathering formal and informal feedback from all stakeholders operating with the energy system, including consumers and their protection. The CEPC would also continuously monitor and review the progress of policies in the energy, buildings and transport sectors and report these back to government, industry and wider stakeholders. On the basis of this process, it would make recommendations to the government of the day on how to meet their energy policy goals.

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<sup>3</sup> Governance is taken to mean policies, institutions, rules and incentives (ie the rules of the game).

## **Ofgem**

Ofgem should revert to being an economic regulator, having delegated responsibility from the Secretary of State/DECC to regulate those organisations responsible for transmission and distribution within the system. The wider responsibilities that it currently has in respect to social concerns and sustainability should be passed – in part to the CEPC and the IISO. As an economic regulator, Ofgem is not involved in policy decisions.

## **Independent Integrated System Operator (IISO)**

The IISO is directed by the SoS and DECC to ensure that it both acts to facilitate the CCC carbon budgets and the recommendations from the CEPC. The IISO is a state owned system operator, and it gains independence by taking this role out of National Grid. It is also integrated with responsibility for transmission and distribution across electricity, gas and heat networks, and transport (in respect to electrification, power to gas, etc). The IISO will ultimately have responsibility for overseeing the energy system transformation to ensure policy goals for decarbonisation and system security are met, and for the energy system aspects of affordability. As such as well as having market relationships with transmission and distribution operators it provides direction to them to enable and facilitate the transformation of the energy system.

## **System Codes**

Industry Codes are no longer self-regulated and the current Code Administrators are bought together into one Code Body. The Codes are shaped and run to meet the decisions of the IISO and are either a separate or a subsidiary of the IISO.

## **Distribution Service Providers (DSPs)**

DNOs are transformed into ‘active’ distribution service providers and are at the heart of the future energy system. They are regulated by Ofgem and directed by the IISO. They both facilitate change from the bottom up, by providing or supporting new market platforms, including a pool for energy and services that meet consumer demands; as well as facilitating change from the top down by ensuring the goals of Government and needs of the IISO are delivered.

## **Markets**

As well as wholesale and retail markets, new markets are more easily enabled with the new framework, such as ‘nested’ or local markets within the distribution areas and platforms to enable companies and consumers to connect in new ways. Ultimately markets offer new ways to buy and sell energy and services within the system in a more facilitative way than is currently the case, bringing value to both the system and consumers.

## **Market Monitor and Data Body**

With oversight of all the institutions and markets in the energy system, a new market monitor is created, that is independent of the economic regulator and other institutions. It monitors and reports what is happening within the market openly and transparently. In addition to this, a Data Body is created which treats data as a public good; it collects and provides access to available data within the system to ensure that the goals for energy policy are met. The market monitor and the Data Body will need to work closely together and are directed via the Secretary of State/DECC.

## **Consumers**

Consumers are no longer viewed in respect to domestic, commercial, industrial, etc. Instead they are thought about in respect to how active or passive they are within the system. Ultimately the system is there to meet consumer demand for energy services and many of the changes that are occurring are within the demand side, and as such much closer to consumers. The energy system therefore needs to become more facilitative to what consumers want in respect to energy and services, enabling those that want, or are happy, to be active players in respect to demand and/or supply, whilst protecting those that are unable, or unwilling to be active.

## **3. The Rationale for change**

Current governance does not complement the technological, business and social changes, and change that is occurring is happening despite of, rather than because of, governance. Much of these changes are either to do with decentralised technologies, on the demand side, or occurring at the distribution level from the bottom up. Whilst the whole energy system has to become 'smarter', the case for optimising the system from the customer perspective is becoming increasingly strong. However, to enable and adapt to change efficiently also requires top down guidance, not least to implement the institutional governance changes to enable that. What is needed is a whole system approach to governance, based on legitimate direction from the top, optimisation of supply and demand from the bottom up, and then middle out facilitation through system and market institutions.

### **The Role of the Committee on Climate Change (CCC) and the Climate and Energy Policy Committee (CEPC)**

Currently, the CCC provides advice to Government on the science (and state) of climate change and ways to reduce emissions to meet the GHG reductions set out in the Climate Change Act. The CCC has to walk a very sensitive line between setting out the GHG reduction needs, recording the extent to which various policies have worked in reducing the GHG emissions, and explaining how further reduction needs can be met. The CCC is not meant to take a view between different technological or social pathways, rather it is meant to show the various ways the GHG budgets can be met cost-effectively.

At the moment, GB lacks a formal home for transparent discussion about climate and energy policy and for reaching consensus on potential policies and decisions. For example, the extent to which this

or that policy or regulatory issue appears to be working and leading to practice change, and the reasons why it is or is not doing so. The Climate and Energy Policy Committee (CEPC), a new parallel body to the CCC, is intended to provide a space – modelled on the Monetary Policy Committee – where the ‘politics’ of energy can be openly discussed before a policy gets put in place; where ideas about new technologies, social preferences, business models and so on can be introduced into the debate; and where potential ‘consensus’ policies can be agreed. Like the CCC, it would also report to Parliament, and DECC would have to report to Parliament on whether DECC accepts the CEPC advice.

We think that the CCC role should be split into two: First, the CCC should continue as the body which keeps track of the state of climate change and establishes the GHG budgets which have to be met, and by when. Second, the CEPC would be established with 5 functions: (1) it would be responsible for enabling, and collating, stakeholder feedback and views about climate and energy policies in an inclusive manner, including having a grasp of what new technologies and social preferences mean for energy policy and system operation; (2) it would continuously monitor and review the progress of policies in the energy, buildings and transport sectors – including ensuring the social (including customer protection), environment and security goals of Government are met in practice - and report these back to government, industry and wider stakeholders; (3) it would provide intellectual co-ordination across Government and Ministries to deliver necessary climate and energy policies and highlight gaps; (4) it would enable a ‘national conversation’, involving all major political parties and social and economic constituencies, supported by expert input on technologies, behaviour change, costs etc. And (5), taking these 4 functions into account - it would give advice to DECC and the government of the day on how to meet their energy policy goals (taken to include governance issues).

An example of this might be, with respect to fuel poverty, that the CEPC would provide intellectual coordination across Government to ensure building regulations for housing; to ensure energy efficiency policies, and value for providers; to enable targeting of vulnerable groups / fuel poor; and to protect customers at the edge of mainstream services, such as via a default service of a rising block tariff.

IGov argues that the CCC recommendations need to be linked more into GB governance. For example, Codes are the basis of all transactions within the energy system. At the moment, there is no requirement on the Code Administrators to ensure that they enable the meeting of the CCC recommendations. IGov envisages that the IISO (as explained in more detail below) is directed to ensure an energy system capable of meeting the CCC budgets, and that would cascade down to the TO, the DSPs, and the Codes (see below for details).

For further discussion on these topics see:

- [Putting the environment back into GB energy policy](#)
- [First-past-the-post Politics is a Major Barrier in GB to a Legitimate, Long term Energy Policy Framework](#)
- [Restructuring GB’s Energy Institutions – why it is worth the cost](#)

## **The Role of the Secretary of State (SoS), DECC and Ofgem**

The current energy policy paradigm is that Government takes high-level policy decisions, but where possible leaves the delivery of energy goods, services and some policies to the market. The argument is that it beneficially ‘de-politicises’ energy policy decision-making and implementation through an ‘Independent’ energy regulator which works to certain Duties, and which receives ‘guidance’ from Government every 5 or so years<sup>4</sup>. The energy regulator is responsible for overseeing market and network regulation, and the energy system is expected to operate cost effectively. Ofgem was initially set up as an economic regulator but has since taken on other social and environmental responsibilities. This means that the role of the regulator has expanded over time, and now de facto includes decisions on trade-offs between government goals and policies.

New technologies are opening up multiple new pathways to meet Government climate change policies. The choice of one rather than another technological pathway has large distributional impacts on different sections of society (including the industry and supply chains), its total costs and its speed of transformation. Technology pathways are heavily influenced by policy support (for example, of nuclear power and/or renewable energy through RO/CFDs etc) undertaken by Government. But Ofgem’s actions matter through the surrounding regulation (network charging, codes, balancing market design, decision on distribution system operators versus distribution service providers etc.). Through their executive authority they are now taking a multiplicity of de facto policy choices which themselves have major impacts on, for example, the relationship between the TO and DNOs / DSOs / DSPs; the centralised versus decentralised nature of the energy system; the availability of local markets; the involvement of customers.

The context within which the regulator operates and makes decisions has changed dramatically since they were set up, and because of this their role has to be rethought (see below). The IGov argument is that many decisions that should be in the policy sphere, ultimately decided on by the Secretary of State (SoS), have drifted by default into the regulatory sphere. We think this should be ended, and confronted, by scaling Ofgem back to be a minimal economic regulator and by re-assigning the social, environmental and security responsibilities elsewhere.

IGov argues that energy policy decisions are deeply political, and more transparency and legitimacy has to be brought back into the GB decision-making and institutional framework. It should be the SoS and DECC which has capacity to take all policy decisions, and be responsible for them. Moreover, these policies should together enable the CCC recommendations to be met.

A legitimate energy policy process is required which can be nimble enough to take account of the rapidly changing energy system and incorporate a consensus views. IGov argues that a combination of more capacity in DECC to take policy decisions; the advice from both the CEPC and the CCC; a restructuring of the hierarchy of decision-making in the energy system so that an economic regulator and a state owned system operator are on the same level; and the SoS directing the IISO to meet the

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<sup>4</sup> Currently under discussion

CCC budget requirements is a preferable process to ensuring that Government goals are met to the one we currently have.

For further discussion on this topic see:

- [The odd couple: Will a new Strategy and Policy Statement help sort out the relationship between government and Ofgem?](#)
- [Submission to DECC Consultation on the draft Strategy and Policy Statement](#)
- [Restructuring GB's Energy Institutions – why it is worth the cost](#)
- [Energy Depoliticisation in the UK: Destroying Political Capacity](#)

### **Returning Ofgem to being an Economic Regulator**

IGov argues that Ofgem should return to being an economic regulator only. Its environmental Duties should effectively be passed to the state-owned IISO, which has responsibility for system security and transformation to a sustainable energy system to meet the CCC and CEPC recommendations. Because the IISO would have more technical capacity than the economic regulator, it should be more able to drive technical discussions with the TO and DSPs. We argue that the economic regulator is the wrong institution to take responsibility for social concerns (primarily affordability and fuel poverty) with respect to the energy system (see below).

The SoS would have hierarchy over both the economic regulator, and the IISO. However, the economic regulator and the IISO are on the same level of hierarchy – this is a resetting of institutional importance from where economics / competition / the market has hierarchy to one where the latter and a strategic framework to meet the CCC recommendations are on an equal footing. This is because IGov argues that we need more strategic direction in relation to meeting Government goals. Once that strategic framework is established, then markets can work. This is a more balanced approach between markets and regulation, but it is not an anti-market view. On the contrary, IGov sees markets establishing more values in the IGov Framework than currently.

In the IGov framework, the CCC sets out the science, the CEPC advises on what needs to be done; the SoS decides on the policy and directs the IISO to deliver, and the Regulator to regulate. Once the IISO has decided what has to be done by when, and there is agreement with the TO and the DSPs, then the economic regulator, regulates that agreement. The economic regulator is not involved in policy decisions.

For further discussion on this topic see:

- [Public Value Energy Governance: establishing an institutional framework which better fits a sustainable, secure and affordable energy system](#)
- [Progressive Regulation – What Future For OFGEM?](#)
- [Change and Inertia in the UK Energy System – getting our institutions and governance right](#)

## **The Integrated and Independent System Operator**

IGov has argued that the current system of joint system operator and transmission operator within National Grid encompasses too many conflicts of interest for NG, at a time of fast changing and decentralising energy technologies. As such, we recommend that the system operator portion of National grid is renationalised to become a state owned independent system operator. In addition to this, we think it should also be integrated, looking across electricity, heat and transport. This reflects the fact that energy is a whole system: making changes in one place, will lead to changes in another part of the system and it therefore has to be integrated in order to run the system effectively.

We place the responsibility for the transformation of the energy system from its current state to one which meets the CCC objectives and for maintaining security on the IISO. This system operator is responsible for both transmission and distribution and would be integrated between the electricity (including the electric vehicle structure), gas and heat networks. Markets also have to provide value to complement this smart infrastructure operation and development.

IGov is arguing that the energy system becomes customer-focused and optimised from the bottom up. The IISO therefore will be responding to distribution service providers (see below) but the IISO has ultimate responsibility for the system. The state-owned IISO which links markets and networks; and oversees both transmission and distribution networks is the best way to enable that.

For further discussion on this topic see:

- [National Infrastructure Commission call for Evidence - submission from Energy Policy Group](#)
- [Not just independent but also integrated – the future for energy system operation](#)

## **The Codes**

The current code governance system is not fit for purpose being prone to inertia, capture by incumbent interests, overly complex and opaque and not sufficiently connected with over-arching policy goals. That need to change in order that they facilitate change, IGov held a workshop on this topic and the papers can be viewed below.. The key IGov policy recommendation is that Codes stop being self-regulating, and become a technical aspect of the energy system. Codes should be changed to fit with the IISO decisions, as and when needed. The Code Administrators should come together within one Code Body. This can either be separate or a subsidiary of the IISO but in both cases, the Code Body works to the IISO.

For further discussion on this topic see:

- [Innovation and energy industry codes in Great Britain](#)
- [IGov Codes Governance Workshop](#)
- [Codes Governance and Reform Discussion Paper](#)

## **Distribution Service Providers (DSP)**

IGov has also held a DSO/DSP workshop, and the papers can be viewed in the link below. IGov argues that the distribution network companies should transform into being 'active' distribution



service providers (DSPs). This could occur if their regulation changed from being related to units supplied and the value of their asset base to where a larger proportion of their revenue is related to performance based regulation outputs (PBR) and the extent to which they facilitate market transactions. The New York Reforming the Energy Vision (NY REV) sees the move to DSPs taking about a decade. At that point they are envisaged as being the 'heart' of the electricity system with new values (or payments) available to new entrants for providing new services (both system and energy) to customers. We envisage DSPs with market platforms, including a pool for energy and services.

The IGov framework envisages that the IISO will have an overview of the type of system needed to meet the CCC GHG reductions. The DSP will be following various PBR outputs (complementary to Government policies) and customer wishes. The IISO will gauge whether this is sufficient for meeting infrastructure changes necessary to meet CCC recommendations, or whether they have to make an agreement with the TO/DSPs to speed up change on the DSP network. The PBR outputs can be ratcheted up if necessary and Government policies, for example, to encourage more energy efficient buildings (and thereby lower energy demand) could become stronger, and should be complementary. The economic regulator then regulates these agreements. This is an ongoing and iterative process.

The boundary between the IISO and DSP is complex. The IISO ultimately has hierarchy. The DSP should become more active by meeting its PBRs, following customer demands and facilitating markets. We envisage that there is a place for both 'smart' top-down and bottom-up optimisation of the energy system. However, ultimately, for those times when a choice has to be made between the 2 levels for system operation reasons, bottom-up optimisation would be supported because the system should be customer-focused and aims to be energy efficient – which includes capturing demand side possibilities which are increasingly at the local level.

IGov argues that a move to a DSP system seems to be the most logical way to both direct the energy system to meet Government goals whilst at the same time encouraging markets.

For further discussion on this topic see:

- [What, and how, the New York utilities are expected to transform to over the next decade – the New York REV's Ratemaking May 2016 Order](#)
- [IGov Roundtable on Distribution Service Providers](#)
- [More flexible, more renewable – our evolving energy systems are changing fast](#)

## **Markets**

GB currently has a bilateral wholesale market (the British Electricity Transmission and Trading Arrangements) with several market platforms linked to it. As we said above, we envisage a DSP with market platforms, including a pool for energy and services. 'Nested' or local markets within the distribution areas would have the choice to either sell into the DSP pool (for either supply or demand products) or directly into the wholesale market. Customers – of different types – would buy and sell into any of those markets they chose to. Larger producers and customers may continue as they are buying and selling via the wholesale market. IGov would argue that new entrants,

technologies, social preferences and so on are opening up new services and wishes and values in markets should be available for them.

For further discussion on this topic see:

- [Future energy markets and networks in the UK and European Union](#)
- [We must not recreate the wrong market model](#)

### **Market Monitor and Data Body**

The recent CMA inquiry has highlighted the inadequacy of GB market monitoring, and IGov argues that a transparent market monitor should be created, independent of the economic regulator. In addition, access to available data is becoming increasingly important to system operation and energy economics. IGov takes the view, as in Denmark, that data is a public good and open and transparent access to it will ultimately benefit society more than trying to marketise it at its source. The market monitor and the Data Body will need to work closely together.

For further discussion on this topic see:

- [Overview of our submissions and thinking on the CMA Inquiry](#)

### **Customers / Consumers**

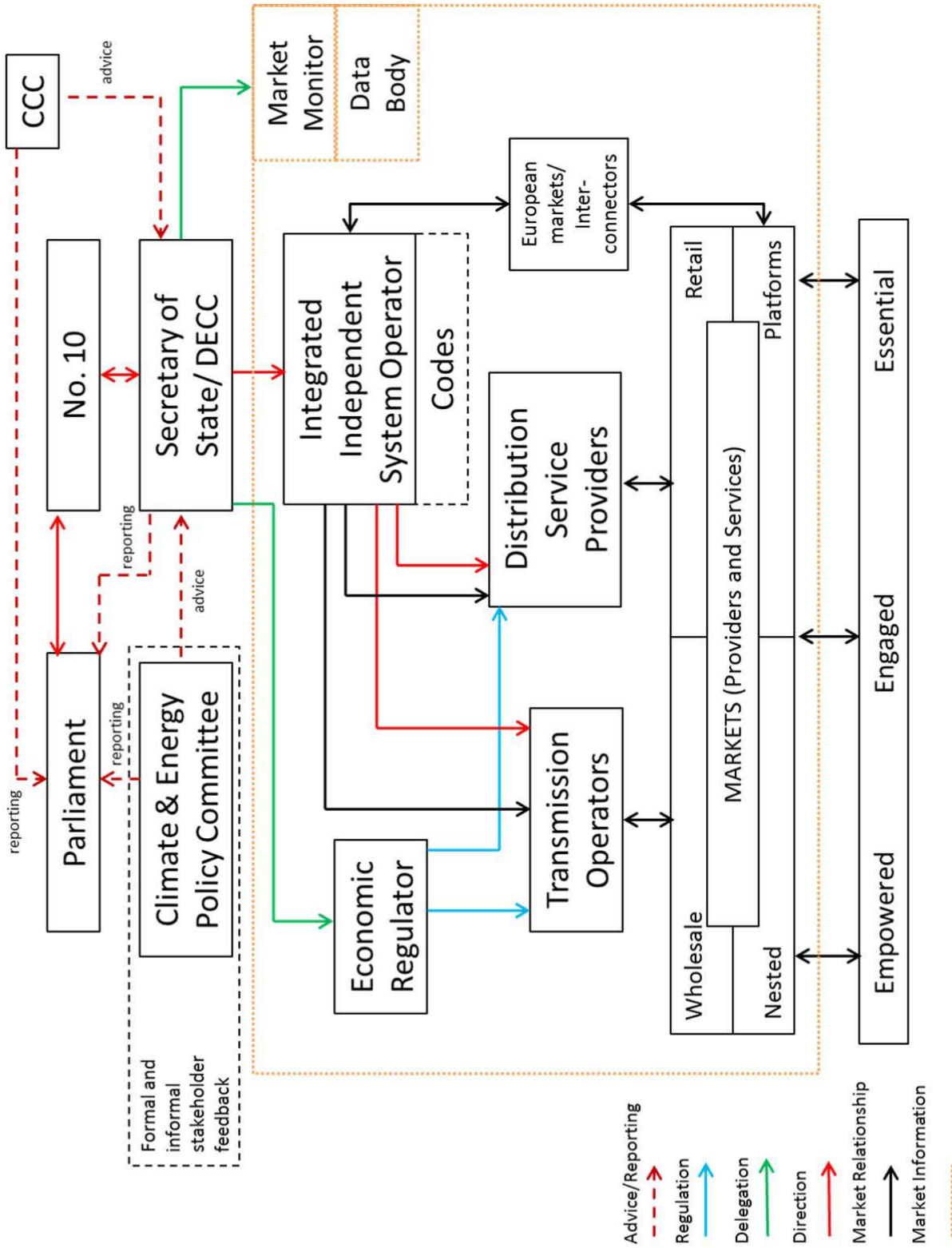
IGov takes the view that consumers should no longer be viewed in terms of their sector, i.e. domestic, industrial, commercial and so on. In line with what is happening in other countries it makes more sense to view them in terms of how able or willing they are to engage with the system. This is because available technology, new businesses models and change in social practices allows each consumer to be treated individually, from those that are very active i.e. prosumers through to those that are unable or unwilling to act. Consumers can be thought of on a continuum from ‘empowered- engaged-essential’. Moreover, we argue that the energy system should be customer-focused, meaning that it should be run in such a way that it fulfils customer wishes – rather than customers having to fit into company and regulator wishes – but also provides a better service in terms of system operation cost.

Customers will make or break the move to a smarter and sustainable system. As a result, efforts to connect them to their energy use are essential – and this is far more complicated than viewing this in relation to the numbers which switch. We support the introduction of a Social Licence for all energy institutions and actors to ensure that they build and offer legitimacy, credibility and trust. We support default service for fuel poor, vulnerable or disengaged customers provided it has a rising block tariff. We do not support a default service based on price. In addition, a change of mind set has to occur so that companies and the system views customers as a source of system services, for which the customers are paid and which potentially negates the need for additional infrastructure capacity elsewhere. This we expect to occur via the DSP markets. Moreover, we support ‘conversations’ about energy with customers. Funds have to be available for this and should be bid for by those which wish to undertake the conversations. We imagine Citizen’s Advice would have control over those funds which could be bid for by local authorities, small communities or

companies. We also think DSPs should be enabling 'outreach', and this would be incentivised via their PBRs.

For further discussion on this topic see:

- [Rethinking the role of consumers in our evolving energy system](#)
- [Switched Off – is switching really a measure of consumer engagement?](#)
- [Forget the 'trilemma' – tackling the fourth challenge of inertia is the key to unlocking a sustainable energy future](#)



5 August 2016

# Energy Saving Trust submission: National Infrastructure Assessment

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## Introduction

Energy Saving Trust is pleased to respond to the National Infrastructure Commission's (NIC) consultation on the National Infrastructure Assessment (NIA).

Energy Saving Trust is the leading, impartial sustainable energy organisation. We work on behalf of governments and businesses across the UK providing services in the area of data, assurance, consumer engagement, advice and grant administration.

For the Department for Business, Energy and Industrial Strategy (DBEIS) the Energy Saving Trust delivers the telephone-based Energy Saving Advice Service in England and Wales. We also undertake other research and awareness-raising work for the department on a project-by-project basis. Prior to the coalition government, for over 15 years, EST ran national energy advice services for DECC and predecessor departments as a grant-funded organisation.

In Scotland the Energy Saving Trust is the principal delivery partner of the Scottish Government for home energy efficiency. We run comprehensive local and national advice and grants programmes.

Public engagement on energy is at the heart of our work. In total each year the Energy Saving Trust handles just under half a million energy efficiency advice calls on behalf of UK and Scottish governments. Energy Saving Trust has a unique relationship with the public around energy saving and renewable energy and our response reflects that. We welcome the fact that the NIC is accepting general responses relating to the NIA and we have adopted to take this approach for our submission.

## Objectives of the NIA and energy efficiency

We welcome the NIC's stated objectives for the NIA to "*Foster long-term and sustainable economic growth across all regions of the UK; improve the UK's international competitiveness; improve the quality of life for those living in the UK*".

We believe that increasing investment in domestic energy efficiency is central to meeting these goals and would therefore urge the NIC to include energy efficiency in the National Infrastructure Assessment (NIA) as vital and cost effective investment into the UK's energy infrastructure. There is a significant and growing body of evidence demonstrating the significant macroeconomic benefits of investing in energy efficiency; we would refer the Commission to reports from Frontier Economics<sup>1</sup> and Verco and Cambridge Econometrics<sup>2</sup>, for instance. The 'multiple benefits' of energy efficiency as put forward by the International Energy Agency<sup>3</sup> makes a strong case for large scale public investment in energy efficiency. In a recent Energy and Climate Change (ECC) Committee report<sup>4</sup>, and in others referred to above, it has been acknowledged that "[...] *improving home energy*

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*efficiency is a 'win win' for households and the UK as a whole. It enhances the UK's energy security, cuts the carbon emissions from our building stock, and reduces costs—the cheapest energy is the energy that we don't use. From the consumer perspective, the benefits include lower energy bills, warmer homes that are more comfortable to live in, and improved wellbeing”*

Government, Select Committees, the Climate Change Committee and industry players have recognised the importance of energy efficiency but this has not yet translated into government policy with the ECC Committee having to call for “*a renewed commitment to tackling energy efficiency by establishing adequate policies with long-term, ambitious objectives, which restore confidence to the industry*”. A paper published by the Energy Saving Trust<sup>5</sup> found that the multiple benefits of energy efficiency are not well incorporated into UK policy making at the moment. We believe that the NIA is the perfect opportunity to remedy this.

We were very encouraged by the statements on the energy sector focus, that the NIC notes “*the importance of looking at the future of heating and the shift to low carbon solutions in the context of the UK's carbon targets, and the important role that increasing energy efficiency could potentially play.*” There is widespread agreement across the energy industry that energy efficiency has a crucially important role to play in the energy system and there is ample evidence that it will help us to meet our carbon targets at lowest cost whilst delivering multiple other benefits. It is also useful to note the interaction between energy efficiency and low carbon heat; many low carbon and renewable heating technologies only perform efficiently if installed in well insulated homes, for instance.

### **Long term plan for energy efficiency**

Energy efficiency should be included firmly within the NIA as part of a whole energy system approach to meeting the UK's demand for energy services in a cost-effective way whilst meeting our climate change targets. We would point the Committee to a short position piece that the Energy Saving Trust recently published ‘Energy efficiency: recalibrating the debate’<sup>6</sup>. In the paper we argue for a clear, coherent long term plan to transform the UK energy system: the economic and social benefits of investing in our housing stock would place home energy efficiency at the heart of this. The challenges of the energy ‘trilemma’ require solutions that take a long term, whole energy system approach and the NIA, with an “[...] *in-depth assessment of the UK's major infrastructure needs on a 30-year time horizon*”, is therefore a fitting mechanism to help deliver this.

In its latest progress report the CCC<sup>7</sup> highlights the lack of action plan for energy efficiency and low carbon heating. The report states that new policies and stronger implementation are required as part of a “[...] *stronger policy framework to drive residential energy efficiency improvement by addressing gaps and strengthening existing policies.*” There is significant untapped economic potential for energy efficiency and we believe the NIA is the perfect opportunity to address this and provide the long term stability that is required in residential energy efficiency. This ties in perfectly with the statement that the NIA will “[...] *determine a 'vision' of the UK up to 2050, to identify long-term infrastructure need in light of that vision and to highlight priority areas for action over the medium-term.*” This is vital for investment in energy infrastructure where long lead times are

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required to provide certainty for industry and establish a clear policy framework. Energy efficiency policy to date has been intermittent and inconsistent which is understandably damaging for the supply chain but also for householders. There is currently no offer for the vast majority of householders with the abrupt end of the Green Deal. We need a stable offer for all households to allow time for awareness of schemes to spread and to provide confidence that it is worth committing time, effort and money into a long term government priority. Energy efficiency has been neglected to date with the vast majority of attention (both from policy makers and the general public) going to supply side issues. This is a significant oversight and we strongly believe that energy efficiency should be seen as the first fuel: the cheapest energy being the one that is not used. This is in line with a growing recognition at an EU level for (energy) efficiency first<sup>8</sup>.

We have long argued for a significant increase in energy efficiency funding and we believe that the infrastructure designation can be an important catalyst to do that. We would point the Commission to the activity in Scotland where energy efficiency was set as a national infrastructure priority last year. This was a significant development and we feel it has been vital in garnering cross-party support for energy efficiency.

### **Future-proofing the energy system**

We agree with the statement that changing technology makes it difficult – and arguably unwise – to try and predict trends. This is especially true for the energy sector where smart meters, decentralised energy, energy storage and a variety of new renewable technologies make it difficult to model the future. With this in mind we think the case for infrastructure investment in energy efficiency is even stronger: demand reduction is beneficial regardless of the technologies deployed or how the system develops. A well-insulated housing stock achieves a number of strategic priorities and would mean the UK is best placed to incorporate any changing technologies as they develop over the coming decades.

Another important consideration we would point to is the cost of inaction vs. the cost of early action. Criticism has been levelled at government on a number of areas in energy that it is not taking an approach that takes into account the long term costs/benefits, especially as they relate to important technologies for the UK to meet its climate change targets. We would urge the Commission to incorporate this into its modelling.

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<sup>1</sup> <http://www.frontier-economics.com/publications/energy-efficiency-an-infrastructure-priority/>

<sup>2</sup> <http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf>

<sup>3</sup> <http://www.iea.org/topics/energyefficiency/energyefficiencyiea/multiplebenefitsofenergyefficiency/>

<sup>4</sup> <http://www.parliament.uk/business/committees/committees-a-z/commons-select/energy-and-climate-change-committee/inquiries/parliament-2015/home-energy-efficiency/>

<sup>5</sup> [http://www.energysavingtrust.org.uk/sites/default/files/reports/1-424-15\\_Payne.pdf](http://www.energysavingtrust.org.uk/sites/default/files/reports/1-424-15_Payne.pdf)

<sup>6</sup> [http://www.energysavingtrust.org.uk/sites/default/files/reports/Energy%20Efficiency\\_recalibrating%20the%20debate.pdf](http://www.energysavingtrust.org.uk/sites/default/files/reports/Energy%20Efficiency_recalibrating%20the%20debate.pdf)

<sup>7</sup> <https://www.theccc.org.uk/publication/meeting-carbon-budgets-2016-progress-report-to-parliament/>

<sup>8</sup> [http://europa.eu/rapid/press-release\\_SPEECH-15-4439\\_en.htm](http://europa.eu/rapid/press-release_SPEECH-15-4439_en.htm)

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5<sup>th</sup> August 2016

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Dear Sir or Madam:

**Re: Response to National Infrastructure Assessment**

Please find the Energy Systems Catapult's input to your specific consultation questions below. The information below also provides a summary of the work of the ESC; we expect it to be very relevant to the work of the National Infrastructure Commission (NIC). To date we have had only a limited engagement with NIC but suggest that the two organisations make direct contact in the near future. If that makes sense please contact me to arrange a call or meeting.

The Energy Systems Catapult (ESC) was launched in April 2015 with a remit to take a whole systems approach to the transition of the energy systems to meet the needs of the so called 'trilemma'.

The ESC is delighted to see the development of the NIC and is aligned with it in terms of agreeing with the majority of challenges identified and many of the approaches proposed to tackle them.

The ESC has already built capability in three areas that it would expect to be relevant to the NIC:

- The Future Power System. In July, together with DECC and the IET it published the attached work on the Future Power Systems Architecture which is also likely to inform the future energy industrial strategy that will be required by BEIS.
- The transformation of residential energy: focussed at Local Authority level, investigating intelligent local energy infrastructure planning, embedding intelligence (smart: digital, communications and standards) in the local energy system, looking at consumer engagement and its potential to drive efficiency and reduce the costs of transformational change, as well as grid edge and beyond the electricity and gas meters. A key objective of this Smart Systems and Heat programme is to enable an efficient market, with an appropriate supply chain to 'right size' future energy infrastructure
- A whole systems approach to developing future energy scenarios, plausible transition pathways and using formal methods to derive related policy and (innovation) investment recommendations. This involves bringing together the energy systems planning, expert community in the UK including the Energy Technologies Institute's SAF, the National Grid's FES, the Committee on Climate Change and the various experts from academia to enable them to communicate more effectively with decision makers. This will involve communicating more unified messages and clear language around areas of consensus in terms of the way forward and associated required actions to deliver future energy infrastructure in the UK.



The ESC has only answered the consultation questions below from its perspective on energy and provided a few insights for each question that it hopes are helpful. The work is far from exhaustive.

1.

- 1.1 The objectives given to the NIC may prove to be mutually exclusive. For example, the best way to improve UK international competitiveness may be to invest in the South East, but this would not foster growth across all regions; or a new airport may improve competition, but at the expense of the local quality of life. How will the NIC make a decision where the three objectives are not aligned? Is there a priority order for the objectives?
- 1.2 To achieve the decarbonisation of energy will almost certainly require uncoupling economic growth from the consumption of energy. All experts and commentators in the energy transition pathways community have identified that OECD countries will have to reduce demand for energy by up to 50% by 2050
- 1.3 The decarbonisation agenda is a global challenge. The UK alone will not have all of the solutions. While international competitiveness is an important goal the UK will have to work collaboratively with other countries to deliver success, as international choices, innovation, investment and momentum will strongly influence what is adopted in the UK and globally.
- 1.4 Adopting new energy infrastructure will be as much about implementation as investment and innovation. Implementation will require a large workforce with many new skills. The education of that workforce will need to start well in advance of implementation if it is to meet the scale of the challenge. For example if home decarbonisation conversion started in 2020 in the UK, it would have to convert 18,000 homes per week to meet its decarbonisation targets.

2. Yes, the bullet points listed are all good.

- 2.1 The ESC has been set up around the principle of taking a whole systems approach to the energy transition. One of the key challenges for the ESC has been finding formal methodologies to apply a whole systems approach, as whole systems thinking is not yet main stream or 'commoditised'. The issue with not having an agreed formal methodology is that when the NIC publishes future recommendations and third parties do not agree with them they will seek to challenge the methods that have been used to reach the recommendations. Therefore the ESC would recommend that the NIC take time to ensure that its methodologies are as widely accepted and as transparent as possible.
- 2.2 Whole systems approaches imply the need for systems integration which brings additional costs that are not usually identified when a challenge is approached via silos. A decision made within a silo generally reflects the narrow financial incentives within that silo. To get whole system decisions, implies taking account of costs/other impacts beyond the silo where the decision is being made. If a party incurs additional costs by making a whole system decision, rather than optimising within their silo, will they be compensated or will they be expected to take the financial hit? This systems integration cost requires clear communication and can be hard to justify in a traditional silo based system.

3.
  - 3.1 The section on digital and communications makes no reference to cyber security. Given the increasing use of digital systems to operate all other forms of infrastructure, this is likely to be a key issue.
  - 3.2 In taking a whole systems approach the ESC interrogates the energy sector through multiple lenses. One of those lenses views the system as having three layers: 1. The technical layer (which needs to obey the laws of physics) 2. The market layer (or commercial) that enables the technical layer to operate economically and 3. The institutional layer which accommodates the institutions (eg regulator, operators, supply chain, investors, unions) that are organised around the market and technical layers. It is important to recognise that future infrastructure recommendations will have implications for all three layers.
4. All of the areas of focus are required. In terms of sequencing, or prioritisation, one of the biggest immediate physical risks to existing infrastructure is flooding and the over-topping of the flood defences in Carlisle last year (which had been built in response to the floods 5 years previously) highlights the difficulties in forming a long term view. The ESC would argue for an early review of flood protection to both understand the risk to existing assets and ensure that the siting and design of new assets takes account of flood risk.
5. As identified, the energy sector is likely to be key as its usage is driven by what is happening in the other sectors and it is much more expensive/difficult to upgrade than digital/telecommunications.
6.
  - 6.1 The ESC strongly supports that performance must be measured by the services delivered, not km of road etc built.
  - 6.2 The option value of infrastructure solutions is not well understood and therefore only rarely included in evaluating future infrastructure recommendations. An example in energy would be electrical energy storage which is not currently economically viable when evaluated against current economic criteria. However energy storage provides options in terms of energy flexibility and timing of future infrastructure choices, and that optionality has a value; however that value is rarely considered.
7.
  - 7.1 Could add a cross-cutting issue of “giving private investors confidence that the plans will be delivered”. One factor here could be identifying the drivers behind individual projects thus highlighting the circumstances that could lead to a change of plan.
  - 7.2 Consumer experience and expectation could be added as a cross cutting issue. As could business models and market mechanisms (regulation). One potential advantage of whole systems thinking is avoiding unintended consequences.
8. The methodology should also consider flexibility to subsequently expand e.g. building roads with the ability to add lanes later if necessary. It should be a priority to avoid building assets that may need to be replaced because they cannot be expanded.
9. National Grid, the Committee on Climate Change, the Energy Technologies Institute and WholeSEM and UKERC in academia have done a lot of work on “least regrets” decision

making, but not sure that they are significantly better than others. The ESC has started to also look to the aerospace and defence sectors and the discipline of systems engineering for the most advanced thinking and expertise in the area of whole systems approaches. We are working with INCOSE, the International council of systems engineering, to extend our knowledge.

10.

10.1 The ESC agrees with the drivers identified and suggests three additions:

- International considerations, investment, knowledge and momentum in other countries can have both positive and negative supply chain and economic implications
- Resource constraints, physical, human and financial
- National Security

10.2 It will also be important to maintain an horizon scanning process. The NIC is charged with looking 35 years ahead. Back in 1980, the internet did not exist as a business tool and environmental concerns were focused on acid rain. It is to be expected that, by 2050, new drivers will come to the fore.

11. It will be important to get the different sectors talking to each other as well as individually to the NIC. The risk of solely holding bilateral discussions is that there could be a misunderstanding between two sectors that would be flushed out by direct discussion. The proposed portfolio of investments may be a combination of short term issues (this area is being held back by a lack of broadband etc) and long term (to reach its full potential this area has the following infrastructure needs). Some methodology will be required to compare the benefits of short term actions to resolve particular bottle necks against more holistic long term plans.

12.

12.1 One way of identifying infrastructure needs will be to consult local businesses as to what their needs are likely to be. Inevitably, this will tend to overstate the need and the NIC will need some way of moderating the needs identified by local businesses.

12.2 The linkage between national and local needs will need to be accommodated

12.3 While a 10 to 35 yr time horizon seems appropriate it will be important to have a longer term vision. For example if the UK wanted to have a hydrogen based energy future by 2100, that vision would significantly influence, and in many cases change, decisions that are made in the 10-35 year time horizon.

13.

13.1 If a simple model can be made available, it gives people a way of investigating potential solutions to a problem that they have identified and then engaging more intelligently with the NIC. It would also aid transparency about decision making but, given the wide remit of the NIC would be very difficult to achieve.

13.2 The NIC will need to be an intelligent customer and while it will need to engage with a very wide community of expertise the ESC would recommend that NIC develops clearly set requirements and expectations in all of its requests or input from third parties. Additionally we would recommend that the NIC set up Special Advisory Groups (SAG) around a small number of key themes, both cross cutting (e.g. systems

engineering) and vertical (e.g. transport), to engage real expertise as and when it needs. One way this has worked for the ESC is with a SAG helping prepare detailed requirements for tenders or consultation with wider audiences to ensure meaningful input from the wider audience.

Yours faithfully

[name redacted]  
[job title redacted]



# Response to National Infrastructure Commission consultation on the National Infrastructure Assessment: process and methodology

## Overview / Key Points

The Energy Technologies Institute (ETI) strongly welcomes the creation of the National Infrastructure Commission (NIC) to develop a strong strategic vision for the UK's long-term economic infrastructure needs. We also welcome the broad approach set out by the NIC to the National Infrastructure Assessment, in particular the emphasis on

- objectivity and rigour,
- challenging established thinking, and
- the importance of a whole system perspective.

These tenets have been prominent in ETI's own long-term analysis of the UK's energy system and the challenges posed by delivering an affordable and economically efficient transition to a low carbon future. Over the past eight years we have developed a rigorous and robust capability in UK national whole energy system analysis (our Energy System Modelling Environment – ESME), which is uniquely informed by the business and engineering expertise of key global players engaged in the UK energy sector and our portfolio of technology development, demonstration and knowledge building projects. This enables the ETI to explore lowest-cost decarbonisation pathways, under a range of assumptions, constraints and uncertainties. Our analysis has been widely cited by academics, government and by the Committee on Climate Change in its advice to government.

We believe that rigorous national energy system modelling, informed by realistic underpinning research and engineering insights, is a key source of evidence to inform future strategic planning of energy infrastructure and related questions in transport, industrial and water infrastructure. As such we look forward to supporting the work of the NIC in delivering a robust and rigorous National Infrastructure Assessment, that is consistent with the UK's legally binding climate change targets.

While modelling such as that carried out by the ETI cannot forecast the future or create 'blueprints' of the future shape of our national energy system, it clearly shows the importance of enabling a strategic and cost-effective approach to decarbonisation<sup>1</sup>. In particular:

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<sup>1</sup> Further details can be found in the ETI report 'Options, Choices, Actions: UK scenarios for a low carbon energy system transition', available via the ETI website [www.eti.co.uk](http://www.eti.co.uk)

- Our analysis shows that the UK can implement an affordable low carbon transition by 2050, based on developing, commercialising and integrating a basket of low carbon technology options, which are currently largely known but under-developed.
- The incremental (average annual) costs of carbon abatement across the national energy system (i.e. electricity networks, transport, heat, industry and infrastructure) could be contained at around 1% of GDP by 2050 within a coherent economy-wide market and policy framework. Failure to successfully develop and deploy key technologies could easily double this cost to the UK economy.
- Action in the next decade will be critical in preparing for and beginning the large-scale deployment of key technologies. Resources should be focused specifically on bringing a basket of the most promising options to genuine deployment readiness in the UK. A portfolio approach will limit inevitable implementation risks (and cost) in the future and should include: carbon capture and storage (CCS), new nuclear, offshore wind, gaseous systems, bioenergy, efficient vehicles and low carbon heat for buildings, along with the supporting network infrastructures.

By the early 2030s the UK will need to have largely decarbonised electricity production and be initiating large scale deployment of low carbon heat and transport solutions.

Consultation questions:

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

In view of the Commission's objectives it is worth highlighting the scale and importance of the decisions around energy infrastructure on the UK economy's productivity and international competitiveness.

- Energy is a key determinant of the cost of living – affecting real wages and living standards across the economy and all groups in society (particularly those on lower incomes)
- Energy is a key input to the UK's industrial cost base, particularly many manufacturing and process industries which have important broader economic linkages
- Direct spending on energy itself (solid and liquid fuels, gas & electricity) makes up around 7.5% of GDP. This includes the costs of conventional electricity and gas production/generation and transmission and distribution infrastructure. Total spending on meeting our energy needs, however, constitutes a much higher proportion of GDP, since it also includes complementary equipment and services (e.g. vehicles, buildings, appliances, heating systems etc), all of which will be influenced by collective decisions about energy infrastructures. The future cost to business and consumers of low carbon energy services will be significantly influenced by the UK's broad strategic approach to decarbonisation.

Policy and spending decisions around low carbon energy and investments in energy infrastructure will shape how efficiently the UK can transition to a low carbon future.

***The UK can efficiently decarbonise its economy by developing, deploying and integrating a portfolio of known but currently underdeveloped energy technologies, such that they can be deployed efficiently at largescale***

To effectively position itself for an efficient transition to low carbon energy, the UK must develop and prove a basket of the most promising supply and demand technology options, such that they are genuinely 'deployment-ready' at large scale. Developing a basket of options (rather than a single blueprint) will help to limit inevitable implementation risks. Key technology priorities for UK decarbonisation include:

- CCS
- New nuclear (including both large-scale and small modular reactors)
- Offshore wind
- Gaseous systems
- Bioenergy
- Efficiency of vehicles
- Efficiency and low carbon heat for buildings

It is critical to focus resources in the next decade on preparing these options for wide-scale deployment. Preparedness entails not just technology development and first of a kind deployment, but also the development and proving of viable business models, operating and regulatory frameworks to underpin stakeholder and investor confidence. By the mid-2020s crucial decisions on long life infrastructure assets will need to be made, so it will be important to have greater clarity about our ability to deploy key options in practice.

Within this broad context there are important opportunities:

- The effective large-scale deployment of CCS and bioenergy are the two most important system-wide opportunities to contain abatement costs. Each can reduce low carbon UK energy system costs by circa 1% of GDP (compared with the cost of meeting carbon targets without their deployment)<sup>2</sup>. Sensitivity analysis suggests that these findings are robust under a broad range of future scenarios. The ability (or failure) to deploy them has a huge impact on future energy infrastructure requirements, on which key decisions will be needed by the mid-2020s. Other technology options are important, but from an energy system perspective are more easily substituted.

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<sup>2</sup> ETI's latest modelling estimates savings significantly higher than 1% of GDP. However, figures based on modelled scenarios extending over 35 years into the future must always be used with caution and provide an indication of broad orders of magnitude. For these reasons we quote a more conservative order of magnitude estimate 'more than 1% of GDP'. Implicitly this (conservatively) allows for the potential that very steep abatement cost curves in future energy transitions without deploying both or either CCS or bioenergy would induce significant unanticipated innovation and efficiency improvements.

- Delivering negative emissions from the 2030s onwards by combining bioenergy and CCS could unlock headroom for some continued use of fossil fuels where they are most costly to replace with low carbon alternatives. This would enable a much broader portfolio of options for future heat and transport systems, and enable the cost savings described above.

A key principle that has emerged from ETI's eight years of in depth strategic analysis of the UK's energy technology and decarbonisation options is the importance of a **whole system perspective**. Many of the issues and options can only be considered meaningfully and rigorously within a whole system analysis – simplified metrics (e.g. £/MWh) or partial comparisons of energy vectors or generation technologies which have fundamentally different system characteristics can be profoundly misleading for national strategy or policy formulation.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

ETI fully supports the principles proposed by the Commission.

In considering a '**whole system approach**' and '**interdependencies**' our work on long term transition in energy systems points to the importance of the **interdependencies between technology and society**, as well those of a technical or engineering nature (e.g. the interdependency of energy infrastructure needs with strategic choices about the energy or generation mix).

There are crucial interdependencies between infrastructure requirements and social, behavioural and policy issues. For example the potential role and scope of heat networks in the decades ahead will depend on their social acceptability, changes in the behaviour of consumers and the degree to which an enabling policy environment for investment decisions can be created.

In terms of **challenging established thinking**, our work also suggests that it is particularly important not to be bound by existing policy conventions and categories. For example, much of the debate and analysis of energy infrastructure is dominated by power sector considerations. Discussions of security of supply, infrastructure needs and storage/flexibility is often considered from primarily a power/electricity sector viewpoint. However, our work on the UK energy transition shows the importance of taking a wider perspective. For example, technologies such as CCS and bioenergy can support multiple flexible applications across power, heat, transport and industry. Securing their successful deployment would strongly influence energy infrastructure needs (e.g. markedly reducing need for grid-scale electricity storage), but also requires analysis and policies that are not bound by conventional sector-specific policies or existing statutory frameworks.



### Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

- ETI strongly supports the Commission's intention to cover the energy system as a whole, taking account of electricity, heat and transport. We would also add industry to this list, as a key energy user and source of carbon emissions. There are important interactions between industry, industrial clusters and potential energy infrastructure needs.
- We welcome the energy sector analysis the Commission has already begun, for example through its Smart Power report. We would also encourage the Commission to place its analysis of power sector infrastructure requirements into a broader 'whole system' context. The future role and challenges for low carbon electricity infrastructure need to be analysed taking full account of the nature of lower carbon solutions for industry, heat and transport. ETI's whole system analysis, for example, tends to point to the unique importance of flexible and versatile technologies which reduce the need for expensive solutions to match supply and demand within the power sector. For example, whole energy system analysis points to the potential for heat storage solutions and hydrogen production and storage as sources of flexibility in meeting peak demands.
- We understand the Commission's intention not to cover upstream energy extraction and processing infrastructure, but there may also be some important infrastructure interdependencies relevant to downstream energy generation, transmission and distribution infrastructure. For example, North Sea decommissioning could be an important influence on opportunities for the development of CCS.

### Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

ETI's particular expertise relates to energy infrastructure and our analysis suggests that future energy mixes are likely to raise new and different issues for the governance and regulation of energy network infrastructure which both challenge and go beyond the current essentially 'vector-specific' statutory regimes (e.g. electricity and gas acts). Our analysis suggests that the UK can transition most efficiently to a low carbon energy by

1. Enabling and incentivising investment to substantially adapt and enhance existing network infrastructures (e.g. efficient configuration of electricity networks to meet needs of decarbonised generation).
2. Enabling and incentivising investment in the creation of efficiently configured new network infrastructures (e.g. new heat networks and/or heat-based energy storage, or new CO<sub>2</sub> infrastructure to support CCS).
3. Configuring and operating network infrastructures so that they can interact and integrate to enable optimisation across vectors (e.g. enabling efficient interplay of power, heat and gaseous energy vectors).

The ETI's broader body of analysis of the UK's energy transition, based on holistic modelling of the UK's energy system, also points to the importance of the **next decade** in preparing for key infrastructure choices in the mid 2020's to enable large scale roll-out of low carbon technologies ('10 years to prepare for a low carbon transition')<sup>3</sup>. This includes not only technical development,

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<sup>3</sup> Targets, technologies, infrastructure and investments – preparing the UK for the energy transition

demonstration and early deployment, but also putting in place enabling market and regulatory policies to underpin investment into infrastructure and large-scale deployment of low carbon solutions.

The need for policy development is not confined to existing energy networks (principally electricity and gas). Major new investment is also likely to be needed in low carbon heat (in district heating and heat pumps) or in CO<sub>2</sub> transport and storage, where regulatory approaches are less mature. There is a need to identify the regulatory reform needs implied by low carbon futures, to reduce the risk of holding up investment or increasing costs to consumers through poor market design.

The ETI's work on energy system scenarios and market design raise a number of key challenges around the policy and regulatory framework for investment in the network infrastructure assets which will underpin and enable the transition, many of which are currently subject to separate specific regulatory regimes. In particular ETI's 'Patchwork' and 'Clockwork' scenarios envisage:

- Greater flexible interaction (and potentially competition) between a range of energy vectors for power, heat and transport, entailing more complex trade-offs in investment choices and greater flexibility in the operation and balancing of different infrastructure networks (e.g. interacting heat and power networks, gaseous vectors, transport fuelling from both electricity and liquid fuels)
- The efficient creation, location and establishment of new energy network infrastructures at varying scales (e.g. new local and City-scale heat networks, hydrogen storage and distribution infrastructure, CO<sub>2</sub> transport and storage infrastructure)
- Substantial investment in new energy generation, conversion and storage facilities (e.g. new nuclear, CCS and renewable electricity generation, gasification plants, biomass handling infrastructure, hydrogen storage etc), with a need for economic signals to drive efficient choices and location decisions in relation to network capacity
- The potential break up of some aspects of national energy network provision, with for example a patchwork of choices for heat provision reflecting local characteristics, as well as the development of new consumer propositions for home energy supplies
- Major shifts in the volume and patterns of usage of existing energy distribution networks (e.g. a potential decline in usage of gas distribution infrastructure, alongside substantial new demands on electricity transmission and distribution assets)

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

There are important interdependencies between transport and energy sector infrastructure choices. Decisions elsewhere within the energy system will influence the depth of carbon emissions reductions that will be required to meet 2050 carbon targets in the transport sector, which is conventionally viewed as 'difficult to decarbonise'. If the UK is successful in deploying CCS, and

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<http://www.eti.co.uk/wp-content/uploads/2015/02/Targets-technologies-infrastructure-and-investments-preparing-the-UK-for-the-energy-transition.pdf>

bioenergy, then there may be greater scope to continue relying on liquid fuels in the transport sector – influencing requirements for charging infrastructure or investments in electricity distribution networks to meet future transport energy demand. Conversely, greater changes to transport infrastructure to accommodate further electrification or hydrogen propulsion may be required if the ‘negative emissions’ potential of CCS and bioenergy deployment is not exploited effectively and deeper cuts in transport emissions are required. Broader strategic development of transport infrastructures and public transportation may play a key role in meeting future mobility needs with less reliance on private vehicles journeys.

A number of the strategic issues are explored in our report <http://www.eti.co.uk/project/ldv-an-affordable-transition-to-sustainable-and-secure-energy-from-light-vehicles-in-the-uk/>

#### **Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

We support the intention to focus the NIA on the cross-cutting issues identified. In particular we believe that there are important questions around governance and decision making that will need to be resolved for new kinds of infrastructure for which there is no strongly established institutional or regulatory template (as exists, for example, in relation to regulated utility networks).

#### **Q7. Are there any other cross-cutting issues that you think are particularly important?**

The consultation identifies funding and financing as a key cross-cutting issue. Within this there appear to be a plethora of current funding and financing models (regulated asset base, various PPP/PFI structures, long term contracts etc, with different details regarding the balance of risks between public sector, customers and private investors). The Commission may be able to stand back, draw lessons and apply a framework to bring coherence to the mix of financing mechanisms and policy instruments employed to support infrastructure financing across the board.

There are also a range of questions around charging for access to infrastructure, where common principles could be developed to guide practice, to ensure as far as possible the development of efficient economic and price signals for the services provided by infrastructure, in turn creating economic drivers for the future efficient development of infrastructure assets.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

We are broadly very supportive of the methodological approach that the Commission proposes, and would be very happy to work with your team on modelling and other sources of evidence that the ETI can make available.

We welcome the Commission's emerging engagement with energy sector challenges as exemplified in the 'Smart Power' report published earlier this year. The addition of broader whole energy system analysis will also extend and build upon these insights in important ways. The challenges for the power sector (for example, the extent of electricity storage required in future), and the options for new infrastructure will depend crucially on interactions with low carbon solutions for heat, industry and transport and the extent to which they can provide flexibility or be developed to manage peak loads.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

Over the past eight years the ETI has developed strong credentials in national energy system analysis, informed by the latest industrial and engineering expertise, embodied in our Energy Systems Modelling Environment (ESME). ESME contains geographic representation of the UK whole energy system as well as probabilistic functionality to explore a range of uncertainties. This enables the ETI to explore lowest-cost decarbonisation pathways, under a range of assumptions, constraints and uncertainties. Our analysis has been widely cited by academics, government and by the Committee on Climate Change in its advice to government.

Further details about ESME are available here: <http://www.eti.co.uk/project/esme/>

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

We agree that the Commission has identified the key infrastructure drivers. We would note one or two further influences and drivers of the nature of societal infrastructure needs in the decades ahead:

- Attitudes towards technologies and governance: there are clear examples where societal attitudes to energy technologies are likely to have a strong influence on infrastructure needs. Examples would include attitudes to onshore wind and large-scale new nuclear developments. There are some important low carbon technology opportunities that remain untested in terms of societal acceptance: for example, small modular nuclear technologies, or large-scale CCS.
- Attitudes to the governance of decisions will also be important in terms of local and regional solutions for low carbon heat (e.g. heat network developments).
- Extent of market failures and inertia policy vs 'economic optimisation'

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

We support the Commission's strong emphasis on using modelling and analysis, along with a thorough exploration of uncertainties, to support its work to identify the portfolio of investments. We also support the concept of a 'portfolio' approach, given unavoidable uncertainties over the time periods to be considered in the NIA. The ETI's own analysis of the UK's low carbon transition has similarly identified a 'portfolio' of the most promising technologies which should be developed and deployed to provide a robust basis for meeting our future energy needs while delivering against carbon targets.

In considering key energy infrastructure decisions we would encourage the Commission to consider the materiality of key decisions, the decisions which have a clear national strategic character to them (i.e. characterised by complex market failures, large scale or other factors which make pure market-led decision making problematic).

In addition to national level modelling and analysis, focusing on identifying the investments that will offer the greatest prize to UK economic performance (i.e. most likely to raise medium and long-term economic productivity), the Commission should also consider regional objectives and balance.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

Our answer to Q11 above applies. The Commission anticipates that it may carry out 'detailed analysis of specific issues'. In this regard, we expect that the Commission may well want to analyse issues around the proper role of government and the public sector in supporting and enabling economically rational and productive decisions about infrastructure investment. The ETI analysis of low carbon transition options suggests that some key decisions are likely to be strategic in character, affected by market failure or by the broader policy framework for the shape and role of market signals in driving private sector investment decisions.

Key strategic decisions about infrastructure may also have important implications for regional balance or equity considerations. These issues should be considered by the Commission to the extent that they will be relevant to decisions about national infrastructure needs.

*For further information contact:*

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# Energy UK response to National Infrastructure Commission Consultation on the National Infrastructure Assessment

August 2016

## Introduction

Energy UK is the trade association for the energy industry, with over 80 members; representing energy generators and suppliers of all sizes, as well as those involved in new energy services including demand-side response, storage and smart technology. Our members supply gas and electricity and provide network services to both the domestic and non-domestic market. Energy UK members own over 90% of energy generation capacity in the UK market and supply 26 million homes and 5 million businesses, contributing over £25 billion to the UK economy each year. The industry employs 619,000 people across the length and breadth of the UK, not just in the South East, contributing £83bn to the economy and paying over £6bn annually in tax.

## NIA Process and Methodology Consultation

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK;**
- **improve the UK's international competitiveness;**
- **improve the quality of life for those living in the UK.**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

A1. Energy is a key enabler for all economic activity and enhanced quality of life. The sector itself faces serious challenges to ensure sustained access to a secure supply of low carbon energy at the lowest possible cost:

- An ageing infrastructure with old power stations coming to the end of their life span;
- This leads to the need to attract investment in a challenging climate with competition from global markets;
- Combined with our commitment to decarbonise our power supply to meet domestic and internationally binding targets.

The Government has ensured that Electricity Market Reform (EMR) continues to bring forward low carbon energy, whilst ensuring security of supply, by reforming the Capacity Market and launching a review in to charging arrangements to ensure that they are fair and cost-reflective. The Government has also signaled its intent to continue on the cost-effective path to meet the Climate Change Act 2008 by setting the fifth carbon budget in line with the Committee on Climate Change's advice. Energy UK supports the policy tools which make up the EMR package and these reforms are part of an ongoing process to modernise the electricity market arrangements.

Government has also announced a series of changes to support mechanisms over the past 12 months, such as the Climate Change Levy and delays in the CfD auctions, which has reduced investor confidence and added risk premium to investment decisions. Coupled with the uncertainty from the EU referendum result, it is vital that confidence is provided in the form of long-term stable policy to attract the much needed investment required in energy

infrastructure given that 25% of our generation capacity has closed since 2010. The NIC can play a key role in delivering that aim as a non-party political body.

Britain is competing across the globe for low carbon energy solutions. In the short-term, there are pipelines of investments, such as offshore windfarms, nuclear and mature renewables that are waiting for clarity from government. . The current Government is also keen to ensure increased development of gas fired power station. Investors require stable and predictable policy to commit to this type of long term investment.

Analysis from EY Renewable Energy Country Attractiveness Index<sup>1</sup> has already seen the United Kingdom fall to its lowest level in the survey. Policy stability and predictability must be returned to prevent its further decline. Energy UK consider that it is important for the Capacity Market auctions and Contracts for Difference allocation rounds to continue with as much visibility and transparency as possible to provide the framework to encourage investment in the UK.

We welcome the creation of the National Infrastructure Commission as a body which will take a long-term strategic view of the future infrastructure needs of the British economy, including in respect of the challenges outlined above, the so called energy trilemma, and to liaise with other government departments to ensure a holistic approach is taken to policy making, that recognizes the interdependencies between sectors such as power generation and homes and transport.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

A2. Due to the nature of the National Infrastructure Commission's work it is important that it operates in an open, transparent, consultative manner that is based on market principles. Energy UK and its members are keen to work closely with the Commission and to offer a source of expert industry advice to tackle the challenges facing the industry.

The independence of the Commission is important but it must also be influential with decision makers and feed in to those with the authority to direct policy. The NIC should be clear on how it will influence policy direction and how it goes about setting its objectives.

In addition, in developing and implementing the NIA, the NIC must recognise that policy decisions taken in one government department / sector can have a substantial impact on the policies of other departments and their sectors. There is a role for the Commission in promoting a collaborative approach to policy making which ensures that government departments do not become siloed in their thinking and reflect its findings through the NIA. For example, whilst looking at an assessment of needs for energy this should include requirements from a multitude of sectors such as networks, transport, manufacturing, and house building.

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<sup>1</sup> <http://www.ey.com/GL/en/Industries/Power---Utilities/Renewable-Energy-Country-Attractiveness-Index>

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

A3. We agree that the National Infrastructure Commission should look at the energy system from a whole system view and pay particular attention to the interrelated nature of heat, transport and electricity. It is important to consider potential impacts from other sectors and developments that could impact the energy sector, for instance, major transport infrastructure projects such as new railways which will impact energy demand as well as on where transmission assets are sited.

Energy UK welcomed the publication of the Smart Power report earlier this year and believe it is important for Government to look at innovative ways of balancing supply and demand through emerging technologies including energy storage, demand-side response and smart tech. The National Infrastructure Commission should ensure that future ambitions, especially for innovative technologies, must be founded on robust and rigorous engineering and economic analysis

As noted by the Commission, the electricity sector has undertaken much of the heavy lifting towards decarbonisation over the last twenty years. It is important that other sectors including the heat and transport sectors make similar progress in order that the UK can meet its greenhouse gas emission reduction targets. The Committee on Climate Change 5<sup>th</sup> Carbon Budget report provides scenarios where the combination of plug-in hybrids and battery electric vehicles reach 9% of new car and van sales in 2020 and around 60% in 2030. This anticipated increase in the amount of electric vehicles on Britain's roads would have a major impact on electricity demand and associated network infrastructure which must be considered when making government policy.

Energy UK believe that the most appropriate way to ensure a "whole systems approach" in specific topic areas is to establish a taskforce to consider key interactions within specific remits. Energy UK continues to call on the establishment of an Energy Taskforce to sit within the NIC framework that delivers expert advice on the interactions of low carbon heat, power and transport and the requirements for successful delivery. See annex for the Terms of Reference of such a body.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

A4. Energy UK believes that there must be a resilient infrastructure and a diverse energy mix which encompasses all types of electricity generation including gas, onshore and offshore renewables, interconnectors, and nuclear, as well as technologies to help balance supply and demand such as demand-side response and energy storage. We believe that all of these technologies merit attention.

Energy UK's recent report *Pathways to 2030 for the GB Electricity Sector* outlined the view from across industry that the electricity sector is increasingly moving towards a more decentralised system from what we have had in the past. This shift in the way that electricity is produced and consumed would have implications for the GB's electricity networks and the way in which they are paid for. Energy UK has carried out analysis on transmission and distribution network charges and believe that this is an area which the National Infrastructure Commission should take account of; including the work undertaken by Ofgem, National Grid and the energy industry with respect to the implications on incentives to invest.

Additionally, as mentioned above, there are a number of interdependencies that affect the future development of electricity and gas infrastructure, including the transition to electric vehicles and the growth in housing, commercial development and wider infrastructure. There



are opportunities to complement the existing gas network infrastructure that could for instance involve the introduction of lower (or zero) carbon gases into regional networks where there is a positive business case to do so<sup>2</sup>. Northern Gas Networks is currently progressing a project investigating the potential for making Leeds a hydrogen city<sup>3</sup> and National Grid are carrying out analysis on the future of gas<sup>4</sup>.

We also believe that the NIA should ensure that identification of the UK's future infrastructure needs should reflect resilience as a priority, as the impact of extreme weather events such as flooding, drought and higher than normal temperatures can result in certain infrastructure failing. New infrastructure must be planned to avoid such failures. Finally, the NIA should take account of the requirements of the planning system together with relevant aspects of environmental protection, including Environmental Permitting.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognizing interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

A5. As noted in previous answers, it is important that the Commission takes a holistic view of energy policy which cross-cuts sectors and traditional government departments and takes a UK-wide view. Energy efficiency is an important tool to reduce the UK's carbon emissions but has suffered from disjointed policy in recent years. We understand that the Commission will not have a remit over housing supply but would like to stress the importance of energy efficient homes and buildings which are necessary to lower demand for heating and electricity and provide a cost-effective solution to meeting future energy demands.

Due to the interdependencies between the energy sector and water, waste water treatment, agricultural, mineral, housing, commercial development and major infrastructure sectors, all must be considered holistically, as changes in any one sector could impact on energy and/or other sectors. Electrification of heat and transport will have significant impacts on the power system and it is vital that investment requirements are signaled early to ensure that the UK has appropriate skills and systems in place to deliver on the investment. Additionally, both offshore and onshore energy infrastructure should be considered where appropriate during the NIA development process.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

A6. NIC is uniquely placed to consider the cross-cutting issues. Government departments are in their nature focused on policies within their remit and can fail to coordinate and link across other sectors. The NIC should play a leading role in ensuring a UK economy wide approach.

We understand that once Government and Parliament has scrutinised and approved the NIA, any proposals will become 'Endorsed Recommendations', which will be fed into Government policy. It is vital therefore that Government Departments and the devolved administrations have early sight of likely recommendations to ensure that reviews of the Energy National Policy Statements (NPSs) and the National Planning Policy Framework are undertaken without delay post the publication of the final NIA, in order to avoid further periods of uncertainty. Equally, the NIC should engage with the devolved administrations to ensure a UK-wide approach.

The Commission should have regard to existing and emerging processes for assessing infrastructure needs and opportunities as well as requirements placed upon regulated utilities. It should not duplicate or re-create such work, but use and build on it in consultation with stakeholders. Collaboration is key to the Commission's success.

<sup>2</sup> <https://alansenergyblog.wordpress.com/2016/07/14/the-green-gas-book>

<sup>3</sup> Northern Gas Networks H21 Leeds Citygate project: <http://www.smarternetworks.org/Project.aspx?ProjectID=1630>

<sup>4</sup> <http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/Gas/>

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

A7. See answer 5.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

A8. We agree with the Commission's proposed methodology. In addition, we believe that the requirement for infrastructure should not be determined by funding mechanisms. There are a number of approaches to funding be that by the public sector (e.g. transport) and or the private sector (e.g. energy). The NIC should not focus on one rather than the other; the assessment of need for infrastructure should be agnostic in this respect. The importance of making the NIA a document designed to attract private sector investment should also not be underestimated.

**Q9 Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

A9. Energy UK's *Pathways to 2030 for the GB Electricity Sector*<sup>5</sup> looks at the future shape and structure of the UK's energy system and provides recommendations to policy makers as to how this can be achieved.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each driver?**

A10. Energy UK agrees that it is important the Commission considers the impacts of different technologies and how each interact to ensuring electricity and gas demands are met. We also welcome the Commission's recognition of the need to operate within the constraints of our climate change and other environment goals when making infrastructure decisions. The NIC should ensure that any proposals complement the work done by the Committee on Climate Change to progress the UK's carbon budgets.

It would be useful if the NIC works towards promoting mechanisms for joined up infrastructure and land use planning in order to avoid following the consequences of growth planned by planning authorities or pre-empting the outcome of land use plans. Close joint working with plan making authorities is clearly to be encouraged but the importance of integrated planning is significant in that the NIC will need to consider closely its role as part of a process of joint working, particularly with larger, devolved authorities. The NIC will also need to consider whether there is a case to promote legislative change to more clearly enable cross boundary land use and infrastructure planning, for example along transport corridors.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

A11. Energy UK believes a diverse energy mix made up of a full range of electricity generation technologies, infrastructure for gas demand and ancillary services to help manage the system are required for the future. We believe that any methodology to determine the investment portfolio to meet the energy trilemma should be based on a foundation of technology neutrality.

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<sup>5</sup> See [www.energy-uk.org.uk/pathways2030](http://www.energy-uk.org.uk/pathways2030)

Equally, any methodology must fully recognise the interdependencies between the energy, heat, transport sectors, and the impact of massive growth in housing, commercial and major infrastructure on the inter-related energy, water, waste water, minerals and agriculture sectors.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

A12. It is important that in considering the UK's future infrastructure needs, the NIC should consider the challenges that prevent or block project delivery. There are consented energy projects that do not progress to development stage for a number of reasons. We believe that these reasons should be identified and considered by the NIC and, where appropriate, addressed by Government. With regards to infrastructure investment, recognition should be paid to the impact this will have on international competitiveness. Energy is a principal cost for several industries and due regard should be made to ensure that the UK remains competitive, this applies equally to wider infrastructure provision.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

Energy UK supports the suggested engagement tools for deriving an evidence base highlighted in paragraphs 78 to 82, and believes that engagement and communication is the key to delivering a robust proportional representation and evidence base. In addition:

- ▶ Energy UK continues to call on the establishment of an Energy Taskforce to sit within the NIC framework that delivers expert advice on the interactions of low carbon heat, power and transport and the requirements for successful delivery. See annex for the Terms of Reference of such a body.
- ▶ Energy UK would welcome the opportunity to represent the energy sector in the proposed Expert Roundtables, and Panels of Experts including in particular the panels covering finance and investment, and engineering and science.

For further information please contact Sam Hollister, [<email address redacted>](mailto:).

Annex:

## **An Energy Taskforce – A ‘whole systems’ approach to energy policy for heat, transport and power**

**Energy UK, Pathways for the GB Electricity Sector to 2030, February 2016**

*“Government should establish a taskforce comprising of representatives from the electricity, heat and transport sectors to map out the critical requirements for delivery of a low carbon economy. This could form part of the future work programme of the National Infrastructure Commission, as it considers the National Infrastructure Assessment.”*

### **1. Rationale**

Delivering the UK’s commitments on climate change will require significant progress on decarbonising each of the power, heat and transport sectors. To date, the power sector has undergone a period of transition to a more low carbon generation base, and continues to do so. There has, however, been limited progress on the areas of heat and transport.

Energy UK’s “Pathways for the GB Electricity Sector to 2030” report<sup>6</sup>, published 23<sup>rd</sup> February 2016, outlined how the required increased deployment of low carbon heat and transport solutions would likely have a significant impact on the power sector through power generation capacity and infrastructure upgrades.

We believe that a Taskforce, comprising government and industry representatives from electricity, heat and transport sectors should be established to consider the long-term requirements for increased deployment in low carbon technologies.

### **2. Outputs and Function**

Energy UK is supportive of the remit of the National Infrastructure Commission and believes that consideration of long-term infrastructure requirements should sit above party politics.

Given the purpose of the Energy Taskforce, to consider the interactions and long-term infrastructure requirements for a low carbon economy, Energy UK recommends that the group is affiliated with the National Infrastructure Commission, and that this forms part of the future work programme in considering the National Infrastructure Assessment. With greater integration of all aspects of energy required in the future, this Taskforce should be a permanent group and there is an opportunity to put this on a statutory footing alongside the National Infrastructure Commission.

The Taskforce should form an opinion on the expected take up of low carbon heat and transport, the infrastructure requirements for alternative technologies, and the resultant impact on each sector investment decisions.

The output would be a regular annual report to the National Infrastructure Commission to inform its work preparing the National Infrastructure Assessments. The report would consider issues such as: planning requirements and environmental protection, investment needs; availability of skills for construction and operation; customer preferences; impact on jobs; and the role of government support, among other issues.

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<sup>6</sup> [www.energy-uk.org.uk/pathways2030](http://www.energy-uk.org.uk/pathways2030)

### 3. Working Methods

Energy UK believes that there would need to be a working group to consider each aspect of the above in further detail, and, also the need to consider each aspect of the work at a regional level. Therefore, Energy UK would suggest that the Taskforce operates as a steering committee for these working groups.

In addition to the long-term infrastructure requirements, it is important that day-to-day decisions taken by government consider the impacts on heat, transport and energy. Therefore, there may be an opportunity for the Secretariat of this Taskforce to be drawn from various government departments including DfT, BEIS, DCLG and also the National Infrastructure Commission which can then act as a daily conduit for government decision making.

### 4. Membership

We believe that the Energy Taskforce should be chaired by Demis Hassabis in his role as Energy Commissioner, and report to Lord Adonis as Chair of the National Infrastructure Commission.

Energy UK believe that the Energy Taskforce should comprise senior stakeholders from the following communities / organisations:

- Department for Business, Energy and Industrial Strategy
- Department for Transport
- Department for Communities and Local Government
- Department for Environment, Food and Rural Affairs
- HM Treasury
- National Grid
- Committee on Climate Change
- Devolved Administrations
- Office for Gas and Electricity Markets
- Energy Systems Catapult
- UK Energy Research Council
- Representatives from distributed network operators
- Representatives from electricity generators
- Representatives from energy suppliers
- Representatives from automotive manufacturers
- Representatives from engineering industry
- Representatives from energy intensive industries
- Representatives from new energy services, such as demand side response, storage
- Representatives from investment community
- Representatives from building sector
- Representatives from plumbing and heating industry
- Representatives from consumer groups

To maintain the appropriate size of the Taskforce, Energy UK recommends that a single company or trade association should represent each of the groups above.

## Response to the National Infrastructure Assessment Consultation

### ENGIE UK

ENGIE, formerly known as GDF SUEZ, is a global energy company operating in the three key sectors of power, natural gas and energy services. The company puts responsible growth at the heart of all its businesses in order to address major energy and environmental challenges: responding to the demand for energy, ensuring security of supply, combating climate change and making optimum use of resources. ENGIE is present in 70 countries worldwide and has expertise in four key sectors: independent power generation, liquefied natural gas, renewable energy and energy efficiency services.

In the UK, ENGIE has interests in a number of activities across the energy value chain, from gas exploration and production through to services. In total, ENGIE employs approximately 17,000 people throughout the UK across all of its businesses. In generation, ENGIE is one of the country's largest independent power producers, with interests in 4,025 MW of plant. This comprises a mixed portfolio of generation assets that include gas, CHP, wind and the UK's foremost pumped storage facility. The portfolio includes a retail business supplying electricity and gas to the Industrial and Commercial sector, and the company continues to develop its renewables business in the UK.

ENGIE is also the UK's leading district energy company. We design, build, finance and operate district heating schemes on long term concession agreements. ENGIE's high profile district heating schemes include; the Queen Elizabeth II Olympic Park, Southampton District heating scheme, Whitehall District Heating scheme, Leicester District Heating Scheme and Birmingham District Heating Scheme. ENGIE is also a major service provider across a range of related sectors including schools and hospitals.

ENGIE is a 40% stakeholder in Nugen, a joint venture with Toshiba to develop a new nuclear power plant up to 3.8GW capacity in West Cumbria. Nugen has responded separately to this consultation through the Nuclear Industry Association.

ENGIE welcomes the opportunity to respond to the National Infrastructure Commission's consultation on assessing the UK's future infrastructural needs.

### Summary of consultation response

While we agree with the Commission's broader objectives within each of the sectors identified we believe there are particular aspects of infrastructure provision within some of these sectors that the Commission should focus on more closely. These include:

- The greater prioritisation of heat networks and district heating in future low carbon infrastructure planning within the energy sector, particularly as heat networks can form a critical part of future energy infrastructure. Currently heat networks supply only 2% of the UK's heat demand against a projected potential of 14% by 2030. Greater prioritisation would help ensure that heat networks attain their projected potential.
- The creation and adoption of a more joined up approach in the provision of electric vehicle (EV) charging and gas infrastructure within the transport sector. This is important as current projects to roll out EV charging infrastructure are piecemeal, often localised and lacking national focus. A national strategy is not only required to reduce levels of greenhouse gas from the transport sector, but also to tackle significant air quality issues in urban areas and reduce associated health impacts.
- An examination of how existing infrastructure, particularly within the energy sector can be utilised more effectively and efficiently without the need for new infrastructure projects. We believe that opportunities to cut waste from the energy system through waste heat recovery exist within the energy sector. Making more effective and efficient use of existing infrastructure would help meet

one of the Commission's key objectives of delivering infrastructure projects at the least possible cost.

- A greater prioritisation of investment in energy efficiency, which in turn could lead to increased energy savings, helping reduce the levels of investment required in new power generation infrastructure. This too would help meet one of the Commission's key objectives of delivering infrastructure projects at the least possible cost.
- How to adopt a more holistic approach to understanding system interdependencies- particularly as these are likely to play a major role in defining future energy consumption patterns.

More generally, the Commission may need to examine the likely impact on infrastructural investment that the UK's withdrawal from the EU could have. This is particularly important as prospective investors in large infrastructural projects could delay making investment decisions until the future relationship between the UK and the EU is more certain.

### Consultation Questions

#### Question 1.

**The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

**Response:** In working towards its objectives, we believe the Commission should take the following issues into consideration:

- How existing infrastructure, particularly within the energy sector can be utilised more effectively and efficiently without the need for new infrastructure projects. For instance, we believe that opportunities to cut waste from the energy system through waste heat recovery exist within the energy sector. Recovered waste heat, if channelled through heat networks could be used to provide efficient low cost district heating. Making more effective and efficient use of existing infrastructure would help meet one of the Commission's key objectives of delivering infrastructure projects at the least possible cost.  
In addition, advances in fields such as data analytics can play an important role in improving the utilisation and optimisation of existing infrastructure.
- The likely impact on infrastructural investment that the UK's withdrawal from the EU could have. This is particularly important as prospective investors in large infrastructural projects are likely to delay making investment decisions until the future relationship between the UK and the EU is more certain.
- How to adopt a more holistic approach to understanding system interdependencies- particularly as these are likely to play a major role in defining future energy consumption patterns. Traditional fixed energy systems were well understood independent energy vectors. However significant changes to these systems are well underway. Transport will increasingly utilise energy from electricity and gas in the form of CNG and LNG. Heating and cooling will increasingly be delivered through local heat networks and electricity production has already made a substantial transition to decentralised low carbon generation. These changing vectors are helping to drive innovation, competition and enhance security of supply. However, maximising the benefits of flexibility across these highly interconnected systems will require a clear national infrastructure strategy involving multiple Government Departments (BEIS, Health, DCLG, DEFRA) as well as strategic decision makers at both the local and national scales.

- The role of stable and complementary policy frameworks in infrastructure investment. Stable low carbon and renewable energy policy frameworks are essential in creating an enabling environment for investment in large low carbon and renewable energy projects. Policy uncertainty in these areas could undermine one of the Commission's key objectives of ensuring that its approach to infrastructure development is compatible with the UK's carbon and environmental commitments. Recent changes to low carbon and renewable energy policy could serve to discourage investment in renewable and low carbon infrastructure.
- The relationship between the public and private sectors in funding and delivering on identified infrastructure needs. The sectors identified typically constitute private sector players operating in competitive markets. Government's role is key in providing the right environment for investment but it is clear, especially in an uncertain economic climate, that the financing and delivery of national infrastructure needs will be a critical challenge.

**Question 2.**

**Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

**Response:** ENGIE agrees that in undertaking the National Infrastructure Assessment (NIA) the Commission should be open, independent, comprehensive and forward looking.

We believe that:

- An open and independent approach would ensure an objective assessment of the UK's infrastructure needs. This is particularly crucial in avoiding assessments reliant on an incomplete political and public consensus.
- A comprehensive whole system approach would help identify important interdependencies between sectors thereby enabling planners to take advantage of these.

**Question 3.**

**Do you agree that the NIA should cover these sectors in the way in which they are each described?**

**Response:** Yes we agree that the NIA should cover these sectors in the way in which they are described. We welcome the recognition of the interdependencies that exist between the identified sectors, particularly those between energy and other sectors such as transport.

**Question 4.**

**Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

**Response:** Yes we believe that there are aspects of infrastructure provision within the identified sectors that the NIA should focus on. These are as follows:

**The energy sector**

- **Need to prioritise heat networks and district heating in future low carbon infrastructure planning.** Heat networks can form a critical part of the energy infrastructure as we transition to a



low carbon economy and as such should be prioritised in any future infrastructure planning. Currently heat networks supply only 2% of the UK's heat demand against a projected potential of 14% by 2030.

Unlike gas and power networks, heat networks do not have an investment and regulatory framework underpinning them. The absence of such a framework excludes potential investors as the risks around district heating investment are considered to be significantly higher than for other network infrastructure projects. Government can take steps to reduce investment risk for this network infrastructure and secure larger, better-value schemes into development at low cost to taxpayers<sup>1</sup>. In addition to being perceived as high risk investments, heat networks face difficulty in achieving their full potential due to:

- The existing unfair business rating methodology for buried heat networks - which disadvantages heat networks. The current "Contractor's basis" method used for the valuation of buried district energy networks for businesses rates purposes is not an appropriate methodology. It is inconsistent with other regulated distribution infrastructure such as gas and electricity whose valuation is based on the 'Receipts and Expenditures' method. In order for heat networks to fulfil their full potential as an integral part of the low carbon energy infrastructure, the current rating and valuation methodology for buried district energy networks will need to be reviewed.
  - Time consuming and costly way leaves and consent for heat networks relative to regulated utilities.
  - Heat demand/counterparty risk, particularly within the private and industrial sector. In order to help mitigate this risk it would be interesting to explore the extent to which Government could participate with the private sector in alternative risk sharing models which may more effectively facilitate expansion of community energy schemes.
- **Need to prioritise investment in waste heat recovery.** It is essential for Government to strengthen its focus on waste heat recovery through investment in waste heat recovery infrastructure. Recovered waste heat, when channelled through heat networks can provide an important source of low carbon heat- helping to meet one of the Commission's key objectives of ensuring that the UK's infrastructure development is compatible with its low carbon ambitions.
- **Need to prioritise investment in energy efficiency.** Extending infrastructure priority status to energy efficiency could lead to increased savings in energy reducing the levels of investment required in new power generation infrastructure. Cost- effective investment in energy efficiency could:
  - Save up to 196TWh in 2020, which is 11% lower than the business as usual baseline and equivalent to 22 power stations<sup>2</sup>.
  - Help grow the energy efficiency market, with ripple effects on the supply chain including increased opportunities for Energy Service Companies (ESCOs) involved in the installation of energy efficiency measures.
  - Help facilitate the wider deployment of renewable heating technologies within buildings as such technologies work best in well insulated buildings.

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<sup>1</sup> The Association for Decentralised Energy 2016. Response to National Infrastructure Commission Call for Evidence, 2016.

<sup>2</sup> DECC 2012. Energy Efficiency Strategy. Available at [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/65602/6927-energy-efficiency-strategy--the-energy-efficiency.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65602/6927-energy-efficiency-strategy--the-energy-efficiency.pdf)

- Reduce carbon emissions by 41 MtCO<sub>2</sub>e, contributing to achieving our carbon budgets<sup>3</sup>.
  - **Need to look at the impacts of distribution price controls on network companies.** Distribution price controls for network companies inhibit and delay investment in infrastructure projects due to their impact on flexibility. Price control for network companies (fixed) is moving from a 5 year price control to an 8 year control and this is detrimental to flexibility. ENGIE appreciates that re-opening of existing network price controls is not in scope for the NIC however it should be recognised that they have a strong influence not just on direct network investment but indirectly on connected infrastructure.
  - **Need to recognise the important role storage is likely to play in the provision of future system flexibility.** The current rapid advances in storage technology require the regulatory and policy frameworks to "catch up". Government and Ofgem must work to develop a regulatory regime which recognises the value of storage at grid scale. In addition, it is important that network operators have a common approach recognising the benefits of storage and how the technology will shape future infrastructure requirements. Accommodating storage will require consideration of;
    - Connections
    - Planning consent
    - Regulation and licencing
    - Energy consumption and levies
    - Appropriate treatment of an installation that is both generation and demand
  - **Need to ensure sufficient existing, and new-build, electricity generation infrastructure-to maintain security of supply.** Mechanisms are already in place to encourage existing capacity to generate, and for new-build plant to commission (the capacity mechanism), and for the deployment of low carbon generation (CFD mechanism). ENGIE believes these mechanisms should remain to ensure certainty for businesses operating in the electricity sector, and to ensure that both low carbon and security of supply aims are met in this Parliament and into the next decade.

### The transport sector

- **Need for a joined up approach in the provision of electric vehicle (EV) charging infrastructure.** Current approaches to the provision of electric vehicle charging infrastructure are piecemeal, with projects often localised and lacking national focus. There is significant need for a more joined up approach in this area. In addition, there is a need to address the following key issues hindering the wider roll out EV charging infrastructure in the UK:
  - **Funding.** The current roll out of EV charging infrastructure is largely reliant on Government funding- which is often limited. Bids for the limited available Government funding are often won by a few cities leaving out others. This in turn contributes to the disparity in the distribution of EV charging point infrastructure within the UK. For EVs to become mainstream, there is need for greater public/private collaboration.<sup>4</sup> Leaving it to either the Government or the market alone to drive the infrastructure roll out would not achieve the required levels of deployment due to likely constraints in raising the necessary finance.
  - **Poor geographical spread of EV charging infrastructure within the UK.** Existing EV charging infrastructure is not uniformly distributed throughout the UK. Cities such as

<sup>3</sup> Ibid

<sup>4</sup> The UK Energy Research Centre (UKERC) 2014. Electric Vehicle Dreams are now a reality. Accessed 26/07/2016. Available at <http://www.ukerc.ac.uk/network/network-news/guest-blog-electric-vehicle-dreams-are-now-a-reality-well-are-they-.html>

London have by far the highest number of EV charge points relative to any other part of the UK. There is therefore a need for Government to ensure a better geographical spread in EV charging structure if it is to successfully promote EV take up nationally.

- **The poor quality of some of the existing EV charging infrastructure.** A significant number of EV charging points within the UK are of poor quality. Early Government tenders for the installation of EV charging infrastructure were (in cases) won by companies offering the lowest installation costs but not necessarily the best in terms of quality. In addition, follow-up maintenance work was often poor, leading to increased levels of equipment breakdown and malfunction. Going forward, the Government may need to create and introduce minimum quality standards in relation to EV charging infrastructure.
- **Low numbers of EV charging points per capita.** UK cities have some of the lowest numbers of EV charging points relative to cities of comparable population sizes in Europe. Leeds with a population of 750 000 only has 20 EV charging points in comparison to the Rotterdam Municipal area in the Netherlands which has over a thousand charging points serving a population of 620 000. Therefore it is important for any future EV infrastructure roll out strategy to carefully consider the relationship between the size of a population centre and the optimum number of EV charge points likely to be required.
- **DNO attitude towards the provision EV charging points.** Distribution Network Operators (DNOs) have, to date, shown little appetite and support for initiatives aimed at rolling out EV charging infrastructure. DNO support for EV infrastructure roll out is essential as going forward, it will be important for electricity distributors to factor in additional demand from plug-in vehicles as they plan to reinforce their respective distribution networks and grids and consider how to introduce smart grid capabilities<sup>5</sup>. It is therefore essential for policy makers to find ways in which DNOs can be further encouraged and incentivised to play a greater role in the roll out of EV charging infrastructure.

## Waste

We believe that the Commission and the Government could do more to facilitate the exploitation of untapped opportunities that exist within the waste sector. Focus will need to be given to areas such as:

- The development of additional production capacity for grid injectable biomethane (green gas). This is important as grid injectable biomethane could play an important role in decarbonising the UK's future heat supply -helping meet one of the Commission's objectives of ensuring that its approach to infrastructure development is compatible with the UK's carbon and environmental commitments.

However, future plans to decarbonise the UK's heat supply through the increased use of green gas could be undermined by the Government's recent proposal to cease support for large Anaerobic Digestion (AD) plant ( i.e. those of capacity range 500 kW- 5 MW) under the Feed in Tariff scheme (FITs) from January 2017. Currently large AD plant in this capacity range are supported by both the FIT and RHI schemes. Removing the FIT scheme would impact the viability of future large scale AD projects which have previously relied on both the FITs and the RHI. To encourage and incentivise investment in this area, the Government needs to ensure the continued existence of supportive and complimentary policy frameworks.

<sup>5</sup> Office for Low Emissions Vehicles (OLEV) 2011. Making the Connection :The Plug-In Vehicle Infrastructure Strategy. Available at [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/3986/plug-in-vehicle-infrastructure-strategy.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/3986/plug-in-vehicle-infrastructure-strategy.pdf)

**Question 5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

**Response:** An interdependency that is likely to grow in importance in the future is that between energy and transport, particularly as transport is expected to utilise more energy from electricity and gas in the form of CNG and LNG

Another important future interdependency will be that between waste and energy. Capturing waste heat from power generation could provide a cost- effective way of making more efficient and effective use of existing infrastructure- particularly if the captured waste heat is channelled through heat networks and used to provide efficient low cost district heating.

Similarly, power can be generated from waste through such technologies as Advanced Conversion Technologies (ACT) and the combustion of waste derived biomethane/biogas using Combined Heat and Power plant technology.

**Question 6.**

**Do you agree that the NIA should focus on these cross-cutting issues?**

**Response:** Yes we agree that the NIA should focus on the cross -cutting issues outlined in the consultation document.

**Question 7.**

**Are there any other cross-cutting issues that you think are particularly important?**

**Response:** ENGIE has no comment.

**Question 8.**

**Do you agree with this methodological approach to determine the needs and priorities?**

**Response:** ENGIE has no comment.

**Question 9.**

**Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

**Response:** ENGIE has no comment

**Question 10.**

**Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

**Response:** We believe that the Commission has broadly identified the most important infrastructure drivers. However the importance and relevance of some of the key drivers identified - particularly Climate Change & the environment - risk being increasingly undermined by recent shifts and changes to Government renewable and low carbon energy policy which is crucial in underpinning any future climate change mitigation efforts.

Stable renewable and low carbon energy policy is essential in influencing investment decisions around large renewable and low carbon infrastructure projects. The Government's recent policy changes in

relation to support for on shore wind and large scale solar PV projects has led to some investors pulling away from investing in large infrastructure projects within these sectors.

In addition, it will also be important for the Commission to examine the likely impact the UK's withdrawal from the EU will have on renewable and low carbon infrastructure investment going forward - particularly as EU targets in were important drivers of investment in these areas.

**Question 11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

**Response:** We believe that the NIA should aim for a portfolio of investments that is diverse, resilient and flexible- given the potentially long term nature of infrastructure decisions.

**Question 12.**

**In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

**Response:** ENGIE has no comment.

**Question 13.**

**How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

**Response:** ENGIE considers that the NIC's proposed consultation process will enable a good evidence base to be built, but it will be necessary to maintain open bilateral discussions with representative organisations, experts and trade associations as well as individual organisations.

For further information, please contact:

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**From:** [name redacted] [email address redacted]  
**Sent:** 26 July 2016 13:23  
**To:** NIA Evidence  
**Cc:** [email address redacted]; [name redacted]  
**Subject:** Response to Consultation on the National Infrastructure Assessment

**Categories:** Red category

Dear Sir / Madam

Please see below Engineers Ireland Response to the Consultation Document. Engineers Ireland have over 1000 members in Northern Ireland and the impact of Infrastructure is vital to the economy.

Start

### **BACKGROUND**

Through the National Infrastructure Commission, the UK government seeks to determine a strategy to meet the UK's infrastructure needs for a 30 year period and provide a strategic vision to achieve these.

### **GENERAL IMPACT / UNIQUENESS OF NORTHERN IRELAND**

One of the main aims of the report is to *“foster long-term sustainable growth across all regions of the UK”*. Engineers Ireland would like to see specific details in how this impacts on the infrastructure in Northern Ireland. Currently the report is high level and while mentioning the devolved regions in Clause 90 - *In line with the Government’s consultation on the governance and remit of the Commission, the NIA will cover the areas of infrastructure under the UK Government’s responsibility. The Government is considering options for the Commission, UK Government and the Devolved Administrations to develop arrangements to allow for circumstances where their respective responsibilities interact*, the strategy requires substantial further work as to how this is implemented in practice. The report further states *“For further information on how the Commission will interact with Government departments, Devolved Administrations as well as other stakeholders such as regulators, please refer to HM Treasury’s response to their consultation on National Infrastructure Commission dated 18 May 2016”*. The findings of this document need to be incorporated in full within the current document and the output needs to be catalogued to provide accountability and transparency on the pipeline workload in infrastructure associated with the strategic vision. Determining the roles of the devolved administrations and central government and providing transparency and openness in regard to the workload and perceived outcomes are vitally important to the success of any strategy and this needs to be specified in detail. Clause 49 states that *The NIA will seek to understand how economic and physical geography relates to infrastructure provision and development and in turn how infrastructure can shape economic geography. It will look at the role of economic devolution in infrastructure development and consider how its recommendations affect the entire country and local areas*. It is vitally important for the North of Ireland that infrastructure connections are maintained across the Irish Sea. The flow of goods and services across the Irish Sea is vital to Northern Ireland’s prosperity. Cross border trade and infrastructure links are also vital and must be maintained and upgraded to increase the flow of trade both within the United Kingdom of Great Britain and Northern Ireland and across the island of Ireland as a whole. One of the identified drivers for Infrastructure identified in the report is *Population and demography*, due to Northern Ireland's unique location within the UK having the only land border it is important that free movement of persons and trade is maintained to ensure the economic prosperity sought. The North of Ireland has closer geographical and infrastructural links with our neighbours in the Republic but the Northern counties have a significant economic disadvantage ie. Corporation tax, aggregate tax and EU membership. Therefore Northern Ireland requires a very individual Infrastructure model as compared to England, Wales and Scotland.

### **MAINTENANCE IMPACT / LIFECYCLE ANALYSIS**

The 30+ year period determined by the report with an end date of 2050 means that some infrastructure elements such as Asphalt and Bitmac surfacing / maintenance projects with a lifecycle of between 10 and 20 years may be required more than once. Clarification as to how this will be incorporated within the document is required.

## **INTERNATIONAL IMPACT AS A RESULT OF BREXIT**

While BREXIT had not been voted on prior to the release of the documents for consultation references / statements in the documents in relation to improving the *UK's international competitiveness* now need to be re-examined in relation to the impact of any exit from the European Union.

## **MECHANICAL AND ELECTRICAL INPUT TO INFRASTRUCTURE**

Engineers Ireland is unique in that it includes membership of professionals with input to the following professional interests and provides a holistic perspective. The current Infrastructure elements of transportation, civil engineering, energy, flooding, sea defences, drainage, waste, IT, and other elements of the built environment are all involved in the strategy. One element not mentioned specifically in the report is M&E. This is needed for Infrastructure projects and should be specifically mentioned. Engineers Ireland is ideally placed to comment as its membership covers all these aspects. Care should be taken to ensure input from all discipline specific elements of the industry within the commission.

## **INTERDEPENDANCE AND BUILDING INFORMATION MODELLING**

The role of the Commission is to examine *sectors, identifying and exploring the most important interdependencies and resilience implications, showing both the opportunities and risks associated with the interactions between different sectors*. However, the impact of Building Information Modelling (BIM) and the ability to examine impacts economically and on individual elements of infrastructure can be accomplished through scenario analysis through interlocking BIM models. This needs to be more fully examined in light of the compulsory nature of BIM on all UK Government projects over the European Financial Threshold. Specific mention should therefore be made of BIM use in the strategic document under the *Technology* section.

## **AGGLOMERATION IMPACT**

While the consultation document states *agglomeration – bringing clusters of similar economic activity together in the same place – can increase the productivity of firms and workers*, it should also be noted that geographically that the more dispersed regions, such as Northern Ireland and the Highlands and Islands of Scotland will require to be serviced on a minimalistic basis for all aspects of manufacturing so that they are not reliant on infrastructure to transfer goods and services to them from other regions. The environmental and carbon effects of transfer of materials etc for production in a centralised location should be taken into consideration before location of manufacturing to the location decided for the agglomeration. The UK government should ensure that the devolved regions each get their fair share of any industry and that in practice that agglomeration does not mean London centric.

## **RANKING OF IMPORTANCE OF THE ELEMENTS OF INFRASTRUCTURE**

Care needs to be taken in the prioritisation of the elements of the consultation. For instance, water abstraction may only be required for large population centres and highlighting this over the geographical spread of needs would not be considered to meet the needs of the whole population.

## **APPRAISAL METHODOLOGY**

Assessment of large projects using the Gateway process has already been introduced in procurement. The consultation document stipulates that *Evaluation and appraisal methodology: The NIA will assess current appraisal methods for large infrastructure projects and test whether wider benefits, such as system effects, are effectively captured. The NIA will therefore examine existing frameworks and consider if they are suitable for large and nationally significant infrastructure projects. The case for alternative models will also be considered*. The Gateway process already involved the use of Green and Orange book assessments in relation to risk and economics respectively. However, the effectiveness of these metrics will need further research to remove elements of subjectivity. Engineers Ireland support this aspect of the consultation document.

## **PROCUREMENT ROUTE IMPACT**

The consultation document Clause 50 states that the *The NIA will consider the existing funding and financing models in place for large scale infrastructure and consider whether there are alternatives which could help to deliver infrastructure in a more affordable way*. Currently the Northern Ireland government supports the use of the following procurement routes: Design and Build, Prime Contracting and PF2. Eadie et al (2013) conclude that *government policy should ensure that potential efficiencies*

*through choice of route should not be ignored. Further use of robust and innovative procurement techniques should be adopted to ensure value for money.* Therefore this aspect of the report is well received, agrees with empirical research and as a result investigation into procurement routes including PF2 should not be ignored as an economic driver across the UK.

### **OVERALL IMPACT OF INFRASTRUCTURE**

The potential economic impact of increased construction is well documented. A return of £2.83 for every £1 spent on construction in Northern Ireland shows the importance of infrastructure to the economy. It is therefore vital to the wellbeing of the country that the commission ensures that infrastructure is not minimised in any way but provides a route to recovery and ensures the another recession is avoided. The final report should reflect these findings.

#### References:

Eadie, R, McKeown, C and Anderson, K (2013) The impact of recession on construction procurement routes. International Journal of Procurement Management , 6 (1). pp. 24-38

END

I am currently submitting this on behalf of Engineers Ireland as a whole in my role as [job title redacted]. Can you please acknowledge receipt

Best Regards

[name redacted]

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## National Infrastructure Assessment: Process and Methodology

### Consultation response from ESA

1. The Environmental Services Association (ESA) is the trade association which represents the UK's waste management and secondary resources industry. ESA's members provide a wide range of essential resource management services to the public and private sectors whilst protecting human health and the environment.
2. The sector is leading the transformation of how the UK's waste is managed. An industry with an annual turnover of £11billion<sup>1</sup>, our Members have helped England's recycling rate quintuple in the last decade and provide 12% of the UK's renewable electricity<sup>2</sup>.
3. ESA welcomes the opportunity to respond to the National Infrastructure Commission's consultation.

**Q1. What issues do you think are particularly important to consider as the Commission works to this objective?**

**Q2. Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

4. We agree with the objectives and principles outlined by the Commission. It is important to take due consideration of technological and social changes which affect waste arisings, participation in recycling collections and treatment of waste. The Commission must carefully analyse how these changes will impact waste infrastructure needs going forward.
5. Waste is part of a complicated and—with the right policy framework—increasingly circular supply chain. It is therefore vital that the Commission takes a whole system approach, looking closely at how waste infrastructure needs interact with other sectors such as manufacturing, construction, reprocessing and energy generation and distribution.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

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<sup>1</sup> ESA estimate based on ONS data

<sup>2</sup> DECC (2014):

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/437937/Renewable\\_energy\\_in\\_2014.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/437937/Renewable_energy_in_2014.pdf) p.49

**Q5. Are there are particular areas where you think such interdependencies are likely to be important?**

6. We are pleased that waste infrastructure will be covered by the NIA, as it is highly important but often overlooked. Individual sites often fall underneath nationally significant thresholds but together they add up to significant investment in UK infrastructure, delivering jobs and growth for the country whilst moving the UK towards a circular economy, creating resource security and supplying renewable energy.
7. ESA believes that with £10bn capital investment, the waste industry can help deliver 50,000 new jobs and boost GDP by £3bn.<sup>3</sup> This investment is required to replace aging infrastructure and address a capacity gap of around 20 million tonnes.
8. The consultation suggests that more circular business models will lead to less waste. This is not necessarily the case when population growth is taken into account, which will put upward pressure on waste arisings, and indeed we have seen waste generation from households start to rise after years of decline.<sup>4</sup> The ongoing need to divert more waste from landfill will also require more processing capacity.
9. One potential Brexit outcome could be fewer exports of waste to the EU and therefore a greater need for domestic processing capacity. The industry would like to see more waste processed domestically, however this would require investment in infrastructure.
10. Energy generated from waste (including Energy from Waste, landfill gas and Anaerobic Digestion) currently supplies the UK with 12% of its renewable electricity. However, the potential to help the UK meet its renewable heat targets is not currently being maximised. Most modern incinerators are CHP-ready, however due to a lack of heat networks, the UK is losing out on a valuable source of renewable heat. There is a ripe opportunity therefore for the Commission to consider waste infrastructure alongside energy generation and distribution to ensure greater resource efficiency as well as cleaner, cheaper and more secure energy.
11. Waste should also be integrated into the national industrial strategy. There is great potential for residual waste to be used as a feedstock for manufacturing and chemicals, as well as providing energy if co-located with industrial clusters.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

12. We agree with the cross-cutting issues identified by the Commission. Sustainability is a key objective of the waste industry. We can only continue to move away from landfill towards greater levels of recycling and energy recovery with investment in infrastructure, underpinned by a strong, coherent, long-term policy framework.

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<sup>3</sup> [http://www.esauk.org/esa\\_reports/Circular\\_Economy\\_Report\\_FINAL\\_High\\_Res\\_For\\_Release.pdf](http://www.esauk.org/esa_reports/Circular_Economy_Report_FINAL_High_Res_For_Release.pdf), p.2

<sup>4</sup>

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/508787/Digest\\_of\\_Waste\\_and\\_Resource\\_Statistics\\_rev.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/508787/Digest_of_Waste_and_Resource_Statistics_rev.pdf), p.19

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**  
**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**  
**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

13. ESA agrees with the methodological approach proposed by the Commission. There are no obvious examples of successful models for looking at strategic prioritisation in uncertain environments.
14. The Commission has identified important infrastructure drivers. For waste infrastructure it will be essential to consider the impact on waste arisings of population growth and demographics as well as housing, for example high-rise flats and multi-occupancy dwellings present certain issues for recycling. It will also be important to look at changing waste streams, for example the paper waste stream has been steadily decreasing whilst cardboard has increased.
15. The Commission will also need to consider the potential impact of WRAP's consistency of household collections project, which aims to encourage local authorities to adopt one of three collection systems. The aim of the project is to increase both quantity and quality of targeted waste streams, which will have complicated implications for sorting and reprocessing infrastructure and well as organic waste treatment.

**Q11. Do you have a view on the most appropriate methodology to determine that portfolio?**

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

16. We are satisfied with the methodology the Commission has proposed, and its suggestion for engaging with society and industry to develop its proposals.

**Environmental Services Association**

**August 2016**

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## E.ON response

### National Infrastructure Commission Consultation on the National Infrastructure Assessment

#### **Executive Summary**

- The creation of the National Infrastructure Commission is welcomed and believe it can play an important role in looking at the longer term infrastructure requirements of the energy system.
- We support the proposal to include energy within the National Infrastructure Assessment.
- It will be important to take account of cross cutting issues and the interactions energy has with other sectors including transport, digital and housing
- We look forward to the robust assessments being produced that will help lead to informed policy making so that the UK is able to meet the challenge of delivering a secure, lower carbon energy system at a price that is affordable for households and businesses.

#### **Question 1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK;**
- **improve the UK's international competitiveness;**
- **improve the quality of life for those living in the UK.**

#### **What issues do you think are particularly important to consider as the Commission works to this objective?**

1. We support the objectives which the Government has given the National Infrastructure Commission (NIC) to deliver. Against all three of the objectives, energy will play a very important role in helping to meet them.
2. The UK Government has recently signed up to the 5<sup>th</sup> carbon budget which will require significant greenhouse gas emissions to fall by 57% on 1990 levels in the period 2028 to 2032. Delivering this in the most cost effective way whilst maintaining secure energy supplies will be essential, helping to keep the UK on course for much greater decarbonisation in the 2030s and 2040s. The NIC should take this into account when considering its future programme.
3. We believe that in order to deliver this will require much greater ambition in energy efficiency, alongside a more decentralised approach to energy to help enable greater electrification of heat and transport in the 2020s and beyond.



4. The approach taken by the Scottish Government of making energy efficiency a National Infrastructure Priority is welcomed, and is something the NIC should investigate to see how a UK wide approach could be adopted. As part of this, we would support the NIC reviewing analysis which suggests that a more ambitious energy efficiency programme can deliver considerable economic benefits. These include new jobs, economic growth, benefits to the health care system, along with the energy benefits of improving security of supply, reducing carbon emissions and making energy bills more affordable.
5. Since the General Election, there have been a series of energy policy announcements which have undermined investor confidence. In light of this, and the outcome of the EU referendum result, it is essential that confidence is retuned. The NIC can play a key role in helping to deliver this.

**Question 2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

6. Yes, we agree with the principles set out above. In particular we welcome the role of the NIC in providing independent, objective and rigorous assessment of issues to help deliver a longer term strategic approach to energy policy.

**Question 3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

7. We support the sectors which the NIA will initially focus on, and are pleased that the importance of energy has been recognised.
8. In particular, it is sensible to look at the energy system from a whole systems perspective, especially since the electrification of heat and transport will be dependent not only on decarbonising the power sector, but also making sure that it is sufficiently flexible to accommodate these competing demands. The consultation also makes reference to the important role that increasing energy efficiency could potentially play, which we strongly agree with, and welcome this recognition. As we set out above, we believe energy efficiency should be a National Infrastructure Priority and look forward to the NIA exploring this in more depth.



**Question 4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

9. There will remain a role for traditional centralised energy generation for some time to come. However, we believe that there should be an increasing role for decentralised energy to help solve some of the energy challenges facing the UK over the next few decades. There is an opportunity to build on the Smart Power report produced by the NIC earlier this year, which rightly identified demand side response and storage as two areas which have the potential to grow and support this new vision.
10. However in order for the energy system to become more flexible at the lowest possible cost to households and businesses, taking steps to reduce demand in the first place via energy efficiency is a no regrets which should be pursued at scale. The NIA as a matter of urgency should therefore look into this area so that the UK is well placed to take advantage of the enormous potential for domestic and non-domestic retrofit.

**Question 5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

11. We recognise that in order to deliver the UK's longer term carbon reduction goals is likely to require the electrification of transport. It therefore seems reasonable to recognise the interdependencies between these two sectors. Similarly some of the decentralised and more flexible energy solutions will be dependent upon digital and communications. Recognising these links will help deliver a more robust analysis from which to build policy recommendations to Government.

**Question 6. Do you agree that the NIA should focus on these cross-cutting issues?**

12. Yes, we agree with the cross cutting issues identified in the consultation.

**Question 7. Are there any other cross-cutting issues that you think are particularly important?**

13. No, we believe the most relevant cross cutting issues have been captured.

**Question 8. Do you agree with this methodological approach to determine the needs and priorities?**

14. Yes, the approach outlined appears reasonable.

**Question 9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

15. No comment.



**Question 10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each driver?**

16. Yes, we support the drivers identified in the consultation. Economic growth, technology and climate change are particularly relevant for the energy sector.

**Question 11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

17. We do not have a firm view on the most appropriate methodology that should be adopted. However in the case of energy, we argue that there needs to be a balanced approach which embraces a range of solutions for delivering a secure lower carbon energy system at a price that is affordable for customers.

18. It will be important to consider the interdependencies of electricity, heat and transport when assessing the portfolio which best meets the demands of the UK in the future. Equally, it will be important to take into account the increasing approach towards decentralisation and the priorities that the different regions may take. One such area is how different Cities will approach the regeneration challenge and the role that energy will play in helping to support this.

**Question 12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

19. No, we believe the key factors have been addressed in its methodological approach.

**Question 13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

20. The approach set out for engaging with different stakeholders is comprehensive, involving public consultations, call for evidence, expert roundtables, panel of experts and social research. This will help to build a robust evidence base and test key proposals.

21. We also support Energy UK's call for the establishment of an Energy Taskforce to sit within the NIC framework that delivers expert advice on the interactions of low carbon heat, power and transport and the requirements for successful delivery. This could be included within the panel of experts proposal.

E.ON

August 2016

## Friends of the Earth England, Wales and Northern Ireland response to the National Infrastructure Assessment Consultation, August 2016

Via Email Only: NIAEvidence@nic.gsi.gov.uk

We welcome the opportunity to respond to this consultation. Friends of the Earth campaigns nationally and locally for a fair and participative land use planning system that delivers sustainable development.

### Q1 NIC objectives

1. We suggest that the NIC clarify what the Government means by “sustainable” economic growth. We assume that “sustainable” refers to the UK’s definition of sustainable development, ie that the type of economic activity matters, and economic activity needs to be consistent and integrated with the social and environmental goals of sustainable development<sup>i</sup>.
2. We welcome that the NIC have made it explicit that to meet its objectives the NIA will ensure that *“the recommendations are consistent with the UK’s carbon and environmental commitments”*.
3. In line with sustainable development principles previously outlined by Government, we hope that the NIA will explicitly seek to prioritise infrastructure which meets these multiple objectives simultaneously, and rule out infrastructure which trades-off one objective against another. In other words, to seek win-win-win outcomes, and the type of economic growth is crucial.
4. We request that the NIC note that the UK’s climate change commitments are likely to need to be tighter in the near future. The Climate Change Act specifies an “at least 80%” 2050 target; current action and carbon budgets on the road to 2050 are based on the lower-end 80% target. This low-end target is based on a high probability of global temperature rises exceeding 2 degrees; however the 2015 Paris Agreement sets out a new, safer, tougher goal of pursuing efforts to limit global warming to 1.5 degrees. This will necessitate UK emissions cuts greater than 80%. The CCC is currently reviewing what the Paris Agreement means for UK targets.
5. The Planning Act 2008 places a duty on the Secretary of State when drawing up and reviewing National Policy Statements on nationally significant infrastructure as follows:

#### *Section 10 Sustainable development*

*(1) This section applies to the Secretary of State's functions under sections 5 and 6.*

*(2) The Secretary of State must, in exercising those functions, do so with the objective of contributing to the achievement of sustainable development.*



- (3) For the purposes of subsection (2) the Secretary of State must (in particular) have regard to the desirability of—(a) mitigating, and adapting to, climate change;
- (b) achieving good design.

These duties must similarly apply to the NIC's work and role.

6. The NIC must recognise that protecting nature is vital to wellbeing and a thriving economy and must be integral to the NIA and the NIC's work. The critical role of nature is set out by the Government's natural capital advisers<sup>ii</sup>:

*“England's natural capital – the elements of the natural environment which provide valuable goods and services to people such as clean air, clean water, food and recreation – is in long-term decline. Successive 'natural capital deficits' have built up a large natural capital debt and this is proving costly to our wellbeing and the economy. If economic growth is to be sustained, natural capital has to be safeguarded.*

*Pressures on natural capital are already too high but they are set to intensify, with more people expected to be added to England's population over the next 25 years than in any previous similar time period. Given these increasing pressures, significant changes to past practice will be required if we are to achieve the Government's laudable commitment to be the first generation to leave the natural environment in a better state”.*

## **Q2 NIC principles**

7. We agree with these principles. In order to meet the NIC desire to “capture the expertise and opinions of ... the wider public” it will be necessary to do more than issue a public consultation. We cover this issue in more detail below and in response to questions 8 and 13. We believe it is essential – to meet good governance and democratic accountability requirements – that there is strong public participation in the NIA. We believe it will also lead to a much stronger final NIA – “need” for infrastructure is not a top-down exercise best determined by experts, but must take into account the views of the people who will rely on such infrastructure in their day-to-day lives. We agree with the Prime Minister's promise<sup>iii</sup> to “do everything we can to give you more control over your lives” – the NIA process will be an early example of whether people are involved more in such decisions.

## **Public participation and National Infrastructure Assessment**

8. We comment on the four principles set out at paragraph 31 as follows:
9. On being ‘**open transparent and consultative**’ we suggest that the Commission consult and public upon a code of consultation. The current Government ‘code of consultation’ is inadequate for the Commission's purpose in view of the subject matter with which the National Infrastructure Assessment is to engage and the need to draw on wide expertise and evidence. The previous Government's code of consultation set out 7 criteria as follows:
- **When to consult** (when there is scope to influence the policy outcome)
  - **Duration of consultation exercises** (normally at least 12 weeks with consideration given to longer timescales where feasible and sensible)

- **Clarity of scope and impact** (clear about what is being proposed and expected costs and benefits)
  - **Accessibility of consultation exercises** (designed to be accessible to and clearly targeted at those people the exercise is intended to reach)
  - **The burden of consultation** (consultations must remain effective)
  - **Responsiveness of consultation exercises** (responses analysed carefully and feedback given)
  - **Capacity to consult** (officials running consultations should seek guidance in how to run an effective consultation exercise and share what they have learned from the experience)
10. A code of consultation that is adopted by the NIC should be consulted on itself, in order to ensure that people's views on how they should be consulted is fed into the code. We further suggest that inquiries are held (as outlined below) in addition to consultation to ensure public participation principles are met.
11. We further remind the National Infrastructure Commission that the UK is a signatory of the Aarhus Convention<sup>iv</sup>, and Article 7 of that Convention is applicable here – establish a fair and transparent framework for public participation in plans and programmes relating to the environment; identify the participating public; conduct public participation early; give the necessary information to the public; establish reasonable timeframes for public participation; and take due account of the outcome.
12. We suggest that the National Infrastructure Commission follow the example set by Sir Michael Pitt in his role as Chairman of the Infrastructure Planning Commission (IPC) on transparency – publishing every piece of correspondence, together with meeting minutes. This demonstrated from the beginning that the IPC were determined to be open and transparent about their communications. The paucity of information about the NIC and Infrastructure and Projects Authority (IPA) on the gov.uk website, as well as its general inaccessibility, is in stark contrast to this approach. We suggest that the NIC publish its planned meetings with stakeholders and others, as well as meeting minutes.
13. In areas where communities may be directly affected by infrastructure, including adaptation infrastructure, there should be locally-held public meetings and stakeholder workshops. Local people hold a wealth of information about how a place works, what its issues are – social, environmental and economic – which will be hugely useful in considering strategic infrastructure needs.
14. **On being independent, objective, and rigorous** we suggest that the inquiries held by Select Committees could be very useful in this regard. This taking of evidence is transparent, held in public, recorded and accountable. We further suggest that the use of small expert groups such as that favoured recently by DCLG (e.g. the Local Plan Expert Group) are potentially detrimental to both the principles of rigour and objectivity. A small cohort risks individual inclination and perspective coming through more strongly when they are not diffused through a broader spectrum

of participation. In our view this broader spectrum is an essential part of objectivity in approach. Rigour requires the gathering of evidence – a principle of sustainable development is that it relies upon sound science. Assertions and assumptions in the assessment will undermine any conclusions that are made. We strongly suggest that the suggestions in paragraph 78 are enhanced with regional public meetings, and the call for evidence allows for evidence to be tested in public through a hearing or examination in public. A local plan undergoes an examination with a right to be heard in person for the public. The NPS is examined by Select Committee and debated by parliamentarians. The NIC should not do less than is required of the NPS adoption process when preparing the NIA.

15. **On the principle of being comprehensive**, we would note that land use plans, in the previous Regional Spatial Strategies (now removed), and in local plans, have been and are the best vehicles for considering evidence on the interdependence of providing for social and economic needs within the environmental context. We therefore consider that any strategy should draw on the SEA Directive approach, which considers issues and options and reasonable alternatives, and gathers appropriate evidence.
16. On paragraph 32, we consider that the vision proposed would be incomplete without a combination of the NCC, NIC and CCC holding an examination/hearing/public debate on the vision for infrastructure for the UK up until 2050. We strongly suggest that the NIC consider the advantages of the approach in Wales – <http://thewaleswewant.co.uk/> – as part of the work on the Wellbeing of Future Generations Wales Act 2015.
17. On paragraph 37 we caution the NIC against making site-specific recommendations given the possible implications. We are concerned that what may be proposed may not ensure procedural fairness. It is also likely that this infrastructure should be proposed through a local plan process which has an intimate evidence base of the area where the development is required. We therefore suggest that the NIC consider how it may engage with local authorities at a regional (duty to co-operate) level in identify infrastructure needs.
18. Finally we note that the previous Infrastructure Planning Commission had five principles: openness, engagement, sustainability, independence and consensus of which engagement and sustainability is missing from the NIA's principles.

### **Q3 NIA sector coverage**

19. We agree with the Government's decision that the NIC should not cover housing supply on a local plan level, but consider the linked and spatial effects of housing need for infrastructure, and considering constraints such as water resource scarcity, and adaptation (urban heat, flood risk, coastal change). Housing supply is an essential part of the UK's future infrastructure needs, for instance the requirement for all new homes to be zero carbon, but is also a very local issue when deciding on site specific locations – in effect the right place for development. It touches on almost

every other issue related to infrastructure need which is why the local plan led system must be strengthened in order to prevent speculative and unplanned development that locks in high infrastructure costs. Place-making must be at the heart of the NIC's approach.

20. Flood risk requires a much longer timeframe given the timeframes that the development may be expected to last (e.g. 100 years from now). An additional and more comprehensive example is that of Vancouver which has a 100 year plan<sup>v</sup>.
21. There is also a crucial national issue around relative economic development between the rest of the UK South-East of England, with an urgent need for rebalancing the economy to regenerate other areas and prevent further over-heating of the South-East economy.
22. It is not clear how "land-use" will be considered as an infrastructure asset within the NIA. Section 39 rightly mentions "natural" infrastructure assets such as rivers and flood plains, however this area and type of asset is highly complex, and affected by actions in other areas of infrastructure. These would include actions relating to soil quality, food production, the role of natural approaches in flood protection, the restoration of rivers and waterways, the competing needs for scarce land, and the aesthetic, intrinsic, economic and quality of life benefits of green space and protected wildlife areas for both people and nature. Any developments involving UK land and other natural assets will require careful consideration to ensure that a gain in one area does not lead to losses in another, for example in the natural infrastructure available to others and to support our natural environment.
23. The need for a new approach to considering the vital ecosystem services that nature provides us with was recognised in the National Ecosystem Assessment in 2011, "*The natural world, its biodiversity and its constituent ecosystems are critically important to our well-being and economic prosperity, but are consistently undervalued in conventional economic analyses and decision making*". The NEA found that 30% of key ecosystem services were in decline. The Natural Capital Committee was formed to advise the Government on how to ensure that our dependence on natural resources is taken into account in decision making and should be considered in how to plan for future infrastructure needs. However it is also vital that the Government considers the intrinsic value of nature and the contribution it makes to our wellbeing – not all the values of nature can be measured in economic terms.
24. On nature and ecosystems, the UK is committed to international action to reverse the decline of nature and ecosystems with 2020 being an important target date to have made significant progress on restoring species, habitats and systems. The NIA should have regard to this and to how plans will advance these aims after 2020.
25. The London Infrastructure Plan 2050<sup>vi</sup> usefully states green infrastructure's unique role: "*Green infrastructure needs to be regarded as infrastructure in its own right, assisting with flood protection, water storage and recycling, and providing shade, new pedestrian and cycling routes as well as space for recreation and biodiversity.*" (page 9)

26. We also note that the use of terms such as “blue infrastructure”<sup>vii</sup> (relating to the UK’s rivers, waterways, Sustainable Urban Drainage systems and flood resilience mechanisms) and “green infrastructure” re green spaces in cities (value of nature, wellbeing, tranquility, flood alleviation, urban cooling etc) may be useful concepts for the NIA in ensuring a comprehensive overview of the full benefits of different types of infrastructure investment.
27. Paragraph 44 states that “the NIA will not cover upstream energy extraction and processing (such as North Sea oil and gas or refineries)” – it is not clear why the NIA would not cover upstream energy extraction, nor how this is defined.
28. Paragraph 45 suggests that the NIA will cover water usage in a variety of sectors, but does not suggest that this remit will extend to other impacts on water and natural water-based assets. It is important that, particularly in food production and processing, the potential impacts of pollution and contamination of the supply are considered as a risk to both people and the natural environment.
29. The new BEIS’ department’s focus on industrial strategy is of strong relevance to the NIC. What industry we have in the next few decades, and in which locations, is an important factor for infrastructure provision, as the UK should seek to gain synergies and efficiencies through clustering, particularly regarding the need for zero-carbon and circular economy approaches to delivering strong industrial growth integrated with carbon and environmental goals.
30. On paragraphs 42-47 on the different sectors covered, we remind the NIC that for these issues National Policy Statements already exist. All the issues are also planning authority areas for decision-making on development. We are unclear as to how the NIC will work with planning authorities on covering these sectors, as the mention in paragraph 67 is not clear about the approach.

#### **Q4 Focus within sectors**

31. It is likely that the UK economy will need to be near zero-carbon by 2050. Any new infrastructure built in the short-term is likely to be still in place by then. As such there should be a strong presumption against infrastructure which is incompatible with this 2050 goal. This is particularly important for the transport and energy sectors.
32. For transport, we urge the NIA to look in depth at how the aviation sector can be compatible with carbon targets, and prioritise means to integrate economic, social and environment objectives. This is an area where current policy gives overriding priority to GVA growth for the sector, at the great expense of trade-offs with environmental, quality of life and social objectives, particularly carbon emissions, noise and local air pollution.
33. Similarly for surface transport we urge that the NIA’s goals do not continue to treat transport demand growth as a loose proxy for the aim of transport policy, but instead take an integrated approach, and seek to deliver people and businesses’ need for access to services while meeting

environmental and social goals. This would entail a greater focus on demand management, land-use planning, and provision of better, safer, more reliable public transport and walking and cycling facilities. Local transport planning is done most effectively by local governments, and the NIA must recognise the economic benefits of ensuring that people travelling within and across local authority boundaries on a daily basis have access to good reliable public transport networks. For example travelling between Chester, Liverpool, Manchester and Leeds is complex and slow. In addition services do not enable travellers to work on the trains – it is considerable worse than the service to London in both journey times and facilities. If these regional economies are to thrive, people must be able to benefit from much better local services – the NIA must not overlook this in favour of projects that merely benefit London or the South East. Local Governments need to be empowered and have the resources to deliver local transport needs.

34. On energy, we urge a high priority on energy saving and energy efficiency, particularly energy efficiency in the housing stock. We strongly support the approach advocated in the NIC's "smart power" report<sup>viii</sup> this spring with its recommended focus on far greater levels of interconnection, storage and demand flexibility, allied with strong policy to promote electricity saving, and to promote a diverse supply of low-carbon renewable power technologies. However the NIC's recommendations need then to become part of the suite of planning practice guidance – subject to inquiry by the CLG select committee, and to public consultation – before being implemented. At the moment, onshore wind planning policy contradicts itself, and creates a higher bar, for example than that for open cast coal or fracking.
35. On waste, we urge a high priority be placed upon minimising food waste, and particularly the development of prevention, redistribution and recycling infrastructure based on the food waste hierarchy<sup>ix</sup> to support producers, retailers and consumers to cut the 15 million tonnes of food wasted within the UK each year.

## **Q5 Interdependencies**

36. We believe the strongest interdependency is the need for an integrated approach to land-use planning, particularly at a regional and local level.
37. In order for rural communities to benefit from infrastructure investments designed to support local economic growth without suffering disproportionate detriment relating to other areas, such as flood resilience and tourism, developments to the food production and distribution infrastructure will require significant integration with environmental policy and the sympathetic support of the natural infrastructure.
38. There is a strong potential synergy between transport and energy regarding the huge potential opportunities from the new infrastructure needed for the growing electric vehicle sector – both for carbon reduction, and cuts in air pollution but also for the system-balancing potential for electric vehicles with the electricity grid.

## Q6 Cross-cutting issues

39. Yes, these are necessary issues to focus on. On sustainability, the main issue is that infrastructure proposals too often treat economic growth as an overriding priority, irrespective of its type or the damage it causes to other critical public policy objectives. It is the type of economic activity which is crucial, with economic, social and environmental goals integrated, and this needs to be at the heart of a new approach to infrastructure.
40. Governance, particularly around the planning system, is a pivotal concern. In line with the Prime Minister's unequivocal statement that people need to have control over the decisions that affect them, we advocate that the NIA and the planning system have embedded within them a central role for public participation in assessing need and determining priorities. For example, the NIA is similar to the evidence base gathered to underpin a development plan – which is part of an examination process. The Government could hold a short examination for the NIA, and allow for evidence to be brought forward. A select committee could also take the NIA and conduct an inquiry as part of its formulation. Wherever there are site specific or area specific interpretations, it is key, both for accountability and integrity, for local examinations to take place. Hearings such as those that are organised for planning appeals are possibly a good model, or for example the type of stakeholder meetings that were held as part of the development of regional spatial strategies.
41. We believe that fundamental reform is required in appraisal methodologies – there is far too great a reliance on narrow cost-benefit analyses (CBA) in appraisal, which lead to a systematic underestimation of environmental impacts, impacts on poorer people, and impacts in the future. The limitations of CBA are set out by Ackerman<sup>x</sup> and are also highlighted in the Treasury Green Book<sup>xi</sup>, but too often the default is to rely too heavily on narrow benefit-cost ratios which downplay these impacts. Linked, appraisal too often relies on outdated methodologies such as Consumer Surplus Theory<sup>xii</sup> (for aviation) or has too great a focus on one type of impact, eg time-savings in surface transport appraisal. More comprehensive appraisal methodologies are needed. **We strongly suggest that the SEA approach is used for any NIA.**

## Q7 Other cross-cutting issues

42. The NIA should include an additional cross-cutting issue of land use – including for nature protection and food production. Any infrastructure objectives must ensure that the aims of the forthcoming 25 year plan for nature are supported. It is also vital that high quality agricultural land is prioritised for food production. The UK now imports over half of the food consumed here, and it is undesirable for this to increase, particularly given current uncertainty over future trade arrangements with other countries if we leave the EU. In particular, agricultural land graded 1 (excellent), 2 (very good) and 3a (good) should be exempt from development as this is most productive and flexible and can best be used to produce food for future generations.

43. Nature is a cross-cutting issue. Taken together, the National Ecosystem Assessment<sup>xiii</sup>, the Making Space for Nature<sup>xiv</sup> review led by Professor John Lawton and the Natural Capital Committee's work on accounting for nature<sup>xv</sup>, metrics and novel funding mechanisms are important reference points.
44. The **distribution** of access to infrastructure, and distribution of the impacts of infrastructure, is a key cross-cutting issue the NIC should consider. Access to infrastructure to meet people's basic needs is very unevenly distributed across the UK, for example with London having far better quality public transport and cycling provision than other cities, and also London and the South East having a far higher share of future transport spending. Similarly, access to affordable, healthy and sustainable food is higher in many wealthy, urban conurbations than in poorer and rural areas.
45. We urge that the NIC also consider the gross and widening economic inequalities between regions, as a primary consideration in the location of future national infrastructure, so as to help with the economic regeneration of those regions. From a purely economic perspective we also note the Treasury Green Book's guidance that: "*The impact of a proposal on an individual's well-being will vary according to income; as income grows, the satisfaction derived from an additional unit of consumption declines.*"<sup>xvi</sup> – the overall benefit is higher if focussed on poorer areas.
46. We also note that negative environmental and health impacts of infrastructure tend to be higher in poorer areas<sup>xvii</sup>. Given the need for future infrastructure provision to benefit poorer areas more, this is a strong additional reason that future infrastructure must be designed to be low-environmental impact – to ensure that regeneration and inequality goals are met together, and are not in conflict. It is critical that public participation is central to needs assessment and the choice and type of infrastructure provision.
47. The issue of different powers and regulations for different nations, and increasingly different regions - with LEPs and devolved powers – is potentially a cross-cutting issue for the NIA.

## **Q8 Methodological approach**

48. We advocate that the needs assessment should involve public participation, to ascertain the public's view of infrastructure needs. Friends of the Earth ran a participatory appraisal based approach to determine local people's transport needs in Longsight, Manchester<sup>xviii</sup> - it focused on asking people what their transport needs were, whether those needs were met, and what the barriers were. Asking people directly, rather than assuming needs and provision, gives better information about how infrastructure's efficiency can be maximised. For example, this research found that bus provision in Longsight was extensive, but under-utilised and doing a poor job of meeting people's need for access to services because of issues around reliability, safety and cost. We strongly advocate that participatory appraisal techniques are used, rather than top-down consultation exercises, to engage the public in assessing infrastructure need.



## **Q9 Strategic Prioritisation**

49. Friends of the Earth has set out 5 principles for infrastructure<sup>xix</sup> - on future-proofing, sustainable development, integration, subsidiarity and empowerment, which we hope is useful for NIC's prioritisation.
50. The SEA approach is useful for prioritisation as it first ensures that the issues at stake are understood and evidenced, and then a series of options should be prepared, with reasonable alternatives. A judgement can then be made through the process as to which options will be most effective in tackling the most important issues as identified.

## **Q10 Infrastructure drivers**

51. We agree with the Commission's statement that "infrastructure may affect economic growth". One of the key roles of the NIC will be to ensure that the types of infrastructure the UK prioritises are ones which deliver types of economic growth compatible with other key societal and environmental goals, rather than types which damage these other goals.
52. On asset stranding, we note the high risks posed by climate change: both the urgent need to move away from fossil fuel production and consumption - at least 80% of the world's fossil fuel reserves are unburnable to keep to the Paris Agreement's climate goals - and the growing risks to infrastructure from the climate change impacts we can no longer avoid. There is a very high risk of stranding of high-carbon infrastructure, and of infrastructure in flood plains and on some coasts.
53. We welcome the recognition from the Commission of the "need to enhance our environment" in infrastructure decision-making.

## **Q11 and Q12 Methodological approaches**

54. No comment; issues covered in responses to previous questions

## **Q13 Engagement**

55. We welcome the commitment to "capture the expertise and opinions of...the wider public". We do not however believe that issuing "two formal public consultations, beginning with this document" will be sufficient to do this. We welcome the commitment in paragraph 81 to "employ a variety of social research and engagement tools" to understand the views and opinions of the public, and request that the NIC provide further details of what is intended here.
56. We recommend that the NIC employ participatory appraisal techniques in a wide-selection of different geographical areas with a wide cross-section of different sectors of society to look at public need for infrastructure across the sectors set out in sections 39-47. Planning for real <http://www.planningforreal.org.uk/> is one example of tool which might be employed by the NIC. The 'Wales we Want' conversations are an example of how to identify the public's priorities as perceived by the public. France uses an independent National Commission for Public Debate (created by law in 1997) to organise debates when plans or project are at a draft stage, however the organisation of

debates is sometimes considered too rushed. Another example from France is the *Grenelle* format involving representative working groups whose proposals were then discussed in public meetings throughout the country. Germany has instigated ‘citizens bureaus’ for the national improvements to the grid to enhance the development process, and significant changes were made to the initial plans following public consultation<sup>xx</sup>.

57. We appreciate that such tools are more time-consuming than consultations. However, the NIC’s work is crucial to the future well-being of UK citizens as well as the economy; and as such it is critical that the NIC’s recommendations are based on a strong understanding of what UK citizens need. Infrastructure affects everyone’s lives, every day. People need to have a stronger say and stake in how infrastructure decisions are taken, starting with the crucial work of the NIC. As the Prime Minister says: “*We will do everything we can to give you more control over your lives.*”

**ENDS**

Contact: [name redacted], [job title redacted], Friends of the Earth England, Wales and Northern Ireland  
Email: [email address redacted]

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<sup>i</sup> HM Government, 2005. [Securing the Future: delivering UK sustainable development strategy](#).

<sup>ii</sup> <https://www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report>

<sup>iii</sup> Prime Minister’s Office, 2016. [Statement from the new Prime Minister Theresa May](#). July 13th

<sup>iv</sup> UNECE, 1998. [AARHUS CONVENTION ON ACCESS TO INFORMATION, PUBLIC PARTICIPATION IN DECISION-MAKING AND ACCESS TO JUSTICE IN ENVIRONMENTAL MATTERS](#). Article 7.

<sup>v</sup>

<http://www.cnv.org/your%20government/sustainability%20in%20the%20city/city%20initiatives/100%20year%20sustainability%20vision>

<sup>vi</sup> Mayor of London, 2014. [London Infrastructure Plan 2050: A consultation](#).

<sup>vii</sup> TCPA, 2008. [The essential role of green infrastructure](#). TCPA, 2009. [GRaBS Expert Paper 1: the case for climate change adaptation](#).

<sup>viii</sup> National Infrastructure Commission, 2016. [Smart Power](#). March.

<sup>ix</sup> Pagagyropoulou, E et al, 2014. [The food waste hierarchy as a framework for the management of food surplus and food waste](#). Journal of Cleaner Production, vol 76, pp106-115.

<sup>x</sup> Ackerman, F, 2008. [Critique of Cost-Benefit Analysis, and Alternative Approaches to Decision-Making](#).

<sup>xi</sup> HM Government, 2014. [The Green Book: appraisal and evaluation in central Government](#).

<sup>xii</sup> Ackerman, F and Stanton, E, 2008. [Generated User Benefits and the Heathrow Expansion: Understanding Consumer Surplus](#). July

<sup>xiii</sup> UKNEA, 2014. [UK National Ecosystem Assessment](#)

<sup>xiv</sup> DEFRA, 2010. [Making Space for Nature](#).

<sup>xv</sup> Natural Capital Committee, 2014. [State of Natural Capital Report](#).

<sup>xvi</sup> HM Government, 2014. [The Green Book: appraisal and evaluation in central Government](#). Annex 5

<sup>xvii</sup> HM Government, 2015. [English Indices of Multiple Deprivation](#). Friends of the Earth, 2004. [Paying for better transport](#). Section 4. Friends of the Earth, 2004. [Incinerators and deprivation](#).

<sup>xviii</sup> Friends of the Earth, 2003. [Better buses and safer streets for Longsight](#).

<sup>xix</sup> Friends of the Earth, 2013. [Five principles for infrastructure](#).

<sup>xx</sup> <http://www.bmwi.de/EN/Topics/Energy/Grids-and-grid-expansion/public-dialogue.html>

## **GATWICK AIRPORT SUBMISSION TO NATIONAL INFRASTRUCTURE COMMISSION**

### **Overview**

Gatwick Airport welcomes the Government's proposed objectives for the National Infrastructure Commission, particularly the commitment to fostering long-term and sustainable economic growth across all regions of the UK.

If the Commission's National Infrastructure Assessments are to create the framework for balanced and sustainable growth, the UK needs an ambitious, nationwide vision for transport that protects competition, improves domestic connectivity and ensures that the UK's regions are connected to emerging markets.

The value of regional connectivity and competition should therefore be reflected in any future decision making on infrastructure planning, including airport expansion.

In light of the UK's uncertain economic outlook it is also important that infrastructure projects are properly assessed as to their costs, whether they are funded by the public or private sector.

### **Balanced growth**

To ensure that the NIC's National Infrastructure Assessments lead to growth that is balanced across the country, it is important that the Commission considers the following issues:

#### **Competition**

In May 2016, the Competition and Markets Authority deemed the forced breakup of BAA by as a great success, leading to more efficiency, better service, lower charges and more choice for passengers. Maintaining and increasing that competitive structure within the UK airport sector is vital for balanced regional growth. Along with the growth of low cost airlines over the past 20 years, greater competition between airports has enabled business and leisure passengers across the UK to choose the airport that best suits them, based on cost, timings and efficiency.

It is important that the priorities laid out in the NIA are established following a detailed assessment of the impact that future investment will have on competition within the sector. This will ensure that we do not reverse the progress made over the past 20 years.

#### **Distributed international connectivity**

Whilst not all international destinations will have enough local demand to support numerous direct routes from the UK, an increasingly competitive market has already allowed regional airports to secure their own direct links to key emerging markets.

This is partly due to improvements to technology and an increase in fuel efficient aircraft, which have made previously marginal long-haul routes more financially viable. For example, in March 2016, Hainan Airlines launched twice weekly flights to Beijing from Birmingham Airport and in June began their four weekly flights from Manchester Airport.

This builds on the regular services into Middle Eastern hubs with Emirates, Etihad and Qatar from Edinburgh, Glasgow, Newcastle, Manchester and Birmingham Airports, as well as from Heathrow and Gatwick.

By increasing direct flights to international destinations, regional airports can act as drivers for local growth, facilitating trade for businesses and helping to secure inward investment and direct economic growth for their cities and regions. This direct connectivity play an important role in decentralising the UK economy and ensuring all regions of the UK are able to compete for growth.

It should be the responsibility of the NIC to ensure that infrastructure investments are planned in such a way that the competitiveness of the sector is not impacted, so that these direct international routes can continue to grow and provide nationwide economic benefit.

### **Domestic connectivity**

Gatwick welcomes the proposal to adopt a multi-modal approach to the analysis of transport requirements.

As the first airport in the world to have a direct train link and an integrated railway station, Gatwick has always recognised rail as the best and most sustainable way to bring passengers to the airport.

The initial steps of Gatwick's rail upgrade programme have already taken place, with the introduction of Oyster and contactless fare payment in January 2016 and the first of 108 new Gatwick Express carriages coming into service. Continued, strategic investment, facilitated by partnerships between Gatwick and the rail industry, will mean that capacity on rail services to Gatwick will double by 2020 and nearly treble by 2035.

38% of passengers already choose rail to travel to the airport. Ambitious plans are well underway to increase this to over 50% - the highest percentage of any UK airport and among the best in the world. By 2019, with the completion of the Thameslink upgrade project, Gatwick will connect directly to up to 175 stations and to over 1000 with a single change.

Relative surface access improvements across the UK have the potential to improve domestic connectivity, taking pressure of congested networks and increasing the ability of business and passengers to access their own local airports. For example, increasing East/West connectivity in the North of England would significantly increase the catchment area of Manchester Airport and further enable it to make use of its two runways' worth of capacity.

Focusing surface access investment on joining up regional communities with airports at the centre as part of an integrated transport plan will go a long way to establishing a network of competing airports across the UK each serving its local market.

This approach, supported by low cost access to London airports from throughout the UK, will ensure that all regions of the UK are able to benefit from increased international connections to the global economy.

### **Costs**

The costs of infrastructure projects have proved susceptible to increase in the past. Whether funded by the private sector or the public sector the costs associated with infrastructure are ultimately borne by the public, as consumers or as taxpayers. In this regard, the costs, and risks to costs, must be properly assessed both as they relate to the competitiveness of the projects under consideration and with respect to the risk of cost over-run. The risks associated with cost over-run should also be assessed with respect to the allocation of risk, particularly in the context of privately funded projects.

2 August 2016

National Infrastructure Commission

Dear Sir/Madam,

**Re: National Infrastructure Commission Process and Methodology Consultation**

We are writing to provide a response from the Grantham Institute – Climate Change and the Environment, Imperial College London to the consultation launched in May 2016 on the National Infrastructure Commission's (NIC) proposed methodology for the National Infrastructure Assessment (NIA). The terms of reference for this inquiry set out a number of questions and we have focussed our response on the questions where we feel we have the relevant expertise and knowledge to add value.

We would welcome the opportunity to provide further input, as required.

We, together with a wider range of our colleagues, look forward to welcoming the NIC to Imperial College London in September to discuss in person the issues that we have raised here as well as broader issues associated with national infrastructure..

With best wishes

**[name redacted]**

[job title redacted]  
Grantham Institute,  
Imperial College London

**[name redacted]**

[job title redacted]  
Grantham Institute,  
Imperial College London

## **Brief Introduction:**

### *About Imperial College London and the Grantham Institute:*

Consistently rated amongst the world's best universities, Imperial College London is a science-based institution with a reputation for excellence in teaching and research that attracts 13,000 students and 6,000 staff of the highest international quality.

Within the College, the Grantham Institute is committed to driving research in climate change and the environment, and translating it into real world impact. Established in February 2007 with a £12.7 million donation over ten years from the Grantham Foundation for the Protection of the Environment, the Institute's researchers are developing both the fundamental scientific understanding of climate and environmental change, and the mitigation and adaptation responses to it. The research, policy and outreach work that the Institute carries out is based on, and backed up by, the world leading research by academic staff at Imperial.

### *About the author:*

This consultation response has been prepared by the Co-Directors of the Grantham Institute, Professors Joanna Haigh and Martin Siegert and the Head of Policy and Translation, Alyssa Gilbert. These views represent our understanding of the issues and is based on the extensive work that our affiliates, throughout the college, do on a range of climate change and environmental issues. However, these affiliates did not contribute directly to this response.

## **Response to the Consultation**

### **General comments**

We welcome the establishment of the National Infrastructure Commission (NIC) and the introduction of a National Infrastructure Assessment (NIA). Infrastructure is vital to the fabric of our communities and a strategic and joined-up approach is necessary, as explained so clearly in the consultation document.

Investment in the development of the UK's infrastructure to make it more modern and to support and encourage growth offers a rare opportunity for the environment. The government should grasp the opportunity to fundamentally integrate environmental and climate change solutions into the new infrastructure vision, as well as individual developments. It is important that infrastructure development and environmental protection are not considered as forces in opposition. The sound development of sustainable infrastructure can contribute to the solution of issues surrounding climate change and can, if sensitively planned, support biodiversity and conservation whilst simultaneously supporting the economy.

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

**What issues do you think are particularly important to consider as the Commission works to this objective?**

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

Q1. The NIC's three objectives (sustainable growth, competitiveness and quality of life) will all be enhanced by careful consideration of national environmental and climate objectives.

We recognise that the NIA will be developed to deliver these three objectives 'whilst ensuring that the recommendations are consistent with the UK's carbon and environmental commitments.' We urge the NIC to recognise that these carbon and environmental commitments cannot be treated as an add-on or quality check at the end of the NIA development process but fully integrated into it. It will be cheaper and easier to deliver our carbon and environmental objectives if the right infrastructure is in place. So, whilst it is important that any new infrastructure developments minimise their negative carbon and environmental impact, it is even more important that the NIC fully grasp the opportunities that new infrastructure investment offer to deliver on our carbon and environmental goals. In this regard, we welcome the recognition in the consultation document that a disjointed approach to infrastructure investment compromises the achievement of carbon targets.

We are at a rare juncture, with the prospect of significant infrastructure investment on our doorstep. It is important that we make the right decisions now, as we will be locked-into these investments for decades to come.

When considering the UK's competitiveness, it is important that that of future industries is considered alongside the competitiveness of existing, established sectors. These future opportunities include many environmental goods and services as well as cleantech industries per se. Some of these industries, including e.g. CCS, offshore wind, satellite services for climate change, climate finance innovation, can flourish in different parts of the UK, offering geographical diversity.

Q2. We are delighted that the NIC will carry out its tasks according to the four principles outlined in the consultation document. In our view, systems thinking and a willingness to challenge established thinking will be particularly important. With this open-mindedness and creativity, the UK's new infrastructure can deliver on the essential objectives whilst also contributing to carbon and environmental goals, amongst others.

Several of the challenges associated with infrastructure decisions in the past have related to delays in the timing of decisions, and sometimes reversing decisions. Whilst it is accepted that the NIC cannot dictate the timing of political decisions it might want to consider a principle related to timeliness of decision making, to overcome some of these barriers.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?**

Q3. We agree with the way the NIA has described the approach to these sectors. We welcome the use of climate change as a key driver in understanding infrastructure needs and risks associated with infrastructure.

Recognising that the NIC is responsible for flood defences, we note that it is vital that decisions about flood infrastructure be taken in tandem with an understanding of flood risk, changes in flood risk as a result of climate change but also as a result of other factors e.g. planning and physical infrastructure, and the use of soft measures to reduce the impact of flooding. These were explored in previous flood reviews e.g. The National Flood Resilience Review.

It is excellent that consideration of circular economy approaches is being integrated into waste management infrastructure planning. In doing so, it is vital to consider what behavioural drivers might be needed to encourage a more circular economy, and to what extent these behaviours may be influenced by infrastructure provision.

We have been working on some energy model scenarios that consider outlier changes: for example more rapid electrification of transport than currently expected. We would encourage the NIC to stress test their scenarios against extreme scenarios for some of the drivers, to help support informed decision making. The consultation describes the use of a range of models as part of the infrastructure assessment process, and we are supportive of such an approach.

Q4. We welcome NIC's consideration of interdependencies between and within sectors. We fully support the treatment of the energy system as a whole. It is essential that the future of the energy sector is designed with all of the component parts in mind: renewables, storage, smart grids, energy efficiency etc. The development of the energy sector should include appropriate opportunities for new and emerging clean tech innovation, including opportunities for pilots and wider deployment.

Q5. The intersection between energy and transport, as recognised in the consultation document, will be key. Specifically, electrification of transport (and heating), stimulated by the UK's climate change goals, will require careful consideration in the energy infrastructure planning.

Furthermore, there will be a significant intersection between planning, the built environment, water infrastructure and flood risk. The division of responsibilities for planning between different levels of government might make this intersection difficult to manage but the NIC should be in a position to develop a national understanding of the relationship between planning of physical infrastructure e.g. roads, housing, pavements, with flood risk and with water and flood management infrastructure. This guidance may be useful to local level planners and practitioners.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

Q6. We welcome this choice of cross-cutting themes, and are pleased that sustainability remains at the heart of these decisions. We would note that as well as being compatible with



sustainability objectives, infrastructure developments offer an opportunity to deliver those objectives and it is important that we take full advantage of the opportunity to use infrastructure investment accordingly.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

Q10. We agree with the identified infrastructure drivers. In light of our remit, we are particularly pleased to see the focus on climate change and the environment as a key driver. It is important, as stated in the consultation documents, that infrastructure is resilient, in the light of climate and environmental pressures. It is equally important that 'the need to enhance our environment when choosing what and how infrastructure services are delivered' is taken very seriously. These must include the role that these infrastructure services have to play in helping us meet, as cost-effectively as possible, our targets on climate change mitigation, air quality, waste management and resilience to extreme events.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

Q12 The energy and transport sectors contribute significantly to emissions of NOx and particulates which creates poor air quality and contribute to poor health. Investments in infrastructure should take impact on air quality and human health into account. This approach could ultimately save the public purse money through savings to the NHS. The current draft consultation document does not mention air quality at all – we are not proposing making this a cross-cutting theme of its own, but it should be accounted for somewhere in the methodology.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

Q13. The Commission's detailed and thoughtful plans about engagement with society and with a range of stakeholders is well thought-through. We look forward to engaging further with the Commission at various points in this process, through the different mechanisms described. We hope that the Commission will also welcome contributions to the process from some parties outside the UK, where it is relevant. For example, for some energy issues interconnections to non-UK countries will be important. Similarly, for some environmental challenges, input from non-UK contributors might be helpful e.g. ideas on resilient infrastructure, specialist modelling etc.

We would also urge the Commission to think carefully about the public communication element of their work, including engagement with the media. Large-scale infrastructure projects can become the subject of controversy for a range of reasons, even when the argument for taking a particular approach might be very sound, balanced and rational. The openness and transparency already demonstrated by the Commission is commendable, and a continued

awareness of communication approaches for different audiences may help the Commission see through projects from Vision through to implementation effectively.

# The National Infrastructure Assessment process and methodology consultation



Written submission by Green Alliance, August 2016

Green Alliance welcomes the National Infrastructure Commission's consultation on processes and methodology for the National Infrastructure Assessment. We appreciate the NIC's goals of producing an objective, holistic analysis of the UK's infrastructure needs, and a strategic plan to address them.

We also broadly endorse most of the suggestions made in the consultation document, particularly the focus on climate change and the environment as cross-cutting issues, the emphasis on demand management alongside supply-side options, and the focus on infrastructure interdependencies.

We have a number of suggestions as to how the Commission can best engage with the public during the NIA process. These suggestions build on our report, *Opening up infrastructure planning*, which we published last year and which is a source of further context and elaboration of the arguments below. It is available here: [http://www.green-alliance.org.uk/opening\\_up\\_infrastructure\\_planning.php](http://www.green-alliance.org.uk/opening_up_infrastructure_planning.php)

## **Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

It is right for public engagement activities to run throughout the NIA process, as indicated in the diagram on page 30 of the consultation document. Securing a public mandate for new infrastructure will be essential to successful delivery, but it cannot be done through conventional parliamentary politics alone. The public should have genuine opportunities for input, which must go with the grain of devolution and deliberation. This will not eliminate controversy and outcry, but if practised effectively, engagement could lead to more informed decisions of higher quality, with improved legitimacy. As hinted at in the consultation document, this would improve transparency and leave both decision makers and the public with a better understanding of the issues in question and the infrastructure outcomes that will be valued most by society.

### **The Vision and Priorities process**

The Vision and Priorities process is critical, because historically, the public has not been involved enough in defining infrastructure need. Engagement opportunities have been too concentrated around the details of specific projects, rather than upstream definitions of the need for infrastructure and the outcomes it will enable. The public needs space to discuss and define the need for infrastructure and different options for meeting it. Otherwise, these big questions will end up getting squeezed, generally unsuccessfully and fractiously, into stages of the planning process that were never designed to handle such matters.

It is encouraging that the NIC proposes to commission social research that will employ a range of engagement tools in order to understand the views and opinions of the public. A diverse range of

engagement tools should also be used when seeking the public’s response to the Vision and Priorities document – a document, such as the current consultation document, is not an engagement method that works for most of the public. A truly “full” public consultation will use diverse techniques and multiple ways of presenting information, so that the information is as accessible as possible. Engagement experts can advise on how best to do this. One example is the [citizens’ assembly](#): two recent pilots in Sheffield and Southampton [found](#) that these can build political engagement, legitimise decision making and go some way towards defusing apathy, as well as producing evidence based recommendations that reflect local needs.

**Sources of expertise**

The descriptions of the infrastructure drivers in chapter 3 note that they are each iterative, impacted on by infrastructure as well as impacting it. Perhaps reflecting this complexity, and the importance of thoroughly understanding these drivers, it seems that the three panels of experts described in paragraph 82 roughly align with three of the infrastructure drivers listed in chapter 3, as shown in the table below. Yet there is no panel proposed that will have expertise on the fourth infrastructure driver, environment and climate change, despite this area also being pinpointed as a cross-cutting issue.

We suggest that a panel of experts is tasked to advise on environmental issues and to highlight risks that might otherwise go unnoticed. This could include representatives from the Committee on Climate Change, other statutory environmental bodies, academia, and the third sector.

<b>Infrastructure drivers</b>	<b>Panels of experts</b>
Population and demography	Economics and social science
Economic growth and productivity	Finance and investment
Technology	Engineering and science
Climate change and environment	

**Place**

The geographical assessment stage will be most useful if it involves local dialogues. These would be an opportunity for the public to participate in strategic, place-based discussions about where infrastructure should go; the different ways in which needs could be met; and the trade-offs that such choices will involve.

**Engagement capacity**

The recommendations above, if implemented properly, demand a significant increase in public engagement related to infrastructure planning. To provide that capacity, we recommend the creation of an independent body, to which we have given the working title Citizen Voice, to be an impartial facilitator and a well-resourced source of engagement expertise. It would have a critical

role in facilitating a rich debate around the identification of need and strategic direction at national and sub-national level.

Citizen Voice should actively create forums for representative cross-sections of communities to deliberate, including those who wouldn't usually get involved, with monetary compensation available for those who participate in time consuming processes such as focus groups. As well as direct deliberation with local residents, a range of stakeholders would have to be involved, including developers, planning authorities, Local Enterprise Partnerships, Local Nature Partnerships, academics, green groups and consumer groups.

### **Contact**

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## **CONSULTATION RESPONSE FROM GREEN HOUSE THINK-TANK**

### **Overview**

This consultation document is relevant not only to infrastructure provision but also for the environment, sustainability, and the wellbeing of future generations. However the document does not properly acknowledge this.

Infrastructure is a key factor in determining what options are open at the individual/household level for adopting a more sustainable lifestyle. For example, energy infrastructure can be biased (as it is currently) against distributed energy and in favour of centralised supply.

Infrastructure decisions often divert expenditure in ways which conflict with sustainability objectives: for example, money for expensive road-building versus improved bus services.

Infrastructure puts pressures on land, water, soil, air quality, and (through carbon emissions) the atmosphere. However the document is written in a way which implies that the only relevant major constraint ("envelope") is money.

The document lacks any sense of current pressures on the global environment. It is firmly based in the narrow mindset of "UK plc", apparently unaware of the wider world and the problems of climate change, ecosystem deterioration, and the many costs of the current path of economic growth.

### **Responses to consultation questions**

1. If the Commission is serious about economic growth being "sustainable" and the UK economy being competitive, and if it is working on a 30-year time horizon, it will need to consider long-run trends in the world economy, including factors such as population, climate change, water availability, food supply and changes in land use. A methodology which considers the UK economy in a purely national perspective, ignoring world conditions, will have no credibility.

We welcome the emphasis on 'all regions of the UK'. We hope that this will lead to an attempt to rebalance the UK economy geographically – although this needs more than simply an assessment of infrastructure, but a spatial plan for England, and its regions, to tie in with those for Wales and Scotland. The lack of planning on anything more than the very local scale is something that has unfortunately been lost since 2010. The key issue in this

rebalancing is to limit the dominance of London and the South East. A disproportionate amount of national infrastructure expenditure, for example, is spent on London, or enabling people to get to London (e.g. HS2) and this needs to change.

2. These objectives are reasonable ones. The 'whole system' approach the Commission intends to take needs to include our natural assets, resources, commitments to reduce emissions of green house gases and quality of life, not simply the economy.

Similarly, the remit letter it is proposed will come from the Chancellor of the Exchequer, should instead be jointly with, for example, Business, Defra, and DCLG, or from the Prime Minister on behalf of the Government as a whole. Current arrangements clearly imply overriding priority for Treasury considerations.

Making matters worse, the only envelope referred to is the proposed "fiscal envelope", when attention should also be given to the limits of water supply, land supply, and acceptable levels of carbon emissions. There should be four envelopes – fiscal, water, land, and carbon.

3. The emphasis of the Commission on large-scale transport infrastructure threatens to further reinforce the current bias in transport spending against local schemes to facilitate walking, cycling, repairs to pavements and road surfaces, etc. In the case of energy, there is a danger of a focus on large-scale infrastructure at the expense of the development of distributed forms of energy generation, such as solar and wind. In the case of waste, an emphasis on infrastructure may result in insufficient attention being given to waste minimisation.

'Water and drainage' and 'Flood defences' are considered in the document as separate issues, whereas in fact they are intricately linked and should be considered together. The key factor linking them is land use/management. With the increased intensity of rainfall that we are going to see, ensuring that water is retained in uplands as much as possible, rather than feeding through quickly to the rivers, is going to be more important than ever. In urban areas, reducing the amount of impermeable land – buildings, tarmac and concrete - as well as ensuring the maintenance of gullies and drains, will be critical to preventing a significant increase in the incidence of flash floods. Minimising run-off means the land becomes in effect a reservoir for water, improving water supplies and reducing the need for more water supply infrastructure.

4. It will be important for the Commission not to adopt a methodology with an automatic preference for increased infrastructure provision over all other policy approaches (this issue is referred to in paragraph 61).
5. It will also be important not to allow the profitability considerations of private developers to shape the pattern of infrastructure provision, which would tend to direct provision towards the interests of those with more money and against those with less (living, for example, in rented or social housing).
6. The question of “geography and local growth” and the question of “governance and decision-making” need to be considered in relation to local democracy, which should be seen positively rather than simply as a barrier to increased quantities of infrastructure. The planning system can be an important arena for debate about the sort of world we want to live in. It is not simply something that hinders or facilitates ‘delivery’.
7. The question of “evaluation and appraisal methodology” should include consideration of the way in which discount rates currently create an enormous bias against the interests of future generations – important when the Commission is considering a 30-year time horizon. This implies the need to move away from the approach followed by the Treasury Green Book.
8. It is essential for the Commission to be seen to act independently of the civil engineering industry and other vested interests. In particular, much more work will need to be carried out by the Commission itself than is implied here if it is too avoid reliance on existing industry methodology (para 66), which would result in giving too little attention to climate change and other environmental considerations, factors such as distributional impacts, and to the effects of the types of policies referred to in para 61.

The concept of “drivers” is a questionable one, because it carries the implication that an assessment of the “need” for infrastructure can be derived from sets of information about existing trends, which might well be ones it is desirable to change. It may be that faced with the consequences of the existing trends, society decides it does not want to pursue them – a possibility the Commission’s proposed approach appears to reject a priori.

9. We are not aware of any existing methodology that would enable the Commission to successfully deal with the very wide range of issues it faces. An early task for the Commission will be to develop this, avoiding simply putting into the methodology the various biases we have identified as implicit in this consultation document.



10. The potential impact of different infrastructure options on different sections of the population should be a key consideration. The Commission's work should include an investigation of this aspect, which would enable it to highlight the significance of different options for its stated "quality of life" objective.

Under the heading of "climate change and environment", there is no mention of biodiversity, nature conservation, air pollution, noise or land use! The idea that national consensus can be built by a Commission which appears set to ignore these issues is clearly ridiculous, undermining the whole stated purpose of the Commission.

11. The appropriate methodology is one which does not simply extrapolate major trends and then propose infrastructure development to fit in with them, but one which helps to enable society to actually choose which direction to take, bearing in mind the impact of different choices on different social groups and on the environment, and not only on the national economy. Otherwise the Commission is in danger of falling back into the old discredited DfT "predict and provide" approach.

12. The key relevant factor is the need for normative judgements, which have to be made politically and cannot simply be found through an "objective" analysis. The danger here is that highly contentious normative judgements will be "smuggled into" the Commission's analysis through the methodology it selects.

13. Although the document talks about "promoting the benefits of infrastructure" (para 74), it should be equally willing to promote consideration of its costs and difficulties, and consideration of alternative policy approaches, such as demand management measures. There is a similar bias evident in the statement that "the views and opinions of people who are active day to day in delivering major infrastructure will be especially important" (para 75), when clearly such people have a vested interest in increasing the rate of infrastructure construction, rather than seeking to balance this desire against other considerations.

In order to ensure that the Commission takes full account of environmental considerations, it will be vital for it to work closely with, for example, the Climate Change Committee, Natural Capital Committee, Natural England, and the Environment Agency.

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**From:** [email redacted]  
**Sent:** 28 July 2016 14:55  
**To:** NIA Evidence  
**Subject:** Consultation - National Infrastructure Assessment - process and methodology (HSE Response)

Dear National Infrastructure Commission,

Please find below a response from HSE to your consultation on the process and methodology for the National Infrastructure Assessment (NIA). We have made a specific point at Question 12.

We came across this consultation by chance; however, we are a relevant regulator and would expect to be included in such consultation exercises, so please would you include HSE on your list of consultees.

### Questions

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- *foster long-term and sustainable economic growth across all regions of the UK*
- *improve the UK's international competitiveness*
- *improve the quality of life for those living in the UK*

**What issues do you think are particularly important to consider as the Commission works to this objective?**

HSE has no comment to make.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- *Open, transparent and consultative*
- *Independent, objective and rigorous*
- *Forward looking, challenging established thinking*
- *Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?*

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

HSE has no comment to make.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

HSE has no comment to make.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

HSE has no comment to make.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

HSE has no comment to make.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

HSE has no comment to make.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

HSE has no comment to make.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

HSE has no comment to make.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

HSE has no comment to make.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

HSE has no comment to make.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

HSE has no comment to make.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

HSE asks the NIC, when appropriate, to take account of existing land use planning and hazard substances consent requirements when either conducting or making recommendations following NIAs. These existing requirements help to control major accident hazards and contribute to public safety and should not be seen as an afterthought that then restricts National Infrastructure development. Assessment and/or recommendation formation should consider such issues up front and this includes engagement with relevant planners and regulators on these issues as appropriate.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

HSE has no comment to make.

Kind regards,

[name redacted]

[name redacted]

[job title redacted]

[personal information redacted] Redgrave Court, Merton Road, Bootle, Merseyside L20 7HS

[phone number and email redacted]



[2]

HSE is engaging with stakeholders to shape a new strategy for occupational safety and health in Great Britain [Find out more](#)<sup>[3]</sup> and join the conversation #HelpGBWorkWell

[www.hse.gov.uk](http://www.hse.gov.uk) | <http://hse.gov.uk/landuseplanning>

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National Infrastructure Commission  
Consultation on the National Infrastructure Assessment

**RESPONSE FROM HEATHROW AIRPORT**

August 2016

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**Q1. The Government has given the National Infrastructure Commission objectives to:**

- i. **Foster long-term and sustainable economic growth across all regions of the UK**
- ii. **Improve the UK's international competitiveness**
- iii. **Improve the quality of life for those living in the UK.**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

1. Heathrow considers that transport connectivity is a golden thread running through the Commission's objectives. Airports in particular are key enablers of economic growth, competitiveness and quality of life. Surface access connectivity to and from airports is as important as the connectivity provided by the air transport services. Strengthening local and regional transport connectivity to major airports, such as the UK's only hub at Heathrow, can increase accessibility to international markets and destinations, bringing economic, leisure and social benefits to more people. This should be an important priority for the Commission.
2. This will become even more important should Heathrow expand with the opportunity to create a fully integrated national transport hub, helping to spread the significant benefits throughout the UK, not just the south east. The significantly enhanced domestic and international connectivity, and the massive boost to jobs and GDP across the UK will fit well with the Commission's objectives.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

3. Heathrow supports the principles set out in the National Infrastructure Assessment (NIA) consultation. In particular, we welcome the focus on taking a long-term view of the UK's infrastructure requirements and on a whole system approach. Considering infrastructure requirements holistically as an integrated system-led approach and over timescales that stretch beyond political cycles will ensure that we tackle current infrastructure deficits more efficiently and realise far greater benefits than from the current sectoral approach.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

4. We broadly endorse the approach set out in the consultation document for each sector. On transport, however, the proposed multi-modal approach should go further by also considering how the integration of key transport modes can support the movement of people and freight into and across the country. Efforts should be focused on how the UK can build a truly integrated transport network

that enhances both domestic and international connectivity. This is even more important as the UK negotiates a withdrawal from the European Union.

**4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

5. For transport, as set out above, we believe that surface access to the UK's major airports should be a key consideration for the NIA given the significant economic and sustainability opportunities. But this should go hand in hand with consideration of the scale and nature of air transport services provided by airports to ensure that enhancements are prioritised where the greatest value and benefits can be realised.
6. In considering the interdependencies and integration between transport modes, consideration should be given to how the UK can best plan for its transport infrastructure needs. At present, the long-term planning and policy-making to support the delivery of our road and rail infrastructure in particular is undertaken separately in each sector and is therefore unlikely to achieve the integrated multi-model approach we desire without some strategic intervention.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

7. We consider that there is an important interdependency between transport connectivity and land-use planning that should be considered strategically in the NIC's deliberations. Land-use planning has a key role to play in ensuring that the wider economic benefits and opportunities of new transport infrastructure provision can be delivered, e.g. in providing the right type of land-use along transport corridors and enhancing the viability of key interchanges. With no firm or consistent mechanisms for regional or sub-regional infrastructure planning in place, there is a potential gap here where the NIC's consideration of how to address this could be particularly useful in supporting the wider planning of transport infrastructure.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

8. Heathrow welcomes the NIA's focus on the cross-cutting issues outlined in the consultation document.
9. We are also supportive of the response of the National Infrastructure Planning Association (NIPA) which (consistent with our response to Q5) also calls for the NIC to promote mechanisms for joined-up infrastructure and land use planning.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

10. Heathrow broadly agrees with the cross-cutting issues identified.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

11. Heathrow agrees with this methodological approach being commonly-used and recognisable.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

12. No comment.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

13. Heathrow welcomes the infrastructure drivers that have been identified and supports the Commission's focus on these areas.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

14. No comment

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

15. No comment

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

16. Heathrow welcomes the Commission's intention to use a variety of engagement tools in order to understand the needs and issues which affect each sector and infrastructure development. It will be important to engage across all nations and regions and where necessary seek international expertise and experience in considering our own infrastructure need.

17. All parts of society should be encouraged to get involved to help determine the future requirements of the UK's national infrastructure to ensure it delivers for all.



Historic England

National Infrastructure Assessment: Consultation

## Historic England Response

Historic England is the Government's statutory adviser on all matters relating to the historic environment in England. We are a non-departmental public body established under the National Heritage Act 1983 and sponsored by the Department for Culture, Media and Sport (DCMS). We champion and protect England's historic places, providing expert advice to local planning authorities, developers, owners and communities to help ensure our historic environment is properly understood, enjoyed and cared for.

We are a statutory consultee on all nationally significant infrastructure projects and have a close working relationship with High Speed 2, Network Rail, Highways England, National Grid and those involved in the Crossrail 2 proposals. Our role in national infrastructure focuses on responding to the potential impact of new and improved infrastructure on the historic environment, whilst ensuring those elements of England's historic infrastructure are fully considered as part of any future modernisation and enhancement programme. The importance of this legacy is nationally recognised by many of the buildings and structures being afforded statutory protection, but there are other parts of the historic environment that are of considerable local interest and valued by the public.

We welcome the opportunity to respond to the following questions:

**Q 1. The Government has given the National Infrastructure Commission objectives to:**

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

**What issues do you think are particularly important to consider as the Commission works to this objective?**

Historic England recognises and supports the need for economic growth and improvements in productivity and competitiveness. The economic importance of addressing the UK's infrastructure needs is highlighted throughout the consultation document, but a more balanced approach to sustainable development is needed with recognition that infrastructure is not provided in an economic vacuum. When environmental considerations are mentioned, this is often done in terms of meeting the UK's 'carbon and environmental commitments'. Whilst welcoming the objective to improve the quality of life for those living in the UK, we would also expect the Commission to take into account all three stands of



sustainable development in preparing the National Infrastructure Assessment as set out in the National Planning Policy Framework (NPPF [Department for Communities and Local Government, 2012]). These include social and environmental considerations, as well as economic; the historic environment is, of course, an important factor in all three.

**Q 2. Do you agree that, in undertaking the NIA, the Commission should be:**

- open, transparent and consultative
- independent, objective and rigorous
- forward looking, challenging established thinking
- comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

These principles, including the whole system approach, are commendable and we very much hope they are reflected in practice. In light of our response to Q1, the work of the Commission should not simply be driven by economic and fiscal considerations, but also needs to address all three strands of sustainable development as defined in the NPPF – economic, social and environmental. It is therefore important that advice/expertise is sought from the environmental sector given the 30 year time horizon for the National Infrastructure Assessment and its possible long-term implications.

**Q 3. Do you agree that the NIA should cover these sectors in the way in which they are described?**

This appears to be a sensible approach which follows the structure set out in the National Infrastructure Delivery Plan 2016-2021 and the National Infrastructure Pipeline (Infrastructure and Projects Authority). It should be noted that much of the nation's existing infrastructure is of considerable historic interest representing key stages in our transport and engineering history. The UK was the world's first industrial nation and a number of the most significant buildings and structures have been recognised as such and are subject to designation at a national, if not international level (listed buildings, scheduled monuments or world heritage sites) , whilst many others are recognised as being of local interest.

We understood the National Infrastructure Assessment to be a high level overview of the country's needs and priorities up to 2050. The reference on page 16 to the inclusion of specific projects, such as a new bridge, increased water capacity and pilot schemes, does not appear to fit within this approach, and we would welcome clarification as to the relationship between such projects and the original purpose, aims and objectives of the Commission.

**Q 5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

There are undoubtedly interdependencies between housing and infrastructure, and these should be considered, but the interdependencies between infrastructure and other forms of

development also need to be carefully considered, and an unbalanced approach which delivers only housing development (and not the other elements of successful communities and local economies) avoided. Care will also need to be exercised to ensure that infrastructure is not being used to determine future housing supply and its location, thereby impacting on, and possibly undermining, the plan-led planning system.

**Q 6. Do you agree that the NIA should focus on these cross-cutting issues?**

Whilst recognising the importance of considering cross-cutting themes, in an earlier consultation on the National Infrastructure Commission, Historic England expressed the need for further clarity on how the work of the Commission and its ‘endorsed’ recommendations will interact with the wider planning system, National Policy Statements and the National Planning Policy Framework. The current consultation notes the National Infrastructure Assessment ‘will also consider the planning system and how this interacts with decision-making to facilitate delivery’, but the only details provided so far are contained in the previous consultation together with the Government’s response. We also understand Government guidance is to be produced that will provide information to policy and decision-makers about how to use the Commission’s output which will be welcome.

Costs and providing good value for money are clearly important considerations, but this should not over-ride the importance of ensuring that the right scheme in the right place<sup>0</sup> is proposed with high standards of design and quality being the benchmark. Much of our Victorian infrastructure was built to a very high standard and its quality is celebrated and appreciated today. We should aspire to meet similar standards if the provision of new infrastructure is to stand the test of time, contribute positively to our surroundings, and be more readily embraced by the communities it serves. There remains considerable scope for improvement in relation to the quality of infrastructure.

**Q 7. Are there any other cross-cutting issues that you think are particularly important?**

Environmental considerations are only addressed under the ‘cross-cutting issues’ in terms of meeting the UK’s ‘carbon and environmental commitments’. As well economic and fiscal matters, the Commission also needs to consider all three strands of sustainable development in preparing the National Infrastructure Assessment as set out in the NPPF. These include social and environmental considerations, as well as economic.

**Q 8. Do you agree with this methodological approach to determine the needs and priorities?**

References to the environment in paragraphs 57, 61 and 65 are noted, and we refer to our comments in Q1, Q3 and Q7 above.

It will be important for the Commission to take account of all three strands of sustainable development – economic, social and environmental – in preparing the National Infrastructure Assessment as set out in the NPPF. This will include both the protection and seeking positive improvements/enhancements to the quality of the built, natural and historic

environment, whilst recognising the inherent significance in much of the nation's historic infrastructure.

Under paragraph 67, we assume that as well as looking forward to long-term needs and priorities, the Commission will look back, to see what might be learned from past schemes to influence and improve the delivery of future proposals?

**Q 10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

The environment, together with climate change, is recognised as a key infrastructure driver and, whilst welcoming the statement on the 'need to enhance the environment', we suggest this should be widened in accordance with our previous comments and to align it with the NPPF – i.e. to protect and enhance the natural, built and historic environment.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

We refer to our comment to Q8 above.

**Q 13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

Whilst Historic England has no comment on the proposed engagement strategy, we offer the following suggestions on the expert round table and panel of experts:

- In developing the National Infrastructure Assessment it might be helpful to convene an expert round table to consider environmental matters. This could involve the relevant government departments (Department for Environment, Food and Rural Affairs and Department for Culture, Media and Sport), the statutory environmental bodies (Historic England, Natural England, Environment Agency, Forestry Commission) together with other key bodies/organisations.
- Consideration might also be given to setting up a panel of experts covering sustainability issues, to include the environment and climate change.

We also welcome the commitment by the National Infrastructure Commission to meet key stakeholders from across infrastructure sectors and related disciplines, and would be willing to be involved in this process. Historic England looks forward to working with the Commission in preparing the UK's first National Infrastructure Assessment.

[name redacted]  
[job title redacted]  
Historic England  
05 August 2016

## National Infrastructure Assessment

August 2016

### The Home Builders Federation

The HBF is the principal trade association for private sector home builders in England and Wales and our members produce about 80% of the new homes built each year.

### Principles

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

Although we note that the Commission's remit does not include housing supply directly, long-term growth across regions and quality of life are intrinsically and undeniably linked to housing quality and availability. Increasing the supply of housing will support the stated aims and whilst not an explicit objective of the Commission, in the context of the country's deeply entrenched housing crisis, the NIC's work should consider the residential development potential of the specific infrastructure projects under its consideration. Indeed, we would propose that whilst not making direct recommendations on housing supply, the provision of new homes could be a secondary objective of the Commission, serving as a possible metric for assessing possible projects. Home building is arguably unrivalled in its economic and social benefits with very little import leakage and a vast array of direct and indirect advantages in the areas of employment, social investment and improvements to the environment. It is estimated that, in addition to providing a home for a household, each new home built supports the employment of more than four people and generates a range of tax receipts for both local and central government

The planning and provision of key infrastructure can create substantial and compelling opportunities to deliver new homes, via large strategic developments, smaller infill schemes and all possible housing sites in between. In many cases this potential can only

feasibly be realised if the planning of investment is made with a view to effectively unlocking the housing potential of the scheme.

We have seen in recent years a greater focus given to housing potential by Local Enterprise Partnerships in bidding for central government funding for local and regional infrastructure projects. Where possible, given the scale of the challenge the country faces to close the gap between housing demand and supply, we believe this approach should be adopted when assessing nationally significant infrastructure requirements.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

We have no specific remarks in response to Question 2.

## **What the NIA will cover: Sectors**

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

The sectors identified in the consultation document are a sensible and appropriate set of economic infrastructure priorities, most of which directly read across to the potential for increasing housing supply.

On **transport**, HBF would encourage the Commission to give strong consideration to the potential for unlocking housing supply whilst addressing transport need.

In the area of **digital and communications**, we believe that there is scope for the Commission to take into account future housing plans when developing an assessment of infrastructure requirements in this category.

The Commission's work on **water and drainage** and on **flood defences** will be important for developers. Protecting and bolstering flood defences may create new development opportunities for house builders to help meet housing demand. House builders have for many years provided Sustainable Drainage Systems (SuDS) on housing schemes and are estimated to have provided in excess of a billion pounds to water companies since the

current charging regime was established in the early 1990s. The industry has significant doubts about the way in which this has been invested. In the wider context, doubts about future availability of water and of drainage capacity has led to some groups lobbying government to remove developers' right to connect to existing infrastructure. This would undoubtedly compromise housing supply and fails to take into account the vast investment made by developers in what was intended to help secure additional capacity in the future.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

As outlined above, we believe that the implications for housing providers – and the opportunities that infrastructure enhancements could bring to our efforts to tackle the housing crisis – should be considered across the Commission's work and assessments of these sectors.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

We have no specific comments.

## Cross-cutting issues

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

Yes. There should be a strong emphasis on local growth. Infrastructure has the capability to shape future growth and transform local housing and employment markets, providing the Commission with the tools necessary to deliver on its objectives of improving quality of life across the UK.

Likewise, exploration of innovative funding models should give consideration to opportunities for new housing delivery at scale.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

As above.

[name redacted]  
[job title redacted]

1. **The Government has given the National Infrastructure Commission objectives to:**
  - a. **Foster long-term and sustainable economic growth across all regions of the UK**
  - b. **Improve the UK's international competitiveness**
  - c. **Improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

Homes for the North believe that it is important that the NIC considers the role of housing in working towards each of these objectives. We believe that the infrastructure needs of the country, particularly in areas such as the North, cannot be dealt with in isolation.

This is particularly the case when it comes to fostering long-term and sustainable economic growth. We believe that employment and housing are the two primary drivers of sustainable economic growth, and we believe it is imperative that the NIC considers these issues in tandem. For example, by improving the housing offer across a range of income and family types available in the North, we would be able to attract new and returning residents to the area. Additionally, any sustainable economic growth, driven by infrastructure investment and initiatives to encourage private sector investment, needs to be underpinned by a suitably matched housing and community offer.

We would also make the point that the UK's international competitiveness depends upon a balanced, productive and stable economy. We recognise that some areas of the country have made significant strides in improving their competitiveness, and would encourage that this objective is looked on both an international, and a national, basis.

We thoroughly welcome the objective to improve the quality of life for those living in the UK. Again, we think housing has an important role to play in this. We would encourage the importance of high quality homes that match the needs of the local area, both in present and in future.

2. **Do you agree that, in undertaking the NIA, the Commission should be:**
  - a. **Open, transparent and consultative**
  - b. **Independent, objective and rigorous**
  - c. **Forward-looking, challenging established thinking**
  - d. **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

Nothing further to add.

3. **Do you agree that the NIA should cover these sectors in the way in which they are each described? [P17-18] (Transport, digital and communications, Energy, Water and Drainage, Floor Defences, Waste)**

We recognise that the government have decided that the Commission's remit will not include housing supply directly, and whilst we would support housing being added as a distinct sector to be considered, we note that the Commission will be considering housing within its infrastructure recommendations.

We believe that there is a significant bi-directional relationship between infrastructure and housing development. Housing developments and communities work when they are underpinned by the appropriate infrastructure, and vice versa. We would advocate for housing to be considered alongside every infrastructure recommendation. This will be important not only to house the workers as the infrastructure is developed, but also to ensure any infrastructure investment is fully utilised.

This is particularly the case in transport infrastructure. For example, road and rail extensions and capacity upgrades can, and should, improve access to underserved sites for housing developments. We believe there should be a strong public transport offer that links new and existing communities to current and emerging economic opportunities. Homes for the North have previously been strong advocates for housing zones to go alongside enterprise zones to ensure both aspects are delivered.

We also strongly believe that infrastructure investment can act as an enabler to future housing developments, and would help to increase the number of sites that are viable for housing and community development. This would significantly help to ensure that we achieve the government's 1 million new homes by 2020 target.

**4. Are there any particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

As noted before, we believe that housing and transport investment are key and two sides of the same coin. From a Northern perspective, we believe that improved internal regional transport links would ensure that existing, and future, communities are able to easily access all the available employment opportunities. We welcome the national focus on intra-regional transport links has received, such as HS2, however it is important that communities around HS2 stations are just as easily able to move about their local region.

We would also welcome a focus on historical differentials in per capita infrastructure spend. This has meant that some areas in the North have consistently been under-invested with regards to infrastructure. We believe that the NIC should consider the steps that can be taken to redress this historical imbalances. We are aware that the government has made efforts recently to redress this, but believe that this needs to go further.

We also believe that housing needs and opportunities should be fully integrated as part of the infrastructure assessments and subsequent planning processes. For example, we would welcome new housing plans to be considered in the context of flooding, transport and other sectors.

**5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

We echo our previous point on how housing issues need to underpin infrastructure needs assessment. This is both in order to house the workers developing infrastructure but also to ensure future viability of communities and regeneration schemes.

**6. Do you think that the NIA should focus on the following cross-cutting issues:**

**a. Geography and local growth**

Yes



**b. Funding and financing**

Yes

**c. Cost, delivery and resilience**

Yes

**d. Sustainability**

Yes. We believe that the need for environmental sustainability is key here. We believe that the NIC should consider the possibility of a Brownfield Remediation Fund in the North. This because currently many sites are unviable to develop on, given the high costs of remediation of brownfield land. We believe that tackling this would help to increase development.

**e. Governance and decision-making**

Yes. However, we believe that the NIA's recommendations should not be prescriptive and that the governance and decision-making issues should be considered in the context of the devolution and localism agendas and the role that they can play in developing the NIC's work.

**f. Evaluation and appraisal methodology**

Yes

**g. Performance measures**

Yes. We would encourage performance measures that are outcome, rather than output, based.

**Are there any other cross-cutting issues that you think are particularly important?**

We believe that there is scope for social mobility, both in terms of drivers and opportunities, to be considered alongside other elements.

**7. Do you agree with the methodological approach (set out on p23-24) to determine the needs and priorities?**

N/A

**8. Do you have examples of successful models which are particularly good at looking at long-term complex strategic prioritisation in uncertain environments?**

N/A

**9. Do you believe the Commission has identified the most important infrastructure drivers, set out below:**

**a. Population and geography**

Yes

**b. Economic growth and productivity**

Yes. We would argue that there needs to be a consideration of infrastructure investment up to this point too and that recommendations be made with consideration of historical imbalances.

**c. Technology**

Yes

**d. Climate Change and environment**

Yes

**Are there any other drivers which should be considered?**

We would welcome focus on employment and demographic patterns and projections to future-proof infrastructure needs of different areas.

We also believe it is important to consider the role that devolution and governance structures will have in driving infrastructure development. It is important to ensure that there are the political power, ability, willingness and resources needed to drive infrastructure investment. It would welcome for the

NIC to consider the extent to which these structures and resources are currently available throughout the UK, but particularly in a Northern context.

**10. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future? Do you have a view on the most appropriate methodology to determine that portfolio? [p26]**

We would welcome methodological efforts to ensure that there is a balanced approach in the infrastructure investments portfolio, and that it is not dominated by investments in London and the South East.

**11. In your view, are there relevant factors that have not been addressed by the Commission in its methodological approach?**

No, other than comments made above.

**12. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions? [p29-30]**

We believe that it is important that the Commission engages with a diverse group of individuals, networks and representatives in meaningful communication. We would support focus groups, round table debates and surveys. It would also be welcome for the NIC's work to link in with other major reviews, e.g. those conducted by the Northern Housing Consortium and the Housing in the North Commission to ensure that appropriate links are made and that there is no duplication of efforts.



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29 July 2016

Dear Sir

**The National Infrastructure Assessment Process and Methodology; a Consultation**

Hutchison Ports (UK) Limited ('HPUK') is the owner and operator of the Port of Felixstowe, Harwich International Port and London Thamesport. It is part of the Hutchison Port Holdings (HPH) group, a subsidiary of the multinational conglomerate CK Hutchison Holdings Limited.

HPH is the world's leading port investor, developer and operator. The HPH network of port operations comprises of 48 ports in 25 countries throughout Asia, the Middle East, Africa, Europe, the Americas and Australasia.

The Port of Felixstowe is the largest container port in the UK. In 2015 the port handled over 4 million TEU of container traffic, more than 40% of all containers handled in UK ports. The port also has the country's largest intermodal rail freight terminal. Harwich International Port is a leading ferry, passenger and offshore-wind support port. London Thamesport handles containers, roll-on/roll-off traffic, general and project cargoes and is situated on the Isle of Grain in Kent.

HPUK welcomed the formation of the National Infrastructure Commission and the commitment to develop a long term strategic vision for the provision of essential economic infrastructure in the UK. We are grateful for the opportunity to contribute to this consultation on a possible approach to developing the National Infrastructure Assessment.

HPUK recognises the need to consider all aspects of economic infrastructure but as one of the UK's leading port operators, and the largest employer in the sector, our comments refer principally to the provision of transport infrastructure.

Our responses to the questions raised in the consultation are below. We have only responded to questions that cover our area of expertise:

*Q1. The Government has given the National Infrastructure Commission objectives to:*

- *foster long-term and sustainable economic growth across all regions of the UK*

- *improve the UK's international competitiveness*
- *improve the quality of life for those living in the UK*

*What issues do you think are particularly important to consider as the Commission works to this objective?*

A1. We believe that the vision for 2050 as set out in the NIA should be of a strong, flexible and competitive UK functioning as part of a fully global economy. In this respect, investment in infrastructure connections to international gateways will be a key requirement to improve international competitiveness and drive economic growth. The Eddington Study demonstrated that investment in connections to international gateways represented some of the best economic returns and value for money of all transport investment and we believe this conclusion remains valid.

The changing nature of container shipping, and particularly the increasing use of very large container ships, means that the UK ports of call for these vessels will continue to be in the South and East of the country. The deviation from the main routes into Rotterdam/Antwerp is too great for them to justify calls in other UK regions. Ports outside the South and East will continue to service local bulk traffic, Roll-on/Roll-off markets and some niche container trades but not the high-volume inter-continental container trades.

For example, the main route for trade between the Northern Powerhouse and Asia is through the Port of Felixstowe. Infrastructure links between the Port of Felixstowe and the UK regions must be a priority for investment to support regional economic growth throughout the UK.

Q2. *Do you agree that, in undertaking the NIA, the Commission should be:*

- *Open, transparent and consultative*
- *Independent, objective and rigorous*
- *Forward looking, challenging established thinking*
- *Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?*

*Are there any principles that should inform the way that the Commission produces the NIA that are missing?*

A2. We agree that the NIA should be open, transparent, independent, objective and rigorous. It should provide a means to support transport investments that provide the best returns. Whilst we agree with the point in Q1 that it should help foster growth across all regions, projects should be assessed objectively on transport criteria and value for money and not used as a tool of regional policy. Projects should be prioritised in order of the returns they generate, not on geographical location.

Q3. *Do you agree that the NIA should cover these sectors (transport, digital, energy, water/drainage, flood defences and waste) in the way in which they are each described?*

A3. Broadly yes but with the caveat that investment in the UK ports sector is mostly privately-driven and almost always based on commercial criteria. This has resulted

in well-targeted investment that has successfully met the needs of UK importers and exporters. There may be advantages through using the planning system to discourage port development in already congested, built-up, areas but moving away from a commercial approach to port development through Government intervention or grants risks undermining sound, privately-financed, port investments.

Grants or subsidies are not necessary to fund port infrastructure for which there is a commercial demand. Where they are used, either by central government or devolved/local authorities, to support development that cannot attract commercial funding, they distort competition and undermine otherwise sound investments in other locations.

*Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?*

A4. As referred to above, we believe infrastructure connection to international gateways should feature highly amongst the NIAs priorities. Traditionally, major transport arteries in the UK have run on North-South axes. With the country's major ports now on the East coast, more attention needs to be given to adequacy of East-West links.

*Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?*

A5. As well as being the UK's largest container port, the Port of Felixstowe is also the country's largest intermodal rail freight facility. Fifty percent of traffic to the West Midlands and North is transported by rail and rail volumes at Felixstowe have doubled since 2003 as a result of significant investment at the port. The national rail network is capacity constrained and the interdependency between the port and rail freight sectors, and the need to match capacity, will be increasingly important in future.

*Q6. Do you agree that the NIA should focus on these cross-cutting issues?*

A6. Strategic national road and rail networks are fundamental to the performance of the UK economy. We agree that the connection between economic infrastructure and regional economic performance needs to be understood as should the potential impact of regional devolution on the provision of cohesive and efficient national networks.

*Q10. Do you believe the Commission has identified the most important infrastructure drivers (population/demography, economic growth/productivity, technology, environment)? Are there further areas the Commission should seek to examine within each of these drivers?*

A10. We believe the main infrastructure drivers are appropriate but this section of the consultation document appears to be focussed on the movement of people and not freight. The impact of population, economic growth and technology on the movement of freight should be expressly recognised in the NIA.



For example, and as already referred to above, the advent of mega container ships will result in further concentration of traffic through a small handful of ports in the South and East and the provision of transport infrastructure to support international trade should recognise this development.

Large container ships themselves deliver environmental benefits and concentration of traffic in a limited number of ports enables sustainable onward distribution by rail and feeder ship which can only be achieved viably if there is sufficient scale of operation.

We hope the above comments are helpful in developing the NIA. We would be happy to expand upon any of them or to take part in any roundtables or expert panels where that might be helpful.

Yours faithfully

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke extending to the right.

 <name redacted>  
 <job title redacted>

## **Response to the NIC consultation on the National Infrastructure Assessment iBUILD Infrastructure Research Centre, August 2016**

The iBUILD (Infrastructure BUbusiness models, valuation and Innovation for Local Delivery) Infrastructure Research Centre brings together a multi-disciplinary team from Newcastle, Birmingham and Leeds Universities to improve the delivery of local and urban infrastructure.<sup>1</sup> iBUILD is developing and demonstrating alternative infrastructure business models that: take a whole life cycle view of infrastructure systems; exploit technical and market opportunities from modern interconnected infrastructure; leverage economic, social, environmental, aesthetic and other values from infrastructure; identify changes in national and local governance, regulation and policy to unlock improvements; and, use innovative financing and funding mechanisms.

### **Q1. What issues do you think are particularly important to consider as the Commission works to this objective?**

iBUILD promotes a service and system-wide approach to local and urban infrastructure, recognising that there are significant advantages to be gained from planning, investing, delivering, and managing infrastructure and its services on an interdependent basis. Furthermore, that the cumulative benefits of many small scale infrastructure investments, which individually may not show on the radar of national scale investments, can provide far greater returns than a single large project investment.

The National Infrastructure Commission (NIC) and National Infrastructure Assessment (NIA) should consider the distinct role of local and urban infrastructure in driving local, regional and national economies. It is at the local and urban scales where infrastructure services and systems are most dense and where the majority of people use infrastructure services in their everyday lives. Balancing growth across different geographical scales – from the local to the city/city-region – is vital to the long-term success of the national economy, as infrastructure drives local economic growth and job creation, as a consequence of construction and management activities, as well as the enhancement and facilitation of other economic activities. Therefore, whilst iBUILD welcomes the fact that the NIC has stated that one of its primary objectives will be to produce an in-depth assessment of the UK's infrastructure needs over a 30-year time horizon with the aim of “fostering and sustaining long-term economic growth across all the regions of the UK” we encourage the NIA to consider local infrastructure within their assessment. Failure to consider the role of infrastructure at all scales may lead to inefficient investments, that consider only particular types of infrastructure interventions.

### **Q2. Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

One of the stated aims of the NIC is to assess and plan strategically for the long-term, and to produce analyses that reflect what infrastructure the UK needs in economic, social and environmental terms. The merit in producing a NIA is that the NIC will be able to co-ordinate and

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<sup>1</sup> [www.ibuild.ac.uk](http://www.ibuild.ac.uk)

draw together a wide range of expertise and opinion in order to produce strategic and long-term vision and series of recommendations that go beyond short-term political timeframes, and reflect the long-term nature of infrastructure planning, delivery and operation. In preparing the NIA it will be important that the NIC consults widely in the open, transparent manner, as it indicates. Additional to the identified principles we recommend the NIC apply a 'multi-scale' principle throughout its analysis and consider infrastructure from the local to the national, and draw input from regional and local actors as well as national agencies.

Central to iBUILD is a systems view of infrastructure and we therefore welcome the NIA's intended approach to apply systems principles. Infrastructure must be considered, and defined, in terms of a 'whole system' that comprises (Figure 1):

- *physical artefacts* – includes the physical links, nodes and components of infrastructure systems such as roads, bridges, pipes and cables;
- *processes* – includes actors, institutions, management, regulation, protocols and procedures that govern the infrastructure over its lifecycle;
- *resources* – includes people, vehicles, water, electricity and data that are conveyed by the physical artefacts and the materials used in the construction of the artefacts; and,
- *services* – such as warmth, mobility, sanitation, transportation, welfare services and communication that benefit a wide range of users.

A key lesson from iBUILD is that whilst physical components and services are important so are the processes, people and mechanisms for creating, delivering and capturing value. Failure to take this broader view reduces the potential for innovation, and immediately constrains the range of intervention options available.

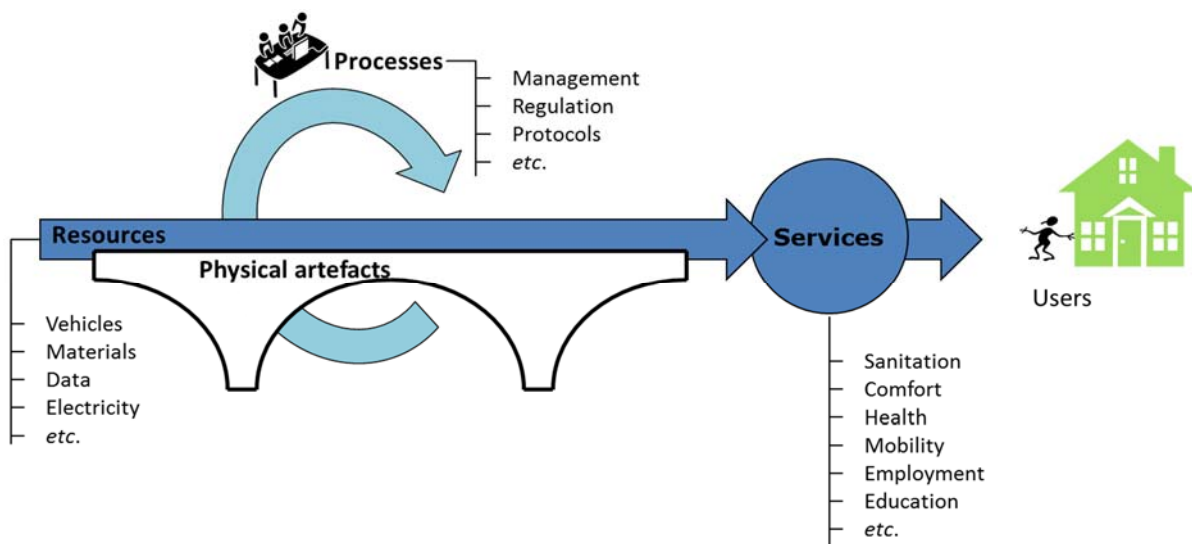


Figure 1. A systems view of infrastructure.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

The sectors identified for consideration in the NIA are fairly standard, and the outline coverage within each sector seems a reasonable starting point. Although we recommend the NIA is



designed in a way that is not constrained by the brief paragraph in this consultation document. Some specific examples are identified below.

An issue relevant to digital infrastructure is its role in underpinning almost all other modern infrastructure systems – yet its significance is not always obvious. Recent flood events in Yorkshire highlighted our reliance on card payments when the local ICT systems failed. Another issue relates to autonomous users of infrastructure (e.g. vehicles) and the implications this has for even stronger cross sector interactions.

In the context of ‘flood defences’ and ‘water and drainage’ it is important to not overlook coastal erosion and urban flood management infrastructure. This includes blue-green infrastructure which is becoming an increasingly important consideration within cities. ‘Natural Flood Management’ infrastructure is becoming increasingly important for catchment scale systems thinking. More generally, these and other softer infrastructure interventions must be considered as they form part of the infrastructure system.

While the NIC indicates that the government has not asked the commission to consider issues surrounding housing, given the huge societal challenge of housing supply and demand, and the linkages between housing and economic infrastructure, it is inevitable that the NIC will be drawn into the housing agenda. The outline role of the NIC in relation to housing, as set out in the consultation document, appears a pragmatic approach in light of this, but as we note in our response to Q14 this may miss crucial opportunities.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

We would not encourage an early focus at this preliminary stage in the NIA, rather use the systems approach to identify key aspects at local, regional and national scales and use that as a basis to prioritise further effort.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

In the context of resilience to climate change a number of key interdependencies were identified in the latest Climate change Risk Assessment Infrastructure Chapter<sup>2</sup> so these are not repeated here.

iBUILD research has highlighted that buildings, and spatial planning more generally, plays a critical role in modulating the demands placed upon energy, water and communications infrastructure. Reducing demand for these services through ‘hidden infrastructure’ such as investment in efficiency measures and demand management strategies reduces consumer bills, frees up capacity to support growth and regeneration, and defers the need for expensive capital investment in new

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<sup>2</sup> <https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/ccra-chapters/infrastructure/>

infrastructure (e.g. for new power stations and water treatment works). The National Infrastructure Plan, for example, sets out a pipeline of £65 billion investment in energy generation and £45 billion investment in energy networks over the coming years. Yet, investing a third of this in energy efficiency measures over the next four decades could free up 12% headroom in generation capacity.<sup>3</sup> These measures are critical to generating long-term and sustainable economic, social and environmental value and must be co-ordinated more effectively.<sup>4</sup>

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

The breadth of cross-cutting issues to be considered is most welcome.

Although they may be bulked together only for brevity, we recommend that resilience is considered as an issue in its own right, rather than only together with cost and delivery.

The NIC should give due consideration to the cost of infrastructure renewal and maintenance. However, we would urge the NIC to move beyond ‘cost’ and consider the short and long-term costs of infrastructure – in financial, economic, social and environmental terms. What might appear as short-term cost savings might in fact generate longer-term financial burdens for taxpayers and users as cheaper but less resilient options are chosen, which end up failing later in the life cycle and costing more to either renew or replace. It is important that the government provides additional flexibility in the fiscal remit given to the NIC to reflect the urgent need to renew existing infrastructure and invest in particular assets and systems – in different places – to help stimulate growth and generate long-term prosperity, particularly in a time of economic and political uncertainty but historic low interest rates for borrowing. This would chime with the objective stated in the consultation document for the NIA to challenge established thinking. The fiscal remit should also reflect the move towards new forms of fiscal decentralisation being afforded to UK nations, regions and cities. The UK government will play a leading role in funding and financing infrastructure, but other spatial levels of government can also play a part in raising capital investment for regional and local infrastructure.

We are encouraged that the NIC will consider the appropriateness of evaluation and appraisal methodologies. Investment in infrastructure provides wider health, economic and environmental benefits for society; infrastructure converts financial value to social value. iBUILD research has found the typically used cost-benefit and multi-criteria analyses are inadequate to capture the long-term, whole-life benefits. Infrastructure must also be built for minimum whole-life costs. This might mean paying a bit more upfront for something that will last – and serve – for longer without the need for frequent maintenance and with lower environmental impact; a resilient and sustainable infrastructure. iBUILD research has been developing a number of advances in this field, although we recognise that there is more to be done.

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<sup>3</sup> Gouldson A, Kerr N, Millward-Hopkins J, Freeman MC, Topi C & Sullivan R (2015) Innovative Financing Models for Low Carbon Transitions: Exploring the case for revolving funds for domestic energy efficiency programmes. *Energy Policy*, 86: 739–748

<sup>4</sup> Gouldson A, Colenbrander S, McAnulla F, Sudmant A, Kerr N, Sakai P, Hall S, Papargyropoulou E & Kuylenstierna JCI (2014) *The Economic Case for Low Carbon Cities*. New Climate Economy and Stockholm Environment Institute, Stockholm. Available at: <http://newclimateeconomy.report>.

As our physical infrastructures rely increasingly on ICT, the role of software reliability and cyber-security (i.e. more than just broadband and wires) needs to be considered as a cross-cutting issue. This is important in issues of safety (e.g. autonomous vehicles), security (e.g. hacking and malicious attack), cascading failure (e.g. interdependencies caused by digital connectivity or poor software design), economic growth (e.g. ability to make payments and increased reliance on cards and non-cash based transactions), and efficiency (e.g. smart electricity systems) to list some.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

Two cross-cutting issues that are not clearly recognised are ‘acceptability’ and ‘equity’. If infrastructure is not considered acceptable then it is harder to build it. Inequitable access to infrastructure services can amplify existing social and economic deprivation which would confound other government objectives. A consideration in both these issues is the wider business model, not just the extent to which the service charge falls on the user, but issues of governance, ownership, local benefits from inconvenience etc.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

The steps in this process look sensible. Perhaps a missing step – at least certainly not clearly distinguished – is the identification of performance metrics. These relate to the cross-cutting issues previously identified, but there is some work to do in order to identify appropriate measures to assess baseline performance and how that might change in the future. Work undertaken by the iBUILD and ICIF Centres for Infrastructure UK<sup>5</sup> has developed some recommendations and case studies on how to achieve this, and can be provided on request.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

We recognise the challenge facing the NIC in leading the development of a new national infrastructure assessment over a 30-year timeframe. The commission may need to procure specific research to inform the NIA, but equally there is a wealth of data that the NIC could draw upon now. It is incumbent upon those conducting research in this field and developing and implementing policy in infrastructure to make available analyses and findings to support the production of the assessment. Gaining endorsement for the scenarios produced during the course of the NIA will be critical to attracting overall support for the national assessment. Early-stage thinking, development and publication, of the framework for producing the potential scenarios would be useful and provide transparency and enable researchers to align their work as early as possible to the NIA process.

At the national scale there are few models that exist – for example NaFRA<sup>6</sup> provide a national scale flood risk assessment. The ITRC<sup>7</sup> has developed a systems model of national-scale infrastructure interdependencies. Other models of national infrastructure exist but there are

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<sup>5</sup> iBUILD and ICIF (2016) A Process for the Formation of Outcome-Orientated Infrastructure Performance Indicators.

<sup>6</sup> [http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/static/documents/Research/ENV0005\\_Flooding\\_in\\_Wales\\_ENGLISH\\_AW\\_LR\(1\).pdf](http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/static/documents/Research/ENV0005_Flooding_in_Wales_ENGLISH_AW_LR(1).pdf)

<sup>7</sup> [www.itrc.org.uk](http://www.itrc.org.uk)

some significant gaps - for example there is no comprehensive ICT model. As recognised by the Commission it is also highly unlikely any model is likely to provide everything they need so careful thought will be required to consider how model findings are integrated into a common framework. These models may not all operate at a national scale, which can help inform local and regional issues – and with appropriate extrapolating assumptions be used to inform some national considerations as well. Two examples include the Tyndall Centre Urban Integrated Assessment Framework<sup>89</sup> that has been applied to London, and the Tyndall Centre Coastal Simulator<sup>10</sup> – both were originally developed with climate and socio-economic changes at the heart but have evolved to consider a wider set of issues.

The recently published Climate Change Risk Assessment Infrastructure Chapter<sup>2</sup> provides an up to date summary of key infrastructure risks as a result of climate change which should be of use. It is also worth noting that the approach taken in the CCRA, which combined a small amount of new modelling with a breadth of existing literature and analysis, may provide a useful experience for the NIC to draw upon.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

The key infrastructure drivers identified in the consultation document and which will form the basis of the new national assessment appear sensible. We would recommend that the NIC considers the relationships between each of the drivers in framing the context in which various options and recommendations will be brought forward.

The Commission has noted the need to consider regions and cities, but as our infrastructure becomes increasingly interconnected globally (e.g. telecoms, electricity interconnectors, shipping) we recommend consideration of relevant international factors.

The land use and resource use implications of many drivers (e.g. technology, industrial and population footprints) must be considered within the analysis of these drivers.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

If the NIC is able to consider all the sectors and cross-cutting issues it identifies then it will be faced with a multi-dimensional decision-making problem that is dynamic in time and spatially variable across the country. Furthermore, we caution against the Commission making judgement about

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<sup>8</sup> Caparros-Midwood D, Barr S, Dawson RJ (2015) Optimized Spatial Planning to meet Urban Sustainability Objectives, *Computers, Environment & Urban Simulation*, 54:154-164. and Caparros-Midwood D, Dawson RJ, Barr S, (in review) Spatial Optimization of Future Urban Development with regards to Climate Risk and Sustainability Objectives, *Risk Analysis*.

<sup>9</sup> Walsh, C.L., Dawson, R.J., Hall, J.W., Barr, S.L., Batty, M., Bristow, A.L., Carney, S., Dagoumas, A., Ford, A., Tight, M.R., Watters, H. and Zanni A.M. (2011), Assessment of climate change mitigation and adaptation in cities, *Proc. ICE: Urban Design and Planning, Special issue on Urban Development and Sustainability*, 164(DP2): 75-84.

<sup>10</sup> Nicholls RJ, Dawson RJ, Day S (2015) *Broad Scale Coastal Simulation: New Techniques to Understand and Manage Shorelines in the Third Millennium*, Springer. ISBN 978-94-007-5257-3.

the relative importance of different issues – rather the NIC should identify a range of portfolios that and their implications and tradeoffs e.g. resilience over cost; equitable local growth over national GDP etc. The decision about the importance of each priority has to be made and clearly stated by elected officials, who are directly accountable to the general public.

There are a number of tools<sup>8</sup> available to support the analysis and development of different portfolios and we recommend the NIC explore the use of these to identify a range of different options. Communicating these rich portfolios to both elected officials and the wider public will still be a challenge, but visions and scenarios are one way of distilling and presenting this complexity to a wide audience<sup>11</sup>.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

In terms of undertaking a first NIA we have no further factors to add beyond those identified above. However, one key stage that is missing – and we consider to be good practise - is to ensure a post-NIA review and reflection to quickly learn lessons for future analyses.

We recommend the NIC work with UKRI, professional institutions, government departments, infrastructure owners and operators, academia etc. to set in motion two longer term capacity building initiatives:

1. Inadequate access or availability to data was identified as a key uncertainty in the Infrastructure Section of the Climate Change Risk Assessment which considered only a proportion of the issues the NIC will be taking into account. Different organisations and sectors record different information, and in different ways. In some instances even basic information on its location or capacity is not available making assessment of national needs challenging. Initiating a programme of data collection, management and standards; coupled with a research and demonstration programmes to showcase the potential of New technologies to monitor and understand our infrastructure would provide significant opportunities for future NIA.
2. Although the NIC will need to draw on existing research for this first NIA, research typically takes a number of years to filter through to practise. There is an opportunity for the NIC to act as an intelligent research client to set out the case, and inform the priorities, for the development of a national capability in infrastructure analysis. This must be set in motion soon in order to bring together industry and academia and draw from the many disciplinary perspectives in order to provide the necessary research to underpin future and improved NIAs.

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<sup>11</sup> <http://www.newcastlecityfutures.org/>

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

In our response to the consultation on the remit and operation of the NIC we provided remarks on how the management and consultation of the NIA should be take place. In summary, consultation on the NIA should be open, transparent and subject to public and wider stakeholder input. We support the Commission’s commitment to this as it should not be used as a mechanism for avoiding citizen input into the planning system: this is a vitally important democratic principle. Consultations undertaken by the NIC, including those relating to the national assessment, will need to be carefully-managed to be consistent with, and add value to, these principles. Only by understanding the purpose and desired outcomes from infrastructure can we develop creative approaches to deliver them.<sup>12</sup>

A consultation exercise centred around long reports is unlikely to engage in meaningfully across society. The NIC must consider a wide range of mechanisms across traditional and new media. We also recommend the Commision consider exploring the potential of deploying innovative approaches to citizen participation, for example, the Digital Civics<sup>13</sup> approach. iBUILD research has shown how community participation in infrastructure delivery and the opportunities it can provide in terms of providing social, environmental and economic value<sup>14</sup>.

In terms of timing, it is right that the NIC starts to develop the NIA as soon as possible. Since the consultation was launched the UK has decided to leave the European Union. Large parts of UK, devolved and local government are becoming immersed in planning for Brexit. However, the work of the NIC and NIA has, in fact, taken on added significance since 23 June. It is important that HM Treasury conveys this message to the rest of Whitehall and ensures the work of the NIC in preparing the national assessment does not become delayed or distracted by other events or by a lack of capacity and resources.

In terms of engagement it will be important that the NIC works with the UK’s devolved administrations and the emergent decentralised cities, city-regions, LEPs etc.

There is also an opportunity for the Commission to use its analysis directly to contribute towards the UK’s reporting to the Millennium Development Goals – in particular on “GOAL 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation” and “GOAL 11: Make cities and human settlements inclusive, safe, resilient and sustainable”.

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<sup>12</sup> Institute for Social Renewal (2016) *The Devolution Revolution: Empowering local communities to drive change*, Newcastle University. [www.ncl.ac.uk/media/wwwnclacuk/socialrenewal/files/NUISR%20Devolution%20Revolution%20final.pdf](http://www.ncl.ac.uk/media/wwwnclacuk/socialrenewal/files/NUISR%20Devolution%20Revolution%20final.pdf)

<sup>13</sup> <http://digitalcivics.org.uk/>

<sup>14</sup> For example: The provision of high quality broadband to properties in the rural areas of the UK is an ongoing challenge as it is not considered economically viable using mainstream methods. B4RN have built a community-owned gigabit fibre optic broadband network in the sparsely populated, rural uplands of Lancashire in the north west of England. Attempts to use existing infrastructure networks to carry the fibre were hampered by existing regulation that discourages such sharing. Costs were reduced: by laying optical fibre cables across land owned by members of the co-operative (as opposed to alongside roads); by members carrying out much of the installation work themselves; and, by members investing in the scheme receiving tax relief through the Government’s Enterprise Investment Scheme. To date nearly 500 km of duct has been installed, nearly 1000 properties have been connected at a rate of between 50 and 100 properties per month. The scheme has expanded into North Yorkshire with connections in Cumbria being imminent.

Although this final point relates to governance, we believe that an important part of societal engagement will be for the government to respond quickly and decisively to recommendations made by the NIC. This will ensure people and organisations recognise the value of engaging with the NIC.

We thank the Commission for this opportunity to feed into the NIA and look forward to making further contributions to its development and the NIC's programme more generally.

**For further information about the iBUILD Research Centre, or to request copies of any iBUILD outputs referenced here, please contact:**

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# Prosperity without (net) Infrastructure Growth

Response to the National Infrastructure Assessment Consultation, May-5 August 2016

[name redacted], Greenhouse Think Tank, 2016. [email address redacted]

## Executive Summary – considering purpose of the NIA and scale/focus of infrastructure investment required

This section comments on the stated purpose of the NIA as it affects the context for all of the questions raised in the consultation. This considers both the purpose of the NIA and the role that infrastructure investment might play if that purpose is to leverage transition to a sustainable future.

The overall aim should be to assess how best infrastructure can contribute to bridge the gap between current lifestyles and a sustainable future locally across the UK, supported nationally.

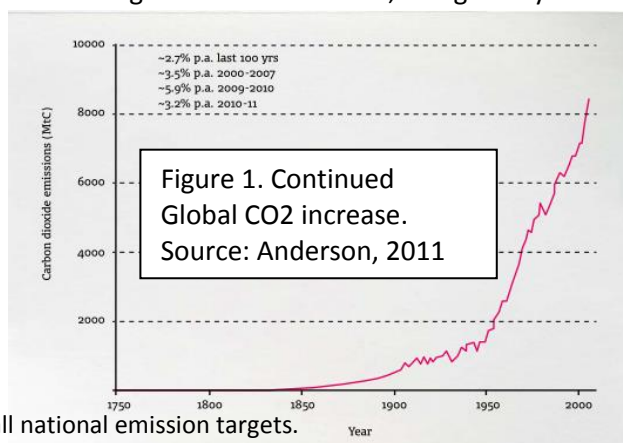
This means this NIA must not identify what ‘new infrastructure gap’ can create growth, which is most likely to continue the UK and world on a pathway to runaway climate change but a different sort of assessment. Instead, this must enable us to plan and invest in the localising transition to sustainable communities and sub-regional economies across the UK – rapid, inspiring and replicable worldwide. Tim Jackson wrote about how it is possible to create prosperity without growth (2009). The challenge of the National Infrastructure Investment is to set out how we can bridge the gap from our current lifestyles, to such an economy and way of living. Thus, the NIA will enable the UK government to plan and invest to mainstream the transition of sustainable solutions to the critical mass where new infrastructure constraints, create a new normal where we live for the common good, and flourish without our climate and other planetary limits.

So, rather than addressing the notion of a ‘new infrastructure gap’ linked to economic growth, the NIA must inform the infrastructure revolution, for the physical economy to be one that is circular, local, renewable and enables our society’s to flourish in balance with our environment. This will utilise all the technologies available to us, and shift our ways of living to make a sustainable future possible.

### **1. Clarifying the Purpose of Infrastructure – to secure a sustainable future**

This response considers the objective of a National Infrastructure Assessment in the context of two significant challenges that are increasing rather than being addressed in the UK, and globally:

- **Firstly, climate change.** The UK has committed to reduce its CO2 emissions in the UK by 80% by 2050 but actual CO2 emissions including contributions due to international shipping and aviation<sup>1</sup> and net embodied carbon of our imports continue to increase, while emissions globally are also increasing.

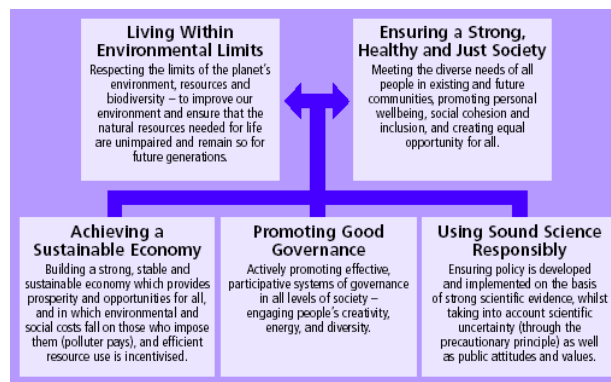


<sup>1</sup> These are still excluded not just from the UK but all national emission targets.



- **Secondly, inequality.** Inequality of income and wealth is rising both within the UK, between the UK and other countries, and overall globally.

These two targets are reflected in the overall twin aims of the UK's sustainability strategy, securing our future: to live within environmental limits, and to deliver quality of life for all.



**Figure 1: Drivers for UK Sustainability: UK Sustainable Development Strategy, Securing the Future**

This consultation did not question the purpose of the National Infrastructure Assessment. This should see economic prosperity not as the outcome, but one way to ensure longer-term sustainability as set out in the figure above. In contrast to the aims set out in paragraph 6 of the consultation (fostering long-term and sustainable economic growth, improving international competitiveness and quality of life for those in the UK) and for this then to ensure consistency with UK carbon and environmental commitments – it should be equality (i.e. a *decent* quality of life *for all* – *both in the UK and overseas*) and improving environmental sustainability as aims.

The foreword in the document suggests that a 'holistic analysis' is required. This should consider not just the relationship of infrastructure to economic growth, and the objectives set out here – but to wider, overall social and environmental objectives.

Currently we are becoming a less sustainable country, both socially and environmentally. The way we chose to invest in infrastructure, how this is prioritised between infrastructure sectors, and with other investment and finance across the UK's economy must lead a transformation to a more equality society where all share in a better quality of life and wellbeing, and this to be delivered in ways that restore rather than continue to degrade our UK environment and bring us back within, rather than continue to exceed global environmental limits.

## **What sort of infrastructure investment will transition the UK to sustainability?**

It is not clear what this national infrastructure assessment aims to deliver. If it is to be that which delivers a transformation towards a (socially and environmentally) sustainable economy, that is flourishing within limits, then it is probably decentralised infrastructure, secondary infrastructure, a transformation/retrofit/flexible reworking of what we have already. It is likely to be local, community or sub-regional in scale as that is the scale at which more economic activity must occur

for a sustainable future. It is likely to be composed of natural as well as physical infrastructure. It is likely to focus on the *quality* of infrastructure (its performance, function, efficiency of use, ability to trigger transformation behaviour change and improved resource and energy efficiency and sharing) and in some cases (e.g. centralised power and waste facilities, industrial production, transport) will reduce in a reduction rather than increase in infrastructure scale.

The scale of challenge for infrastructure to help a transition to a sustainable future is vast. But time is short. That means that, as presented by Kevin Anderson, deputy Director of the UK Tyndall Centre on Climate Change, that rather than investment first and then demand reduction later we need a transformation from infrastructure-led growth to infrastructure and livelihoods ratcheting down our demand for resources, energy use and transport to sustainable levels (see box below).

Every day we turn the lights on, every time we drive a car we add to the accumulating stock of atmospheric CO<sub>2</sub>. Our cumulative emissions – and our carbon budget – are pivotal to understanding temperature and climate change. This insight is fundamentally important; it exposes how inadequate it is to aim for long-term, gradual reductions to be delivered by future technology while highlighting the need for urgent and radical reductions that we need to bring about now...

Behavioural changes could bring about a faster transformation, as might some ‘demand- side technologies’, but there simply is no way of getting the supply-side technologies in place fast enough in the wealthier parts of the world ... Demand-side opportunities dwarf supply-side opportunities, and we can change demand in the very short term. Toasters have a one-to-two year life span, cars only about eight years in reality. Refrigerators and white goods about three-to-eight years. Real change could be brought about very rapidly through a stringent regulatory framework setting minimum standards. ...

The future is almost beyond what we can imagine, what we have ever seen before. Therefore, our role now is to think differently, to achieve greater clarity, to foster a greater imagination and to no longer keep saying that it is impossible. We must make the impossible possible. There is real hope, but that hope reduces significantly each day.

Anderson, 2011. Source: [http://www.whatnext.org/resources/Publications/Volume-III/Single-articles/wnv3\\_andersson\\_144.pdf](http://www.whatnext.org/resources/Publications/Volume-III/Single-articles/wnv3_andersson_144.pdf) pages 21, 27 and 39

Demand-led, efficiency and sharing-first approach can redirect our relationship from infrastructure expansion to better, shared, transformational infrastructure adaptation, operation and maintenance. This has parallels to some interesting developments in infrastructure overseas such as a focus on addressing institutional gaps in collaboration to improve effectiveness of water resource management and targeting innovation in more efficient appliances to reduce the scale of new infrastructure (off-grid renewables) required to meet livelihood outcomes in Africa. Similarly it may be investment in phone apps not wider roads that is not only the most cost effective way to meet our desired for different mobility, but that this does not just reduce the extent of infrastructure required, but the embodied and in-use energy and resources deployed to use that infrastructure.

## Replicability

The consultation document sets out the UK is leading in setting out this approach, this notion of a national infrastructure assessment. Therefore, considering the wider purpose that should drive societal investment in infrastructure, for sustainability this should not just be sustainable in the UK – but provide a sustainable model if this is approach is copied by other countries around the world, but developing and developed countries alike. Thus it is *critical* that this plan has a key driver to **reduce** CO<sub>2</sub> emissions, not use terminology such as ‘infrastructure gap’ to try to re-establish the failed notion of ‘predict and provide’ – justifying more infrastructure supply on the basis of predicted

future demand, therefore locking-in the increased land, resource and energy use, and carbon emissions that this generally entails.

This means a key measure should be the degree to which new infrastructure is able to ‘ratchet-down’ emissions – or in the terminology of the Zero Carbon Britain<sup>2</sup>, to power-down demand, while powering-up zero carbon alternatives. A measure for this could be the carbon return on carbon invested in infrastructure. So, the embodied energy in LED lighting could be an infrastructure investment that drives down future emissions, while the embodied carbon in building new roads and cars will generally lock-in more emissions in future.

It also means that this assessment should be set within an institutional framework where its purpose, objectives and findings are subservient to increasing the extent that the UK exceeds its carbon emission reduction targets by as much as possible<sup>3</sup> while making the UK more sustainable. This means that infrastructure investment decisions, whether justified through this National Infrastructure Assessment process or otherwise must be justified based on its potential to transform our economy to one that is (socially and environmentally) sustainable, not meet economic growth cost-benefit calculations that are only useful if that also delivers this same transformation.

## **Final note**

A wider notion of what a ‘sustainability-led’ approach to infrastructure investment and needs assessment is set out in

[http://www.greenhousethinktank.org/uploads/4/8/3/2/48324387/make\\_do\\_and\\_mend\\_inside2\\_small.pdf](http://www.greenhousethinktank.org/uploads/4/8/3/2/48324387/make_do_and_mend_inside2_small.pdf).

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<sup>2</sup> <http://zerocarbonbritain.com/en/>.

<sup>3</sup> Noting that these are minimum, not maximum reduction targets based on a now superseded science aiming to reduce the *probability* of runaway climate change occurring.

## Response to Specific Consultation Questions

### Q1. Objectives – need to focus on environmental and social transformation

It is crucial that the stated objectives are viewed as means to a greater ends, to deliver improvements in quality of life and equity of outcomes within the UK<sup>4</sup> in ways that transition us from a high carbon, high resource consumption society to an environmentally sustainable one. To focus on the objectives stated without locating them within a wider purpose and vision is likely to create plans that backfire in terms of climate targets (locking in higher carbon lifestyles for decadal time periods) and therefore will fail the scrutiny against the UK's climate change act and global climate and environmental commitments. For this to be strategic, have clarity of vision, and therefore demonstrate credibility and leadership it should nest economic and competitiveness targets within commitments to drive down climate and environmental impacts while improving our collective wellbeing.

### Q2 – Principles – need to be related to wider objectives, as set out above.

To deliver against the principle of being '**forward looking and challenging established thinking**' the NIC should set aside political and economic rationales for infrastructure investment, and instead prioritise investment based on driving down carbon emissions and inequality while improving society and environmental quality. This requires the NIC assessment and ongoing responsibilities to be '**comprehensive, taking a whole systems approach, understanding and studying interdependencies and feedbacks – and long-term trends that the chosen infrastructure investment locks-in/leverages**' Its '**openness, transparency and consultative**' nature should consider analysing and sharing the likely beneficiaries from infrastructure investment, and whether it concentrates or disperses wealth across all households, and geographical areas of the UK, and in terms of its own (embodied carbon) impacts as well as how it will affect future emissions through the use of that infrastructure. Therefore, its '**independence, objectiveness and rigour**' should look beyond the stated objectives in this report and be subservient to society and the environment, and therefore not be dominated by stakeholders with vested interests in delivering or operating infrastructure. Therefore, while the principles appear reasonable, the definitions of what they are purported to mean is challenged.

It is noted that no questions are asked on the vision and priorities set out on pages 15 and 16. Responses to these are included in the Executive Summary included above.

Additional principles should also be considered here. The following are proposed:

- **Precautionary principle** – in terms of limiting investment, and technology choices to that which avoids the risk of doing harm
- **Principle of subsidiarity** – all infrastructure should enable connections to be made as locally as possible, between supply chains, demand and supply, people, between infrastructure systems

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<sup>4</sup> Without negatively impacting the livelihoods or resource and carbon footprints of those living outside the UK.

- **Opportunity and future-led.** Embrace opportunity and consider long-term risks. Some climate change is already locked-in. This means some adaptation, relocation, impacts are inevitable and are greater if considered in the future over the full life of infrastructure invested. This should be considered alongside the creative innovation and new enterprise and infrastructure solutions required to build the alternative systems that address these risks. Thus, infrastructure investment should not be risk adverse, but not aim to enhance resilience through increased robustness, but also consider the combinations of information flows, governance, flexibility, resourcefulness, responsiveness, capacity to learn, redundancy and safe-failure in flexible solutions that are also sustainable and carbon reducing. This is different starting with a baseline – we should start with the sustainability challenge that is required to be met by our society.

### Question 3 – Sectors – change relative investment, prioritise maintenance.

In general, the NIA should also make an additional distinction between whether the challenge of sustainability is best delivered by:

- providing additional infrastructure capacity (and potentially phasing out existing infrastructure); or
- improving maintenance or more effective/efficient operation of existing infrastructure.

In some cases it could be for the former (e.g. provision of renewable energy, reuse and recycling infrastructure) whereas in other cases it could be the latter (UK's transport network is currently expanding freight, import dependency of UK economy, vulnerability to climate shocks, and associated climate impacts – so a re-working may be required, as set out below).

This means that the assessment should not just review whether new infrastructure is required but whether some infrastructure is no longer required, and whether the sustainability and resilience of other existing infrastructure can be improved, and if so how best.

This assessment should also challenge the notion of infrastructure led economic development, to view a much closer relationship between infrastructure and enterprise development/livelihoods, and with future sustainable livelihoods being substantially different, infrastructure will be significantly transformed too.

Finally, it should focus on the way infrastructure is part of an infrastructure systems, how these affect each other and are interdependent<sup>5</sup>, and the wider economy, society and environment. Considering what is required, in terms of infrastructure (and enterprises) to create sustainable communities and sub-regional economies that operate within resource limits and be zero carbon should inform sectoral needs assessments, not the other way around.

Specific sectoral responses are set out as follows:

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<sup>5</sup> For example see <http://www.icif.ac.uk/networks/123/portfolio.html#t67>.

Transport. This should consider accessibility alongside mobility, and respond rather than ‘drive’ other sector investments.

- Effectiveness of transport, and its potential for more efficient use by **increased sharing/public transport, should focus on how to improve connectivity and the ‘final mile’**. This could build on the Transport Review in the late 1990s that concluded investment in local/community transport has much better outcomes than national scale infrastructure investment. For example, constraints on public transport take-up are often due to the final mile to home/destination, as opposed to longer distance connectivity.
- **The major transport infrastructure need is for the transformation to a zero-carbon transport network**. This will mean a far greater use of non-motorised transport (e.g. walking and cycling) which requires a reduction of transport distances, and increased electrification (or alternative mechanism) for longer-distance powered transport to be fuelled zero carbon. This NIC assessment should signpost how this is best delivered in a demand-led (i.e. fast) rather than new infrastructure-led (i.e. slow) way.
- This target for future zero carbon transport must **include international transport and transport hubs** – and be reflected in how the need for the current scale of these can be reduced sustainably, as addressing aspirational gaps to potential future demand, will make it virtually impossible for the UK or global to meet carbon targets, based purely on the current carbon intensity of fossil fuel used and the scale of fuel (and future land) required to produce this scale of fuel without utilising fossil fuels<sup>6</sup>.
- **The ability of spatial planning to reduce the need for travel should be considered as key** solution provider, to plan for better balanced economy across the UK to reduce the need for travel to/from work, to transport goods, and to reduce imports<sup>7</sup>. Thus, transport should not be considered as a prime infrastructure sector – but a responder. Better spatial planning, with more regional economic sustainability, localising the circular economy, food production and resource use and a less London-centric economy will transport the type of transport investment required.

Energy – consider type of generation, demand reduction and storage needed, and embodied energy.

- Similarly to transport, a decentralised renewables, improved appliance efficiency, reduced consumer (and producer/industrial) energy demands should be considered as a way to provide a very different, but also smaller energy supply infrastructure than is currently the place.
- As with transport, a focus on a more decentralised energy economy, reflecting a more sustainable wider economy with reduced long distance transport, would also include less long distance transport of energy. This would mean decentralised power will increasingly use the

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<sup>6</sup> For example, “Executing a Scharnow turn: reconciling shipping emissions with international commitments on climate change” (Anderson and Larkin, 2012 - [www.tandfonline.com/doi/pdf/10.4155/cmt.12.63](http://www.tandfonline.com/doi/pdf/10.4155/cmt.12.63)) analysis of shipping’s carbon emissions concludes, “On the one hand the IMO and ICS maintain a strong but rhetorical pretence of making their fair and proportionate contribution towards global commitments on climate change, while ... planning for emissions to rise by almost 300% compared with 1990. This paper, with its focus on shipping, *has sought to clarify the scale of the apparent masking of rapid, substantial and planned emissions growth by the industry .. and concludes that for shipping to make its “fair and proportional” contribution to even an outside chance of “preventing dangerous interference with the climate system” a fundamental change in its emissions pathway is essential.*”

<sup>7</sup> Which would also help to reduce the UK balance of payments deficit.

'national grid' to balance supply and demand with storage solutions in different locations and scales, rather than large-scale transmission.

- The type (e.g. sustainability and resilience) of infrastructure will be more important than the actual amount as the priority will be to make the supply-demand of energy sustainable and resilient, and for this to be sufficient, not the other way around. This means that alongside increased renewable supply and reducing consumer demand (including through more efficient appliance and infrastructure use) there will be a need for flexible responsive generation and storage not extra baseload generation.
- The energy intensity of infrastructure delivery, operation and maintenance, as well as industrial production/housing provision delivery, operation and maintenance must also be considered – and transformative solutions and more local and sustainable supply chains considered.
- The carbon reduction return on the embodied carbon expended on infrastructure investment should be positive or the infrastructure hard to justify on carbon emission grounds alone.

Resourcefulness (Waste) – should reflect current overcapacity in MSW, create local/sub-regional circular economies and link to resource use.

- Regular reports by Eunomia highlight the UK has already more waste disposal capacity (principally thermal energy from waste plants) than is required, based on the UK meeting EU recycling targets. However, the scale of recycling in the UK is far behind best practice in the EU (e.g. Slovenia's capital has higher recycling rates, and far lower residual waste disposal per capita than London). Waste capacity should therefore focus on the need for increased waste reduction (initiatives), reuse (locations, storage capacity) as well as reprocessing and recycling.
- Furthermore this section would be better described as waste and resources and include the potential to better utilise biomass through sustainable management of existing woodland, and composting/anaerobic digestion of sewage/agricultural waste.

Natural infrastructure may provide the most cost effective solutions in some areas – than hard engineering solutions. However it is crucial that habitats and natural environment is still valued for its intrinsic as well as such instrumental value.

#### Question 4 – Focus investment on creating a sustainable built environment

As set out in answer to question 3 above this should focus on delivering infrastructure systems that support ways of living that are ecologically sustainable – with wellbeing for all.

The lifespan for much infrastructure investment (>34 years) means that this should look beyond the UK's current (minimum) 80% climate change emissions reduction, to the need for these to be as close to zero as possible (or carbon positive), at least in the medium term, within the lifetime of current and new infrastructure. This should be reflected in infrastructure provision. The danger of failing to consider full infrastructure lifetimes as opposed to the relatively shorter current carbon budget, likely design specification or any period for return –on-investment is reflected in the

Thames2100 project

[www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/322061/LIT7540\\_43858f.pdf](http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/322061/LIT7540_43858f.pdf).

The aspiration for provision of infrastructure (even with the required shift from infrastructure that expands supply to that which better manages and transforms demand towards sustainable use) is likely to continue to exceed finance, and deliverability. Therefore, infrastructure investment should be prioritised where it can best leverage the most effective and rapid transition to sustainable use. This is expected to result in:

- a large reduction in expenditure on transport infrastructure;
- increase in renewable energy infrastructure; and
- a general shift from provision of new to better operation and maintenance of a reduced scale and increasingly decentralised and locally connected infrastructure inventory.

### Question 5 – Interdependency: practical local and systemic global links

Interdependencies should not be secondary to sector analysis. Infrastructure should be considered holistically, spatially and work together to improve sustainability and resilience. The infrastructure ‘whole should be greater than the sum of the parts’. In particular:

- more focus should be on decentralised infrastructure systems, and how they can work together in a location to be more resilient to shocks and stresses, and zero carbon; and
- the cumulative impact of all infrastructure must reduce global resource use and carbon emissions to stop environmental degradation or dangerous (1.5°C+ pre-industrial) climate change.
- It should include urban to rural interdependence.

### Question 6 – Cross Cutting Issues

Some of these issues may be considered priorities to set the context for the NIA as opposed to reduced to cross-cutting issues.

Geography and local growth. This should be considered as local and sub-regional sustainability instead. In particular, scenarios for local-to-national sustainable built environment (zero carbon, equitable, quality-of-life etc) reflected under the ‘geography and local growth’ heading should inform decision making, not be considered as an aside. Clear spatial plans are required to relate sustainability principles and policies and solutions to local contexts. The scales required should not just be local and national but the different scales in between that are as local-as-possible (considering the principle of subsidiarity set out above) for different infrastructure solutions.

Funding and financing should include operation and maintenance as well as capital costs. Revenue costs are critical for some infrastructure provision (e.g. circular economy – reuse and recycling have higher revenue costs – and jobs – but lower capital costs than some waste disposal infrastructure solutions).

Delivery/cost – this should not be projectised for new build but considered in terms of what is required to meet the ‘sustainability-gap’ (as opposed to infrastructure supply/demand gap or



similar). It could be considered as collective expenditure in one place, including the related and relative spend between infrastructure and enterprise/consumer demand changes – or transformative planning across different infrastructure sectors at different scales.

Sustainability. This should be considered as a key driver not a cross cutting issue. It should frame the whole NIA as set out above. This needs to combine limits (e.g. carbon emissions reduction and resource use reduction to within planetary limits/one planet living/to achieve zero carbon futures) and diversity (ecological, societal, locational – so solutions are locally relevant not blueprint.

Governance and decision making. This requires different decision making tool. Cost benefit analysis and economic return on investment don't factor in costs of air pollution and climate change and even if so they are prioritisation not strategic planning tools. There is a need to create workable scenarios that deliver the transformative changes required towards sustainability – and then develop different decision making tools that can prioritise (nest) decisions between infrastructure sectors and spatial scales.

Evaluation and appraisal methodology This should plan what is needed to address a sustainability gap not prioritise to meet current objectives set out in the consultation and then safeguard climate and environmental risks and justify in some way the increased carbon to provide and/or future carbon emissions in utilising an ever expanded UK infrastructure. Economic investment should not deprioritise retrofit/maintenance/improvement over replacement/new on grounds of VAT relief or cheaper land for undeveloped areas.

It is inappropriate to prioritise evaluation of the relationship between infrastructure and economic growth above environmental and social outcomes. The reverse should be the case. There is a need to clearly research and determine the impacts of infrastructure investment in distributional terms. For example, if infrastructure tends to centralise economic activity in the capital and major cities (or at least support the continuation of this trend rather than changing to a different economic pathway for the UK) then the impact of this in terms of equality impact assessment should be understood. Does centralisation of our economy to London reduce or increase poverty and reduce or increase regional inequality in the UK. Also, as stated before a clear evaluation of how infrastructure reduces (and avoids investment in that which increases) carbon emissions and resource use should be clear. The tendency of infrastructure to localise or globalise the UK economy and the degree to which this excludes or includes benefits to all/some in society and increase/reduces carbon emissions should be evaluated and appraised through the NIA so it is clearly understood.

## Question 7 – Other Cross-cutting issues

Gender and social inclusion as a result of infrastructure investment decisions.

Futureproofing and degree of carbon lock-in through commitment to continue to operate and maintain, or through infrastructure use and induced lifestyles of infrastructure investment decisions.

These should be mainstreamed, as with other cross-cutting issues, into a wider diagnostic of what happens as a result of infrastructure investment so the environmental, climatic, social and equality

impacts of different types of investment decisions are better understood, and inform strategic business cases, and the decision making that flows from this.

The wider outcomes of infrastructure investment (including the resultant lack of investment in non-infrastructure capital/revenue) should be considered as holistic rather than cross cutting. This should include impact of investing in new rather than enhancing existing (including the increased future O&M revenue burden), need for operation and maintenance, relation of infrastructure investment to citizens and productive sectors of the economy.

## Q8. Methodology – from ‘baseline plus’ to future sustainability scenarios

Paragraph 57 should prioritise infrastructure investment need in terms of:

- Opportunity for collective/shared transformative change that uses existing infrastructure very differently, and behaviour change at individual level
- Improved efficiency of existing
- Provision of new – whether alternatives to what is currently there, or more of the same.

This hierarchy of reduce, reuse/improve efficiency, recycle/circular economy, recover some value before provide more underpins the waste, resource and energy/carbon decision making hierarchies. For decision making related to infrastructure to be sustainable it should follow the same rationale.

Also this should shift from a ‘baseline plus what more is needed’ approach, which is simplistic and could be sector based to one that is holistic and systemic and ‘hindcasts’ back from future sustainability and other societal challenges. This means recognising complexity and interdependencies from the outset, not as cross-cutting second tier issues. These connectivities could reduce the scale of what is required through transformative change. The challenge-response approach is needed for us to clearly articulate the infrastructure plan for our society to transition towards sustainable living. This is crucial as infrastructure has both the power to transform livelihood and societal norms – either to lock in current resource intensive high carbon living or create the transformative change to a better future that is required.

The evidence base should not focus on infrastructure but infrastructure use as a starting point. For example need should be for lighting not energy, wellbeing and livelihood etc – which could be provisioned for in different ways. Transport infrastructure should be deprioritised as the demand for transport is second-order not a direct livelihood need – dependant on import/export, degree of co-production against disparate and specialised production, amount of leisure consumed locally or through travel etc. It should consider service levels, current and future operation and maintenance spend before new build spend (across sectors, for different years – not just looking over the full lifetime of individual infrastructure). Some infrastructure may be allowed to deteriorate while others may be retrofitted to transform/change/extend infrastructure life and/or use.

The methodology should consider, as a priority, how we maintain and restore existing built environment, and do this in a less resource and carbon intensive way. This means, for example, reprioritising basic routine road maintenance (less than 40mm potholes and cracks) to reduce the need for periodic maintenance, resurfacing and rebuild.

The consultation in the methodology should include research institutions, pilot studies, and best practice both across the EU and internationally.

It should start by articulating and developing models of infrastructure interdependencies that are sustainable and resilient in different contexts at different scales. It should prioritise the human/household, to community scale – the final mile of infrastructure.

## Q9 - Tools

This should be qualitative as well as quantitative. It should consider best practice in sustainable communities and developments and how this interfaces with wider spatial planning and infrastructure need, visioning, participatory planning, comparative studies overseas and at different positions in time.

## Q10 – Other Drivers

The key objectives identified in this report are not considered as important as addressing the UK ‘transition to sustainable living’ gap, for which different forms and scale of infrastructure provision. Therefore environmental and social drivers should be prioritised over economic, the latter being what is required to deliver these outcomes. Carbon reduction and equality could be two simple drivers. There is a need to plan infrastructure as part of wider systems, so the interaction not just of infrastructure within and between infrastructure systems (e.g. how flooding impacts energy supply resilience) but with wider society. Therefore behaviour change and degree of cooperation in the use of infrastructure is key – that is recognising the built environment that infrastructure creates transforms the way it is ‘normal’ to live, and thus the social interactions and environmental impacts that are typical of society that results. This is reflected in comparative studies on the impact urban density on carbon footprints, the impact of transit orientated development, the relation between building design and occupancy use, as well as the tendency for increased scale of infrastructure to drive up use (which may be good or bad for society or environment, depending what it is!).

## Q10 – Commenting on Current Drivers

Economic growth and productivity should not be a driver. Sustainable futures require certain types of activities to grow within an economy, and the productivity of some activities (e.g. lower carbon) to be incentivised over others (e.g. higher carbon). This driver should also be subservient to quality of life for all/equality (which is not listed as a driver) and environmental limits/quality (listed).

The technology driver could prioritise some types of technology over others. Different technologies have different impacts – and the precautionary principle should be considered. Technologies that allow the transition to sustainable living (e.g. existing technologies that can be mainstreamed, appropriate technologies) should be prioritised. This could be considered in response to challenges. For example, from an infrastructure point of view much infrastructure is constructed from man-

made or processed materials that are resource and carbon intensive, so reducing our society to zero carbon require these to be produced sustainably and reduced in their scale so that they can be largely provided, and sustained, through renewable resources.

Technologies to transform existing infrastructure, and better maintain and operate it using less resources and carbon should be investigated. The impact of automation and linear supply chains on the potential for local/UK sustainable operation and maintenance, and the potential for automation/obsolescence to increase the resource/carbon footprint of infrastructure provision should be considered.

### Q11 – Portfolio

This should be qualitative and quantitative, and aim to address the ‘sustainability gap’ set out above, that is to transform to a resource sustainable and zero carbon society that retains environmental and society wellbeing and increases equality. This must also consider not just the outcomes, but the resources/energy/carbon required to build and maintain that infrastructure. It could be a mix of different sustainable infrastructure transformation options at a local level that enable this sustainability gap to reflect the different needs of different locations – e.g. urban, rural, large city, small town, developing co-production hubs.

### Q12. What is not addressed in the methodology

The methodology appears to be a ‘baseline plus’ approach. A very different methodology approach is proposed here to lead to a portfolio that addresses the UK’s sustainability gap and produces different sets of sustainable solutions of how this might be addressed.

### Q13 How to engage the UK around bridging the ‘gap to sustainability’?

I think the engage should be innovative and creative, with visions that set out how local areas can be transformed without expending significant embodied carbon in the process. It should be location specific and link supply and demand side pressures. It could focus on the ‘what’s in it for me element’ by setting out the sustainable jobs that this infrastructure transformation towards sustainability will deliver.

In the UK in the Second World War there was a successful mobilisation to work together for the common good. We need such a plan to transform Britain for the better, for a sustainable future, for the common good not just for us, but all worldwide now and our children’s children. With hope, with the trust that we can do it together and the connections created by enabling the public to participate in co-creating plans that we can then see and help make happen will be inspiring and encourage engagement.

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**From:** [name and email redacted]  
**Sent:** 21 July 2016 19:15  
**To:** NIA Evidence  
**Subject:** NIA Process and Methodology Consultation  
**Attachments:** Scan-to-Me from 10.22.47.244 2015-12-01 132304.pdf

Dear Sir

Infrastructure must reduce the damage to the environment, particularly from CO<sub>2</sub> emissions, in operation, and should only be built if these benefits exceed the environmental disbenefits from the construction (embodied in the infrastructure).

The environmental benefits and the operating costs of all the possible schemes for improving our infrastructure must be accrued over the likely operating life, which (with proper maintenance) should be millennia, for a proper comparison of the alternatives.

Storm drainage schemes must as a priority reduce the flooding, particularly with sewage, of homes and businesses, and then local streams, sewage in tidal estuaries (sea water) such as the Thames in London being the lowest priority, and should separate rain from foul water to reduce costly, high carbon footprint, environmentally damaging pumping and treatment, so the Thames Tideway Tunnel, for example, is a poor wasteful scheme (the highlighted items on the attached comparison were not considered during the planning).

Rail (or even road) travel on existing routes is better environmentally than traveling by air, particularly short haul, but new (high embodied energy) rail/road infrastructure is only justified if flight is taxed sufficiently to ensure a large transfer to rail/road.

Hydrogen appears to be the best option for energy since it can be generated at hydroelectric/ solar/ wave/ tidal/ wind energy sites and shipped in existing tankers, or moved in balloons, and countries already have gas grids, which can refill cars at times when house heating is subdued, and new intrusive, high embodied energy and materials electricity transmission systems are not needed.

Used products should be collected, stored, transported and restored for reuse, or else broken up and their constituent materials recycled, and only if in doing this the environmental disbenefits would exceed the environmental benefits, should they be burned for energy or go to landfill.

Regards

[name  
redacted]

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The Tideway Tunnel Submission is incorrect on Separation which is required by UN, EU, UK and GLA Legislation: Separation and the Tunnel are properly compared against NPS policies below

NPS: Government Policy Objectives	NPS Policy Requirement	Compliance With Policy		Features of Solutions		Construction and Power/ Maintenance Costs over Operational Life	
		Separation	Tunnel	Separation	Tunnel Plus Other Projects	Separation	Tunnel Plus Other Projects
Sustainability Public Health Water Quality	Stop all storm flooding of homes, businesses and roads	Yes	No/#/Yes	New system to separate storm water from sewage - sized for the fiercer storms predicted from climate change	Local tanks must be built to store excess water, for pumping it back into the system when storms subside	The Environmental Statement data is from the Sewer Separation Study (an Appendix to the Needs Report) which confirms (page 60 4 <sup>th</sup> bullet) that separating road, pavement and major roof runoff can give estuarial sewage pollution reductions similar to the proposed tunnel: layouts in Appendix A do not use the topography properly to give gravity falls, and ignore the existing storm relief sewers that, possibly with 'lost river' sewers with limited sewage inputs internally separated, and perhaps canals, can carry rain to the estuary, so that new pumping stations are specified unnecessarily, while the sizes of sewers shown on the tables in Appendix B are 50% greater than existing sewers in each area:	Say 50 tanks costing £10m to build and £5k/year to run
Sustainability Public Health Rain Diversion Climate Change	Reduce operational greenhouse gas emissions with new infrastructure	Yes	No	Storm water flows down directly to the estuary, so there is much less pumping, storage and treatment of water than with the existing combined sewer system	Huge increase in storage, pumping and treatment, and hence greenhouse gas emissions/demand for limited (and expensive) renewable energy	Avoidable demand extends fossil fuel use, then uses marginal renewable power	£1-2bn
Sustainability Public Health Water Quality	Stop sewage pollution of local freshwater streams and rivers	Yes	No/#/Yes	New separated systems prioritised for outer boroughs with regular flooding will also reduce sewage flow into the estuary	Local tanks storing excess water and pumping it back to the system require more maintenance and energy use	Say 15 tanks costing £20m to build and £10k/year to run	£0.6bn
Sustainability Rain Diversion Climate Change	Reduce volume of water requiring treatment	Yes	No	Large reductions in the volume of storm runoff treated - improving vehicles and building materials mean runoff is clean and can go straight to the estuary, as for 70% of the GLA area at present	Huge increase in the volume of clean rain water mixed with foul sewage which then has to be treated to remove pollutants before discharge to the estuary	The cost of the chemicals required for treatment may rise due to environment/scarcity issues	£0.3bn
Water Quality	Greatly reduce sewage pollution of the estuary* water	Yes	Yes	When enough road, roof and garden runoff is diverted, sewage pollution of the estuary will be completely stopped	If many local tanks are built as well as the tunnel, all sewage spills in to the urban estuary can be stopped, but releases at the STW outfalls may still occur	Current Estimate for the Tideway Tunnel, Shafts and associated STW enlargements	£5.5bn
Sustainability Public Health Climate Change	Minimise embodied energy of new infrastructure	Yes	No	Systems for separation do not require storage volume, while pipe jacking and using spoil from trenching reconditioned on site as backfill should reduce embodied energy	To provide storage the Tideway Tunnel plus local tanks have a volume (and hence high embodied energy structure) twice as large as an equivalent separated drainage system	The detrimental effects of using fossil fuels and other finite resources are not currently included in energy/material costs	
Sustainability	Minimise debt financial management and interest cost burden	Yes	No	New pipes can be laid and connected to road gullies and large roofs incrementally, funded via annual rates with no borrowing, each completed section giving immediate benefits	Requires major borrowing with associated expensive financial engineering and debt interest payment burden, and gives benefits only when the whole tunnel is complete and commissioned	The financing costs for the large debts that are to be incurred have not been clearly stated	£0.7bn
Sustainability Public Health	Lay systems that allow the most safe and efficient handling for any hazardous substance releases	Yes	No	If hazardous material is spread over areas it, with wash down/ rain water, is the only flow in the surface water system and can be pumped to tankers from downstream manholes without effecting building drainage flows +	Requires major borrowing with associated expensive financial engineering and debt interest payment burden, and gives benefits only when the whole tunnel is complete and commissioned	Extra costs for treating contaminated sewage and/or the costs of temporarily halting building effluent flows are incurred	£0.1bn
Sustainability Public Health	Bury the Northern Outfall Sewer, which restricts roads below and is on intrusive embankments	Yes	No/#/Yes	The Lee Tunnel, not required when storm water north of the urban estuary is separated, can be adapted to operate siphonically as an effective replacement for the Northern Outfall Sewer	The Lee Tunnel is part of the Tideway Tunnel scheme, so a separate tunnel is required (on a similar route) to replace the Northern Outfall Sewer	A tunnel to replace the Northern Outfall Sewer would need to be of similar size to the Tideway Tunnel	£0.8bn
Public Health	Minimise intrusion into London streetscapes	Yes	No	A new storm water system is all buried, and uses existing storm relief sewers - new sewers will be equally unobtrusive	Quite large vent stacks and intrusions into the river for down shafts are required in several locations along the Embankment	Storm Water Separation (2013 Prices) £8bn	Thames Tunnel, Tanks, STW Works and NOS Tunnel (2013 Prices) £10bn-£12bn
Notes	*The Thames estuary, containing saline water, starts at Teddington lock	The EU Directive allows phasing of projects	#Tunnel alone/ other projects	+If hazardous/radioactive material falls out go to urban outfalls, fitted if required with water to retain contaminated water for disposal, or urban outfalls may be closed and runoff water allowed to flow through foul sewers to STW's, with building effluent flows halted to minimise amounts for disposal, while later runoff can safely be diluted by the tides	In the Middle East there are irrigation tunnels that have been in use for more than 2500 years, and in some places in Europe, drain pipes that were laid in Roman times are still in use, so the operating lifetime of large drainage tunnels, built to modern standards with high quality concrete, is likely to be two millennia, and probably much longer		

The National Infrastructure Assessment – Process and Methodology  
*Consultation by the National Infrastructure Commission* Submission  
by [name redacted]

**Summary key points**

- The approach adopted in the NIA must allow some flexibility so that the infrastructure needs of the country are responsive to changing context and new developments. For example, the UK decision to leave the EU will have implications for UK infrastructure, and the NIA will need to reflect the nature and scope of these implications.
- A priority is to provide the necessary infrastructure to improve international competitiveness and a poor productivity performance against the UK's main competitors. There needs to be a greater focus on training and skills development right across economic activity, and in particular an assessment as to whether the existing infrastructure to deliver this is fit for the 21<sup>st</sup> century.
- Greater clarity is needed on how Government will incentivise new infrastructure build bearing in mind it relies mostly on the private sector to deliver fund and deliver projects.
- The gradual move to greater devolution, beyond the national state to the regions, brings with it both opportunities and challenges, and these need to be explored in the NIA.
- In light of the large increase in population over the last decade or so and the forecast potential further growth over the next 15 years, there should be more emphasis given to the built environment.
- It is important that potential societal trends are incorporated into the analysis even though they are much more difficult to predict than technology.
- Bearing in mind the long term nature of much of the country's infrastructure, its resilience to climate change should be more prominent in the work and potential adaptation measures highlighted.
- It would be helpful if a thorough stakeholder mapping exercise for each 'project' were carried out and an appropriate engagement programme developed.
- It is important to consider what is happening in other markets and economies and consider how best to adopt best practice.
- A whole system approach is essential to ensure the very best outcomes while minimising unintended consequences. Equally important is the actual process of gathering, analysing, and interpreting the information provided.
- There is a need to distinguish between qualitative, narrative scenarios and straight forward analytical models providing scenarios based on different sets of numerical assumptions, and adopt the approach best suited to a changing economy.



## Background of the Consultee

[personal information redacted]

## Detailed Answers to Questions

### On Principles

*Question 1. The Government has given the National Infrastructure Commission objectives to:*

- *foster long-term and sustainable economic growth across all regions of the UK*
- *improve the UK's international competitiveness*
- *improve the quality of life for those living in the UK*

*What issues do you think are particularly important to consider as the Commission works to this objective?*

1. Clearly all three objectives are linked and, in particular, success in the first two are a necessary condition for the third. A priority is to provide the necessary infrastructure to improve international competitiveness and a poor productivity performance against the UK's main competitors, particularly in light of the referendum decision to leave the EU.
2. Infrastructure can of course boost growth in the short term because of the large amounts of money involved, but it cannot generate growth in the long term in of itself, rather it is a key facilitator for growth. The key is to improve the environment in which business operates and recognition that all will benefit from this ultimately.
3. Infrastructure can remove bottlenecks, providing new and faster ways to do business; in these ways it can help businesses improve their performance by growing the business and improving productivity. All of these must help improve the competitiveness of UK business. An important question is whether the infrastructure for research and development, and innovation more generally, is fit for purpose in delivering the objectives identified above.

*Question 2. Do you agree that, in undertaking the NIA, the Commission should be:*

- *open, transparent and consultative;*
- *independent, objective and rigorous;*
- *forward looking, challenging established thinking;*
- *comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?*

*Are there any principles that should inform the way that the Commission produces the NIA that are missing?*

4. Agree with these general principles and in particular adoption of a whole system approach which is essential to ensure the very best outcomes while minimising unintended consequences. Equally important is the actual process of gathering, analysing, and interpreting the information provided; it is also important to carry out active (as opposed to passive) consultation so that a good cross-section of stakeholders have provided their views.
5. A comprehensive stakeholder analysis would help inform whether a fair reflection of interests and knowledge have been taken into account in the evidence gathering process. For example, an understanding of the role and ambition of key stakeholders in the private sector is required.

**On what the NIA will cover**

*Question 3. Do you agree that the NIA should cover these sectors in the way in which they are each described?*

6. The NIA covers all the main sectors, except perhaps the built environment which is very important when considering aspects of sustainable growth, competitiveness, and quality of life. The Consultation suggests that the NIA will not focus on 'social' infrastructure with the question of housing supply, for example, considered only in terms of the interaction of new infrastructure on housing need. In light of the large increase in population over the last decade or so, and the forecast potential further growth over the next 15 years, this issue should be higher on the agenda.
7. Other aspects of the built environment that need consideration include the encouragement of new centres for commercial activity and public buildings including health and education establishments.
8. The NIA focuses on the medium-to-long term and the concern would be 'locking-in' solutions in a rapidly changing world. The power sector is a good example where disruptive technologies are emerging that have the capability to change the provision of energy, as already recognised by the NIC in its recent report *Smart Power*; however, there is an important transition period that needs to be carefully considered to ensure an orderly evolution to the new energy system.

*Question 4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?*

9. Delivering the so-called 'Northern Powerhouse' should be high on the agenda to help stimulate activity in those regions, and thus bridge the economic gap between the northern and the southeast regions of the UK. This was an important consideration in the referendum on whether the UK should remain in the EU.
10. Bearing in mind the long term nature of much of the country's infrastructure, its resilience to climate change should be more prominent in the work and potential adaptation measures highlighted.

*Question 5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?*

11. The boundaries between the traditional power, transport, and communications sectors are being increasingly exploited. The move to electric transport is gathering pace as new technology enters the market and the basic infrastructure to support it is deployed. The digital world will clearly impact all forms of activity changing the very nature of work over the time scales covered by the NIA. A key question is how quickly these developments will occur – an important aspect of the NICs work then should be to better understand the converging developments that could lead to the widespread adoption of new disrupting practices.
12. As indicated in the response to Question 4, adaptation to Climate Change appears not to be taken into account of particularly as much of the infrastructure could be around for many decades.

### **On cross-cutting issues**

*Question 6. Do you agree that the NIA should focus on these cross-cutting issues?*

13. The NIA should focus on infrastructure needs and in so doing address cross cutting issues otherwise there is a danger of missing the less interesting but essential basic infrastructure needs of the UK.
14. There has been a tendency to equate sustainability with environment in general and climate change in particular in recent years. However, other aspects need to be considered including the economic benefit, or otherwise, of a particular development, and what is best for society as a whole.

*Question 7. Are there any other cross-cutting issues that you think are particularly important?*

15. Government has recognised the need for an industrial policy for the UK and hopefully will bring forward policies and measures, and infrastructure to make this happen. There also needs to be a greater focus on training and skills development right across economic activity, and in particular an assessment as to whether the existing infrastructure to deliver this is fit for the 21<sup>st</sup> century. The recently established Apprenticeship Levy recognises this need and essentially imposes a financial penalty on the private sector if it does not engage with the skills agenda.

### **On methodology and building the evidence**

*Question 8. Do you agree with this methodological approach to determine the needs and priorities?*

16. It is crucial to have a good understanding of the context for the existing or new infrastructure deployed. The regional and global context are absent from the approach - for example the specific issue of the UK leaving the EU, which could not be anticipated when the Consultation was launched, will implications for infrastructure development in the country.

17. The proposed methodology will cover a range of scenarios but too many suggests an attempt to cover all possible outcomes – it would perhaps be better to concentrate on a limited number of scenarios to test that the infrastructure needs identified are robust, and then review both the scenarios and infrastructure needs at regular intervals.
18. The scenarios need to reflect behavioural trends such as changing working patterns, consumer's ability to adopt new technology, the implications of an increase in leisure time, and so on; the methodology also needs to be able to assess the time evolution of what may be complex developments, relying on the coevolution of technology.

*Question 9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?*

19. There is a need to distinguish between qualitative, narrative scenarios that have analytical models providing valuable underpinning, and straight forward analytical models providing scenarios based on different sets of numerical assumptions. Both have a role to play in the assessment but analysis via narrative scenarios offer the better opportunity to explore uncertain futures over the timescales being considered by the NIC. Such an approach is favoured by successful private sector companies that have major capital investments in long-term infrastructure.

*Question 10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?*

20. The drivers identified are certainly important in helping to define the country's future infrastructure needs. Both climate change mitigation and adaptation should be considered, particular since the infrastructure is being set down that will last decades, well into the 21st century.

### **On finalising the National Infrastructure Assessment**

*Question 11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?*

21. Clearly the Treasury will have a view on how much money the nation can spend on new infrastructure – it is dependent on a number of factors and it will also change over time; there will also be a view on how much is from public finances and how much consumers will have to pay to fund projects.
22. The Government has already put in place the Levy Control Framework that's serves to control the monies spent on new low carbon generation. This has the advantage of providing a degree of certainty for investors in the medium term, sufficient for them to commit development costs in the expectation of money being available to deliver projects, albeit in a competitive process for contracts.

*Question 12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?*

23. It is not clear if the methodology can reflect the flexibility needed in the delivery plan in response to changes in the political, technical and financial environment, and also to emerging social trends.

**On engagement**

*Question 13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?*

24. It would be helpful if a thorough stakeholder mapping exercise for each 'project' were carried out and an appropriate engagement programme developed - it would also be helpful to maintain a 'live' system that can monitor stakeholder views.

< address redacted >

Commission Secretariat  
NIA Evidence  
National Infrastructure Commission  
1 Horse Guards Road  
London  
SW1A 2HQ

17<sup>th</sup> June 2016

The National Infrastructure Assessment, Process & Methodology . A Consultation.

Dear Sir,

I am pleased to include below my response, as an individual, to the above consultation.

**Question 1. The Government has given the National Infrastructure Commission objectives to:**

- **Foster long-term and sustainable economic growth across all regions of the UK**
- **Improve the UK's international competitiveness**
- **Improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

*These three objectives are fine. However, I note that two of the objectives relate to economic aspects, while only one objective relates to environmental / social considerations. There will inevitably sometimes be tension between the two economic objectives and the other objective. It would be unfortunate if such tension resulted in the environmental / social aspect usually losing out. I urge that the economic aspect is given equal weight to environmental / social considerations.*

**Question 2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

*Yes. These four principles are fine, especially the first two.*

*The third principle is interesting, especially the element "challenging established thinking". The Government seems to have had a very strong emphasis on economic considerations, (possibly at the*

expense of environmental / social matters?) The approach of "challenging established thinking" could, perhaps involve ensuring that economic and environmental / social aspects are weighed equally.

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

*No comment.*

**Question 3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

*Yes.*

**Question 4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

*My only comment relates to the transport sphere.*

*Paragraph 23 states "...electrifying transport and heat to meet the UK's carbon targets could more than double demand on the power sector from today's levels, meaning much more capacity would need to be built." Paragraph 42 then also states "A critical interdependency which the NIA will aim to better understand is the impact of future transport provision on the energy sector; in particular the potential implications of large-scale car, lorry and rail electrification."*

*My view on this is that the desirability of increased electrification in the transport sector should take the lead. If this means that more energy capacity needs to be provided then that is fine.*

**Question 5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?**

*Please see my response to Question 4.*

**Question 6. Do you agree that the NIA should focus on these cross-cutting issues?**

*Yes, but I refer to the first principle listed in paragraph 31, namely "open, transparent and consultative".*

*Bearing in mind that principle I urge that any amendments to assessment / decision making (possibly implied by statements made within paragraphs 51, 53 and 54) include safeguards to ensure that the approach is "open, transparent and consultative".*

**Question 7.** Are there any other cross-cutting issues that you think are particularly important?

*No comment.*

**Question 8.** Do you agree with this methodological approach to determine the needs and priorities?

*Yes. There seems to be a particular case for demand management strategies. Also, the last sentence of paragraph 68 seems especially pertinent, namely....*

*"...all results and conclusions will be tested in public and with key stakeholders, allowing the Commission to take in a wide range of views before making any judgment."*

**Question 9.** Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

*No comment.*

**Question 10.** Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?

*First question - Yes.*

*Second question - No comment.*

**Question 11.** The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

*No comment.*

**Question 12.** In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

*No comment.*

**Question 13.** How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

*The approach outlined in paragraphs 78 to 83 is fine.*

Yours faithfully

<signature redacted>





<e-mail address redacted>

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**From:** <e-mail address redacted>  
**Sent:** 27 May 2016 18:27  
**To:** NIA Evidence  
**Subject:** National Infrastructure Assessment

I'm deeply concerned that cycling and walking has been and will continue to be massively underfunded.

Given the pressing issues of air quality, health problems brought on by inactivity, climate change and the enormous cost of these problems, I find it utterly bizarre that the government is throwing money at projects that exacerbate these problem.

Part of the solution is relatively simple; get people out of cars. To do so we need to enable active transport, not discourage it by putting more cars on the road. We enable it by providing effective infrastructure for active transport.

It's so blindingly obvious, take London's CSH as an example, that one can only assume that the government doesn't actually want a cycling revolution, they want to pander to motorist and lobbying groups, maintain the status quo, win votes.

Regards

<name redacted>

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**[name redacted]**

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**From:** [name redacted] [email address redacted]  
**Sent:** 05 August 2016 19:08  
**To:** NIA Evidence  
**Subject:** Response to consultation on NIA process and methodology

I am a Chartered Civil Engineer with an interest in systems thinking and 30 years of experience in highway and infrastructure design and construction. This response represents my personal views. The consultation document does not specify whether systems thinking will be used in the process. My view, in line with Jackson's (2000) system of system methodologies is that soft systems or critical systems approaches would be helpful; both in understanding the complexity of the existing situation and the perspectives in it as well as to develop and test models for improvement.

The theme of my response to the questions posed is intended to highlight aspects of systems thinking which I believe will benefit the process.

Q1. The following issues are important:

- understanding and defining success
  - how performance of various improvement scenarios or models will be judged; and
  - how to assess the success of completed infrastructure.
- existing values, attitudes, skills, resources and ways of working within stakeholder organisations, within government and the wider supply chain, within infrastructure operating companies and in society as a whole.
  - a related issue is that networks (such as roads) are managed and operated as a series of separate networks rather than as how they appear to the user/ customer.
- uncertainty - a flexible approach will provide infrastructure networks that can better meet future needs, e.g. power networks that support community and other small scale power generation.

Q2. The NIC should undertake the NIA ethically, by considering society as a whole as well as the environment, rather than focusing too narrowly on economic objectives or performance measures to select or prioritise need.

Q3. Four comments:

1. Social and cultural change will have large impact on infrastructure needs;
2. 30 years is too short a time scale but it is understood that a boundary is needed and therefore it is critical that thought is given to a longer time period so that success can be better defined and sustainability can be properly taken into account. For example thinking about what society in 50 or 75 or even 100 years will value in infrastructure; and what they will not value.
3. Housing is a big part of infrastructure, has a huge influence on society, quality of life, the environment and the economy. Equally it is interrelated to most other infrastructure.
4. land use and agriculture should be considered because it has significant influence on infrastructure needs and on the condition of natural infrastructure such as river basins.

Q4 & Q5. No. I would anticipate that critical needs and interdependencies will emerge as learning from a systemic inquiry.

Q6 & 7. See response to Q1.

Q8. Policy itself will influence the key drivers. I agree that modelling infrastructure networks has limited value but could be the starting point for conceptual models, used as tools to develop understanding and action.

Q9. Soft Systems Methodology and Critical Systems Heuristics are examples of systems thinking approaches applied to complex and problematic situations that could be used to supplement the assessment.

Q10. Drivers omit social and cultural change and also sustainability.

Q11. See response to Q1. Prioritisation should be based on performance criteria developed for the three objectives stated in paragraph 26.

Q12. Security is an important issue currently - food security, energy security; and it's related to the bigger issue of sustainability which does feature in the approach.

Q13. No response.

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# Response by the Infrastructure Transitions Research Consortium to the consultation on the National Infrastructure Assessment

## About the ITRC

The UK Infrastructure Transitions Research Consortium (ITRC) is a consortium of seven UK universities (Oxford, Cambridge, Cardiff, Leeds, Newcastle, Southampton, Sussex) funded by the Engineering and Physical Sciences Research Council (EPSRC) to “develop and demonstrate a new generation of simulation models and tools to inform the analysis, planning and design of national infrastructure”. The first phase of the ITRC’s research ran from 2011-2015, during which time we developed the NISMOD national infrastructure system model, along with a series of other innovations in interdisciplinary systems research. The approach developed by ITRC is documented in our book *The Future of National Infrastructure*<sup>1</sup> and in many accompanying publications, which are listed at <http://www.itrc.org.uk/>

The ITRC programme is very well aligned with the objectives of the National Infrastructure Assessment (NIA). Moreover, our second phase of funding from EPSRC, which runs from 2016-2020 provides us with the timely opportunity to orientate our research to inform and support the NIA. The ITRC has engaged with the National Infrastructure Commission (NIC) since its formation. We are grateful for the constructive way in which Commissioners and officials of the NIC have approached our work. We offer our support to the NIC as it continues to develop and implement the NIA.

For further information contact [name redacted]: [email address redacted]

## Overview of our response to the consultation on the National Infrastructure Assessment (NIA)

We are very supportive of both the motivation and the proposed approach to conducting the NIA. In particular we welcome the commitment to analysis, whilst also recognising the role of uncertainty and the need for judgement to be exercised by the Commissioners. The proposed conceptual framework for the NIA is well aligned with the framework that we have developed. We note, approvingly, the following aspects of the proposed methodology:

- Framing in terms of the services that infrastructure delivers, which opens up possibilities for substitution between different means of providing those services e.g. heating or communications.
- Framing the assessment as a decision analysis problem, in which a set of possible interventions in national infrastructure systems (including policy and regulatory interventions alongside investments in physical infrastructure) are appraised with respect to a range of possible future scenarios.
- Recognition of the role of drivers of future demand for infrastructure services (notably population, economy, technology and the environment) and a commitment to explore the nature of these drivers and the ways in which they may evolve in future.

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<sup>1</sup> Hall, J.W., Tran, M., Hickford, A.J. and Nicholls, R.J. *The Future of National Infrastructure: A System of Systems Approach*, Cambridge University Press, 2016.

- Recognition of the importance of economic geography, and the complex feedback between infrastructure provision and geographical patterns of demand for infrastructure services.
- Recognition of the role of interdependency between infrastructure sectors and the joint effect of demand drivers across different infrastructure sectors.
- A mature appreciation of the role of models, which provide a means of structuring complex evidence and enabling sensitivity analysis, but are inevitably subject to methodological assumptions and uncertainties.

In short, we think that you have got the fundamentals of the NIA right. There is still much detail to fill in, on an ambitious timescale. We look forward to working with you in that endeavour.

## Responses to consultation questions

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- *foster long-term and sustainable economic growth across all regions of the UK*
- *improve the UK's international competitiveness*
- *improve the quality of life for those living in the UK*

**What issues do you think are particularly important to consider as the Commission works to this objective?**

We note that questions of affordability are not explicit in the Government's objectives. The costs of infrastructure are ultimately borne by people, through user charges or taxation. Whilst the NIC has a fiscal remit in relation to public spending, it is less clear how it will evaluate the overall implications of the cost of infrastructure for households, in particular in relation to cost recovery for privately owned/operated infrastructure.

In this context it is also important to consider inter-generational issues, i.e. the legacy of infrastructure and debt that is bequeathed to future generations.

The quality of the natural environment is presumably implicit in "quality of life". Infrastructure mediates many of society's interactions with the natural environment. For example, thanks to investment in waste water treatment, the UK's rivers, estuaries and coastal waters are much less polluted than they were earlier in the last century. Electrification of the transport fleet would help to tackle serious problems of air pollution. These environmental externalities of infrastructure should not be neglected.

The focus on quality of life "for those living in the UK" potentially overlooks the international externalities of the UK's infrastructure system. The most noteworthy of these is the impact of atmospheric greenhouse gas emissions, so we welcome the NIC's firm commitment to the UK's legal targets under the 2008 Climate Change Act. Other international externalities exist, for example the implications of waste exports to countries that may not be well equipped to safely deal with that waste, which we encourage the NIC not to overlook.

We welcome the NIC's recognition that resilience of infrastructure systems is essential for sustaining growth, competitiveness and quality of life. It is important that the NIC considers what an appropriate level of resilience might be, which is consistent with those objectives. That will be a difficult cost-benefit calculation, as the impacts of lack of resilience in extreme events can ripple

across the entire economy and society, so should be regarded as systemic risks. The NIC's cross-sectoral role provides the opportunity to develop a more consistent and evidence-based view of targets for resilience.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- ***Open, transparent and consultative***
- ***Independent, objective and rigorous***
- ***Forward looking, challenging established thinking***
- ***Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?***

***Are there any principles that should inform the way that the Commission produces the NIA that are missing?***

We welcome each of these principles.

In the consultation we do not however see much acknowledgement of inevitable potential for conflict. Investing in infrastructure involves losers as well as winners, opportunity costs, and building things in people's back yards. At this stage we think it would be useful if the NIC could articulate the principles that will be adopted to navigate these conflicts. For example, is the approach utilitarian from a national perspective, or could there be more innovation in 'gain-share' and 'pain-share' at local scales? What is the Commission's view of the distributional impacts of infrastructure investment?

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

Yes. We have deliberated at length about the scope of the ITRC's work and have arrived at the same list, with the recent explicit introduction of flood defence, which was previously implicit in our analysis of flood risks to infrastructure.

The focus upon 'flood defence' as opposed to broader 'flood risk management' is reasonably justified, as flood defence consumes the large part of the capital and maintenance budgets for flood risk management. However, it has long been recognised (see for example the Government's 2004 *Foresight Future Flooding* report<sup>2</sup>) that flood defence is part of a broader system of flood risk management, that also addresses the sources of flooding at a catchment scale and promotion of resilience to flooding at household and community scales. It would be a mistake if the focus upon flood defence and urban drainage infrastructure neglected that broader system-scale perspective.

Similarly, sustaining and restoring rivers, lakes and wetlands interplays with the quantity and quality of water supplies. Enhancing the natural capital which ultimately provides water supplies can help to save infrastructure costs.

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<sup>2</sup> Evans, E.P., Ashley, R., Hall, J.W., Penning-Rowsell, E.C., Saul, A., Sayers, P.B., Thorne, C.R., and Watkinson, A. *Foresight Flood and Coastal Defence Project: Scientific Summary: Volume 2, Managing future risks*. Office of Science and Technology, London. 2004. 416pp.

Whilst we do not suggest that the NIA should include strategy for catchments and ‘blue-green infrastructure’ and natural capital more broadly, the responsibility for which rightly lies with other government departments and agencies, we encourage the NIC to fully consider these interactions.

***Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?***

We emphasise the role of the services that these infrastructure sectors provide. In particular we encourage the NIC to think creatively about the changing needs for connectivity and the ways in which this may be provided through an evolving mix of digital networks and transportation.

In energy, we agree with the exclusion of upstream fossil fuel extraction, though we note that declining North Sea gas production is likely to have to be substituted by increased liquefied natural gas imports with implications for port and storage infrastructure, which should be considered within the NIA.

We did not see explicit reference to liquid fuels, notably for the transport sector. We are surprised by the exclusion of domestic facilities for refining these fuels. We encourage some consideration of fuel distribution, given the potential for disruption that was experienced in the fuel crisis, and the potential for stranded assets in the context of electrification of the vehicle fleet.

The NIC has the advantage of being able to look at cross-sectoral issues, without the institutional limitations experienced by single sector focused institutions such as economic regulators and are capable of providing forward looking systemic thinking<sup>3</sup>, for example in relation to smart infrastructure services (such as intelligent mobility and smart power) and spaces (integration across infrastructure sectors in cities).

***Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?***

The consultation describes the headline interdependencies:

- the demand of all infrastructures for energy, notably transport and increasingly ICT
- the cooling water requirements for inland thermo-electric plant
- the correlated demand by households and industry for all infrastructure sectors, meaning that all infrastructure sectors are subject to similar demand drivers.

We also note:

- The introduction and diffusion of *integration dependent technologies*, which require the integration of multiple infrastructure systems. For example, electric vehicles are dependent on integration between ICT, electricity and transport. Innovation within integration dependent technologies, such as smart grids, should not be treated as a single sector innovation problem, governed by one sector (e.g. the electricity sector)<sup>3</sup>.

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<sup>3</sup> Hiteva, R. and J. Watson, (2016), Governance of multi-regime interactions in sustainability transitions: the cases of water and electricity, and electric vehicles in the UK, Working Paper, University of Sussex.

- Multiple benefits of reducing water demand, which would not just reduce the requirement for water supply but would also reduce the volume of waste water that needs to be treated and the amount of energy used in households (for water heating) and by water utilities for treatment of water supplies and waste water.
- Multiple benefits of implementing sustainable drainage systems and dual sewers, not only for the waste water sectors but for urban flood risk management.

***Q6. Do you agree that the NIA should focus on these cross-cutting issues?***

Yes.

The bundling of ‘resilience’ with ‘cost [and] delivery’ underplays the importance of resilience. The questions of the appropriate level of resilience and how this might be achieved merit attention in their own right. We acknowledge that arriving at that judgement will require consideration of cost.

As noted above, we think there should be further consideration to affordability of infrastructure services for households and businesses, as a cross-cutting issue.

We have also noted the possibility for cross-cutting initiatives to manage demand for infrastructure, in particular via the progressive ‘servicization’ of infrastructure across sectors e.g. of connectivity and domestic comfort (heat, light, hydration, hygiene).

***Q7. Are there any other cross-cutting issues that you think are particularly important?***

**Innovation**, in terms of technologies and processes (ways of doing) should be a cross-cutting issue for NIA, as it is an essential component of fostering long-term and sustainable economic growth, improving UK’s international competitiveness, and the quality of life for those living in the UK; none of which could be achieved through innovation on one sector alone. Innovation here should be treated as a path-dependent socio-technical process which includes the development and diffusion of innovative and non-traditional business models for the delivery of infrastructure services and assets, as well as introduction of social and eco-innovations, in addition to innovative technologies. By focusing on innovation as a cross-cutting issue the NIC can take ownership of cross-sector innovations, such as smart grids and electric vehicles, which are restricted by a single-sector institutional framework.

**Well-being and quality of life** of people should be an explicit cross-cutting issue of the NIA, in recognition of its primary importance for the purpose of infrastructure. Sustainable economic growth and improved UK international competitiveness through infrastructure could be one of several ways in which well-being and quality of life is achieved. This issue should have an explicit spatial and temporal character, where its consideration should extend equally across the whole territory of the UK and for those generations which will be forced to pay for, use, maintain and dispose of infrastructure build in the next 30 years.



**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

Yes.

We are well aware of the circularity in the demand-driven approach, recognising how provision of new or enhanced infrastructure services can modify demand and ‘needs’. Nonetheless, we think that fully endogenising these feedbacks leads to unmanageable complexity. We therefore advise a consistency check between strategies for infrastructure provision and the demand scenarios that are used to test those strategies.

In the face of uncertainty, it will often be desirable to present options rather than fully defined investment plans. Those options should be accompanied by rationales for how and when the choice should be made between those options. We would like to see more emphasis on the development of adaptive strategies for decision-making. The water sector is beginning to adopt these approaches for water resources planning.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

The ITRC’s approach to decision analysis, set out in *The Future of National Infrastructure*, uses system models to evaluate infrastructure strategies in the context of scenarios of drivers of infrastructure demand, over extended timescales. The NIC is aware of NISMOD’s capabilities for analysis of “long-term, complex strategic prioritisation in uncertain environments”.

Methods for options appraisal under uncertainty have seen particular attention in the literature of climate change adaptation<sup>4</sup>, most notably in the context of adaptation of water resource systems<sup>5</sup>. This literature has influenced the ITRC’s work.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

We agree that these are the main drivers. We are pleased to see behavioural and lifestyle changes in the context of the ‘population’ driver, and note the interdependence between this and the technology and economy drivers.

We are also pleased to see emphasis upon the geography of economic development and acknowledgement of the role of infrastructure in that development. We would also note the role of housing (including house prices) and skills in economic geography, whilst agreeing that these issues are outside the NIC’s remit.

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<sup>4</sup> Hallegatte, S., et al., *Investment Decision Making Under Deep Uncertainty: Application to Climate Change*. 2012, The World Bank: Washington DC.

<sup>5</sup> Ray, P.A. and C.M. Brown, *Confronting Climate Uncertainty in Water Resources Planning and Project Design: The Decision Tree Framework*. 2015, World Bank: Washington, DC.

The NIC will doubtless have studied the evidence report for the second UK Climate Change Risks Assessment, recently published by the Committee on Climate Change<sup>6</sup>. This report sets out a comprehensive long-term analysis of climate-related risks and opportunities for the UK.

***Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?***

Development of the portfolio should be guided by a clear over-arching vision for the attributes of national infrastructure that are desired in future. Such a vision can then be interpreted in the context of each infrastructure sector, also with a view to interdependencies between sectors and the possible scale of drivers of infrastructure need.

Given the inherent uncertainties, it will be appropriate to leave some options open for the future, so it is helpful to identify the critical uncertainties that need to be resolved and the trigger points for decision making. For example, the ITRC's analysis of water resources in England indicates that there may be no need for additional supply infrastructure if enough is done to cost-effectively limit demand and fix leaks. But other scenarios (including a drier climate) foresee the need for significant new water resources. A critical uncertainty is the amount by which water companies will have to limit water withdrawals from existing sources in order to safeguard the aquatic environment (so called 'sustainability reductions'). The scale of these sustainability reductions needs to be resolved before strategic decisions can be made about new water resources. Analysis by Water UK has set out the investments that might be needed with and without the sustainability reductions. This consideration of optionality should be included in the portfolio of investments.

Similarly, demand for energy will be critically affected by the efficiency with which it can be used. The technical scope for efficiency improvement in buildings is very large and a large fraction is known to be cost effective, and therefore investment in it should form part of a least regrets infrastructure strategy. However, there remains significant uncertainty about the extent to which very low energy retrofits are cost effective in practice, and therefore future options for sustainable heating technologies need also to be considered.

***Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?***

No

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<sup>6</sup> <https://www.theccc.org.uk/UK-climate-change-risk-assessment-2017/>

## **Response to: National Infrastructure Commission Consultation on - The National Infrastructure Assessment: Process and Methodology**

### **Introduction**

1. IEMA is the membership body for more than 14,000 environment and sustainability professionals worldwide. We support individuals and organisations in setting and achieving globally recognised standards for sustainable practice, in turn driving the development and uptake of sustainability skills.
2. We add value for our members by providing the knowledge, connections and recognition necessary to lead change within organisations at all levels. We are independent and international. We apply the combined expertise of our members to provide evidence and influence decision-making, working towards our vision of transforming the world to sustainability.
3. IEMA members use their knowledge, influence and networks to play a leading role in making business more profitable, more resilient, less wasteful and future-proof. Our members are actively involved across the infrastructure lifecycle from pre-feasibility, through to planning, construction and to decommissioning and legacy. As an organisation, IEMA is a core partner in Crossrail's Learning Legacy, ensuring the environment and sustainability theme has a substantive influence on future UK infrastructure.
4. As an organisation we gather members' views and experiences to deliver evidence to Governments. In responding to consultations IEMA's key aims are to:
  - inform decision-making, based on robust and relevant information;
  - offer impartial credible professional advice; and
  - ensure the expert voice of our members is heard.
5. The following response has been produced by IEMA's Policy Team, based on research and engagement with IEMA members from across the UK.

### **Summary of Key Messages**

- IEMA supports the development of *The National Infrastructure Assessment*, and the Commission's plans to produce such an assessment in each Parliamentary cycle.
- The UK has a skills gap<sup>1</sup> – with only 13% of organisations fully confident that they have the right skills to successfully make the transition and compete in a sustainable economy. This skills gap limits the UK's ability to take advantage of the significant economic opportunities offered by planning and delivering the infrastructure needed to deliver a competitive and low carbon economy.
- NIA methodology should recognise the key enabling role skills and competence play in delivering infrastructure that meets the UK's needs and is fit for the future. **IEMA proposes that the commission ensures the scope of the NIA includes specific examination of *skills acquisition*, via formal education and crucially within the workforce, as a key enabling interdependency that bridges across the four key drivers identified.**

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<sup>1</sup> Preparing for the Perfect Storm: Skills for a Sustainable Economy (IEMA, 2014)

### **IEMA Detailed Response:**

1. IEMA warmly welcomes the opportunity to engage with the Commission on the development of the National Infrastructure Assessment's (NIA) planned process and methodology. In particular, we are pleased to see the recognition of the need for a broader sustainability objective and the way the approach set out in the consultation embraces the need to respond to environmental issues and climate change in its core remit.
2. IEMA's membership includes thousands of individuals working across the six sectors that will be the focus of the NIA – *Transport, Digital and Communications, Energy, Water and Drainage, Flood Defence, and Waste*. Their knowledge and experience in driving low carbon, sustainable and environmentally aware decision-making in project delivery regularly relates to long-term planning and managing complex cross-cutting issues, such as those listed in paragraphs 49-55 of the consultation.
3. As such, IEMA recognises the cross-disciplinary infrastructure drivers that exist and the challenges of planning, consenting, constructing, operating, renewing and deconstructing such long-term programmes of development. Due to this we would welcome the opportunity to continue to engage in the Commission's work in this area in future to further enable the experience and expertise of our members to support the NIA process.
4. However, in responding to this consultation IEMA has chosen to focus on the fundamental role of skills and knowledge acquisition. Skills play an essential role in the effective planning and delivery of infrastructure from the strategic down to shovels in the ground. IEMA regularly works with infrastructure developers and key contractors in this area, including recent work with Network Rail and Skanska, one of their core contractors, to ensure that appropriate environmental skills are accessible across their infrastructure development and maintenance activities. **We are concerned that the published NIA methodology consultation document has a key gap in relation to systemic issues, in that the role of skills is not listed in the cross-cutting issues listed in Paragraphs 49-55.**
5. IEMA's primary call, in response to the consultation, has direct relevance to Questions 6 & 7. It is our view that skills acquisition is a key enabler of infrastructure development and is already well recognised as a transitional catalyst in moving towards a low carbon economy<sup>2</sup>. As such, we **propose that *skills acquisition* be added to the scope of the NIA as one of the cross-cutting issues that will be a focus of the process.**
6. Broadly speaking we feel that NIA has the right scope of work in exercising its duties. However, to avoid the risk of creating a gap within the assessment the NIA should place greater emphasis on considering the role of an effective national skills recognition and acquisition process plays in planning for the UK's future infrastructure needs. The International Labour Office<sup>3</sup> recognises the vital role that skills play in driving national scale long-term economic performance, in their G20 training strategy, indicating:

*Equipping the workforce with the skills required for the jobs of today and those of tomorrow is a strategic concern in the national growth and development outlooks of all G20 countries.*

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<sup>2</sup> An Economy that Works (Aldersgate Group, 2014) [www.aneconomythatworks.org](http://www.aneconomythatworks.org)

<sup>3</sup> A Skilled Workforce for Strong, Sustainable and Balanced Growth (ILO, 2010)

7. In a UK context, many well-respected studies into strategic areas of Government policy have identified the key role skills and education play in enabling progress. UCL's Professor Paul Ekins and his colleagues in the *Green Economy Policy Commission*<sup>4</sup> identified innovation, infrastructure and information as the core pillars of a green economic strategy to enable the UK to take a more strategic approach to driving UK innovation system. The study identified the fundamental role skills acquisition must play in delivering progress, stating:
 

*It is increasingly accepted that those individuals, companies and countries that have generated and absorbed the **skills**, technologies and working practices that promote resource efficiency and environmental sustainability will prosper...* [emphasis added]
8. Further to this, the Institute of Civil Engineers' 2014 State of the Nation report<sup>5</sup> focussed on UK infrastructure provision, placing significant emphasis on workforce capability and capacity. It stated that: *the focus on infrastructure and desire to attract investment **provides the UK with a once in a generational opportunity to grow the skills of the domestic workforce to help meet the demand for increased capital and maintenance infrastructure projects*** [emphasis added]. The report recognised the link between planned skills acquisition and infrastructure planning, recommending the *National Infrastructure Pipeline* both assess and plan for future capability and capacity needs to ensure the UK work force fully benefits from infrastructure projects. It is IEMA's view that this recommendation is equally valid to the forthcoming work of the Commission and Government progress over the past two years should be built upon within NIA process.
9. Traditional skills acquisition in infrastructure planning and delivery should form a key role in the Commission's NIA process. In relation to sector specific skills and the demand for such skills, we refer the consultation response provided to the Commission by *Energy and Utility Skills*, who have specific expertise in this area. However, the Commission's consultation recognises climate change and the environment as a key driver for future infrastructure. It is IEMA's considered view that while traditional skills development and apprenticeships cater very well for technical sector specific skills, an approach focussed solely on this approach will not be sufficient to ensure we equip the UK for skills needed in for a 21<sup>st</sup> century economy.
10. IEMA's research (Skills for a Sustainable Economy: Preparing for the Perfect Storm<sup>6</sup>) has identified a significant skills gap across the UK in relation to the skills needed to enable an effective transitioning to a low carbon sustainable economy. The study identified the need for improvements in skills acquisition across the economy, including: greater emphasis on core sustainability knowledge, systems thinking, collaborative partnership, lifecycle thinking, and disruptive innovation. The Commission's consultation recognises (paragraph 29) that the NIA may not always look to recommend new physical infrastructure, but instead identify where existing assets can be used differently to provide the required infrastructure services.
11. This is a clear area where enhanced environment and sustainability skills can play a critical role. An example of this can be seen from the outcome of the Environmental Impact Assessment of

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<sup>4</sup> Greening the recovery – the report of the UCL Green Economy Policy Commission (UCL, 2014) <http://discovery.ucl.ac.uk/1421233/>

<sup>5</sup> State of the Nation – Infrastructure 2014 (ICE, 2014) <https://www.ice.org.uk/getattachment/media-and-policy/policy/state-of-the-nation-infrastructure-2014/State-of-the-Nation-Infrastructure-2014.pdf.aspx>

<sup>6</sup> Preparing for the Perfect Storm (IEMA, 2014) [http://oldsite.iema.net/system/files/perfect\\_storm-amended\\_version\\_july\\_2015.pdf](http://oldsite.iema.net/system/files/perfect_storm-amended_version_july_2015.pdf)

Billund Airport, in Denmark. In this case, environment and sustainability professionals positively influenced the infrastructure decision-making process to generate increased capacity and wider sustainability benefits. The project's Environmental Impact Assessment<sup>7</sup> drove a more sustainable and economically beneficial outcome – reducing noise levels to 1,000 homes, doubling the airport's flying capacity and saving E40.4M in avoided construction costs – by recognising and promoting revised operational take-off procedures at the existing runway facilities to achieve the same goals, without the need to invest in a new northern runway.

12. IEMA works with infrastructure developers and organisations in key supporting sectors to enhance the uptake and mainstreaming of environmental, low carbon and sustainability skills and knowledge. As a core partner on the Crossrail Learning Legacy's (CLL)<sup>8</sup> environmental theme we are working to share many of the environmental tools, templates and processes developed during the delivery of Crossrail. We are leading a project, as part of CLL, to assess the feasibility on an environmental and sustainability skills passport system for both back-office and on-site staff and contractors, to enable client confidence in such skills as the infrastructure workforce moves between major projects.
13. In summary, evidence from IEMA<sup>9</sup> and other leading organisations demonstrates the vital role skills acquisition plays in delivering future infrastructure. As such, **IEMA recommends that the Commission include *skills acquisition* within the scope of the NIA as one of the key cross-cutting issues that will be focussed upon in bridging across the key infrastructure drivers it identifies.**
14. IEMA would be happy to participate in future calls for evidence in relation to the NIA's development, and – alongside Energy and Utility Skills – would be happy to engage with and shape the development of an expert panel in relation to skills acquisition. Please contact either myself, or our CEO - [name redacted] [email address redacted], to follow-up on the above and discuss future ways in which IEMA can support the NIA process.

[name redacted]

[job title redacted]

IEMA

E: [email address redacted]

M: [phone number redacted]

**August 2016**

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<sup>7</sup> <http://ec.europa.eu/environment/eia/eia-billund-airport.htm>

<sup>8</sup> <http://learninglegacy.crossrail.co.uk/learning-legacy-themes/environment/>

<sup>9</sup> Position Statement: Skills for a Sustainable Economy (IEMA, 2014)  
[http://oldsite.iema.net/system/files/iema\\_skills\\_for\\_a\\_sustainable\\_economy\\_-\\_position\\_statement\\_forweb.pdf](http://oldsite.iema.net/system/files/iema_skills_for_a_sustainable_economy_-_position_statement_forweb.pdf)



Institute  
and Faculty  
of Actuaries

# National Infrastructure Assessment consultation

IFoA response to the National Infrastructure  
Commission

5 August 2016

## **National Infrastructure Commission: The National Infrastructure Assessment – Process and Methodology – A Consultation**

### **About the Institute and Faculty of Actuaries**

The Institute and Faculty of Actuaries (IFoA) is the chartered professional body for actuaries in the United Kingdom. Actuaries' training is founded on mathematical and statistical techniques used in insurance, pension fund management and investment and then builds the management skills associated with the application of these techniques. Actuaries can provide commercial, financial and prudential advice on the management of a business's assets and liabilities, especially where long term management and planning are critical to success. A majority of actuaries work for insurance companies or pension funds but they also advise individuals and offer comment on social and public interest issues.

### **Actuaries and infrastructure**

Actuaries are skilled in quantitative risk and finance, two areas which are important for developing infrastructure projects and investing in them.

Actuaries' work on infrastructure projects is mainly carried out from the perspective of investors or lenders to projects, for insurance companies, pension funds, investment firms and ratings agencies. A small number of actuaries also work for infrastructure projects directly, or their suppliers or advisers. The profession also has a long-standing joint working party with the Institution of Civil Engineers on the risks in infrastructure projects, as evidenced by the enclosures to this response.

The IFoA's Resource and Environment Board studies questions such as the likely impact of climate change, which is relevant for the sustainability of infrastructure projects.

### **IFoA response to NIC consultation**

1. The IFoA welcomes the opportunity to respond to the National Infrastructure Commission (NIC) consultation on The National Infrastructure Assessment – Process and Methodology. The IFoA's Finance and Investment Board and Risk Management Board are jointly responsible for the drafting of this response, and have oversight of the Infrastructure Working Party, which contributed much of the content.
2. The IFoA supported the creation of the NIC, which we believe has the potential to reverse historic underinvestment in infrastructure. We also support the National Infrastructure Assessment (NIA). This will provide a much-wanted long-term assessment of the country's infrastructure needs that will be "joined up" for the first time; that will seek to achieve political consensus; and that will reduce uncertainty for infrastructure investors. It provides an opportunity for the development of funding vehicles for infrastructure that will encourage participation by UK and overseas long-term investors.
3. The IFoA endorses the general approach to setting priorities described in the consultation paper, which involves drawing on a wide range of sources, such as scenarios based on historic data, models, and the views of sector experts.
4. The consultation paper makes no mention of the EU, but the Referendum result could have a significant impact on infrastructure investment in the UK. Possible implications include loss of subsidies, reduced confidence among investors, and uncertainty about whether EIOPA's preferential treatment of the asset class for insurance companies would continue to apply.



Such uncertainties could lead to project deferment and a negative impact on national economic growth.

5. We recognise that the Commission's remit from Government includes economic infrastructure but not social infrastructure such as schools and hospitals. Nevertheless, we would encourage the Commission to maintain an awareness of how its recommendations in the NIA could affect social infrastructure and vice versa, given the interdependencies between social infrastructure and the types of infrastructure covered by the Commission.

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- a. foster long-term and sustainable economic growth across all regions of the UK**
- b. improve the UK's international competitiveness**
- c. improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

6. To achieve these worthy but challenging objectives, the NIC will need to encourage an infrastructure investment market in which there is a broad range of high quality projects in which to invest, and in which potential investors have sufficient incentive to do so. This is not just a question of providing an adequate return on the investment (important though that is) but also – crucially – only seeking to place on investors the types of risk that they are willing and able to bear.
7. We believe it is important to develop close liaison and transparency between planners and potential investors. One way to do this would be to give investors access to risk studies on individual projects, since whatever the investor's risk appetite, it is crucial for them to understand the risks in depth so they can balance the risks and prospective returns. The project information provided to investors should cover environmental and social aspects as well as economic ones.
8. The NIC should also encourage sponsors and planners to present projects and their proposed financing arrangements in standard formats as far as possible, to facilitate due diligence by potential investors and comparisons between projects. The presentation should specify the risks which the investor will bear and those which will be borne by other parties.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- a. Open, transparent and consultative**
- b. Independent, objective and rigorous**
- c. Forward looking, challenging established thinking**
- d. Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

9. We strongly agree with all of these principles for carrying out the NIA. We particularly support the need for a whole system approach, understanding and studying the interdependencies and feedbacks. We have commented on this in more depth under question 5. In addition, we welcome plans for the NIA to incorporate an element of scenario or stress testing to demonstrate the robustness of the eventual recommendations.
10. You may wish to consider adding “evidence-based” to the Commission’s list of qualities.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

11. We support the approach of treating each sector in an integrated way, and then similarly looking at all sectors together.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

12. One of the work-streams of the Commission should be to study existing publicly-owned infrastructure in each sector (including assets owned by agencies and local authorities). This would be done with a view to identifying which assets could be leased (for 20 or 30 years) to long-term private sector investors at home or overseas, such as pension funds or insurance companies, in order to raise funds for new infrastructure investment. This could lead to a continuous cycle developing in future, whereby new assets would mainly be financed by the public sector, but when construction was complete and the asset in operation, it too would be leased off in order to raise funds for the next round of investment. The leasing of the Channel Tunnel Rail Link is a useful precedent.
13. Private institutions considering an investment are likely to want assurance that any new technology which is to be used has been thoroughly tested first in real-life operation. In the IFoA’s response to the recent Department of Business, Innovation and Skills call for ideas on a National Innovation Plan, we noted that through Innovate UK, the Government is supporting researchers and entrepreneurs to develop a range of systems for adaptable infrastructure. We would encourage the NIC to liaise closely with Innovate UK, so that the NIA can take account of how innovation could influence the provision of infrastructure in each of the sectors.
14. We believe that the energy sector, and especially the generation and distribution of electricity, is of such critical importance that the NIA should focus on it particularly. Regard should be had to future demand forecasts but there should at all times be a sufficient margin (and/or contingency plans) to allow for unexpected extra demand and for discontinuities in the supply chain due to causes such as severe weather or terrorism. The NIA should be consistent with the UK’s carbon budgets and expert advice (e.g. from the Committee on Climate Change) about the need to decarbonise the energy sector to meet climate change targets.
15. Climate change effects, including more widespread flooding, could give rise to water supply problems in parts of the UK, and we believe that ensuring resilience of the supply in those areas should be a priority.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

16. Energy is likely to have strong interdependencies with transport (as noted in paragraph 42 of the consultation paper) and with most other forms of infrastructure. There are also important interdependencies within the transport sector, e.g. between roads and railways, and between both of these and airports. As paragraph 8 of the consultation notes, new housing drives the need for energy, transport and schools, and conversely, provision of adequate infrastructure can affect whether planned housing developments are viable.
17. We would encourage the NIC to look at whether interdependencies could be mapped in a methodical way in the development of the NIA. A simple scale of (say) 1 to 5 could be used, where 1 means low and 5 means high levels of interdependence. For example, a city's tram scheme would probably be ranked 1 against most other forms of local infrastructure, and possibly 2 against local electricity infrastructure. By contrast, a new airport might have a ranking of 5 against other airports, and against roads and railways in its locality.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues? AND  
Q7. Are there any other cross-cutting issues that you think are particularly important?**

18. We agree with the list of cross-cutting issues set out in the consultation paper. We welcome the focus on governance and the recognition that effective frameworks for planning and decision-making are crucial to success. We also wish to highlight three other cross-cutting issues.
19. We are pleased that the NIC has included evaluation and appraisal methodology in the list. The IFoA and the Institution of Civil Engineers have collaborated on two projects (further details of which are attached with this response) which are relevant to this area:
  - a. The RAMP Guide contains procedures for project appraisal, including a method for determining probabilities of various outcomes, leading to a risk-adjusted Net Present Value. RAMP has been used by Crossrail as one of the foundations of its own risk-management system (along with STRATrisk, a guide to managing ongoing strategic risks).
  - b. 'Front end thinking' describes the analysis that needs to be undertaken between identifying a possible need for new infrastructure and authorising a particular project. During this period it is essential to ensure that critical issues are not inadvertently left out of proper consideration and to avoid premature commitment to a particular project. There is a need to use data which is as accurate as possible, with cross checks to other projects, and there should also be a rigorous approach to risk, both quantifiable and qualitative. Without these, many mistakes or omissions can occur, which can lead to sub-optimum projects being selected or even the eventual failure of a project.
20. A second cross-cutting issue which is particularly relevant to the IFoA is funding and financing. We believe that it may be possible to develop more efficient financing structures, which sub-divide the financing into different tranches, carrying different degrees of risk. This would enable different kinds of investor to select the tranche which best meets their own needs from a risk and return viewpoint, and hence encourage their participation. For example, some investors might be willing to bear construction risks and the risks associated

with traffic forecasts, in order to achieve higher investment returns, whereas other investors might be more conservative and wish to invest only in completed projects. Equity finance is often most appropriate in the early stages of a project, while investment in completed projects may be undertaken through debt instruments (possibly index-linked) or a combination of debt and equity. Subdividing the financing structure in this way is likely to encourage public-private partnerships which would provide a greater degree of risk clarity and enable projects to go ahead more quickly, without the confusion and delay which can arise when risks only emerge after a due diligence process has been completed.

21. Some approaches the Commission could consider include:
- a. Financing of large developments by developers using bank finance, with a commitment from the outset by long term investors to buy the developer out once construction is complete and operation has commenced (used successfully in the 1970s for large town centre shopping malls);
  - b. "Shadow tolls" paid by the public sector for those kinds of infrastructure which do not carry their own income stream from charges made to users;
  - c. Public-private partnerships based on charges to the public sector for the provision and continued availability of suitably serviced assets.

We believe that work by the Commission on financing issues would be of material help in getting future projects off the ground efficiently, and the IFoA would be pleased to assist if required.

22. One additional area which we suggest should be studied is the question of how best to compensate people and businesses adversely affected by proposed infrastructure projects. The aim would be to try to work out a better system which would reduce opposition and the resulting long delays, so that projects could commence earlier and their benefits be received sooner. The study should include the quantum and timing of the compensation that would be needed, and the criteria for receiving it, as well as an assessment of whether the costs of any new system recommended are justified, having regard to the resulting savings in development costs and the earlier attainment of a project's benefits.

23. The third cross-cutting issue we wish to comment on is performance measures. The consultation paper notes (paragraph 55) that performance metrics often fail to give an adequate account of the value of services provided. Developing meaningful performance measures will be important both for target-setting and for post-implementation studies to learn lessons for the future. We note that this is an area of active interest for the social impact investment field.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

24. The IFoA would endorse the general approach to setting priorities described in the consultation paper. We agree that difficult judgements will be unavoidable and that the NIC should draw on a wide range of sources, such as scenarios based on historic data, models, and the views of sector experts.
25. The remit of the 'Vision and Priorities' document, which will precede the NIA, includes setting out 'priority areas for action over the medium term' (paragraph 4). Below we have set out a list of some potential infrastructure priorities (not in any particular order):
- a. Ensure the safety and resilience of our electricity supply, including scenarios where demand increases sharply.
  - b. Introduce more protection against terrorism

- c. Improve resilience to severe flooding.
  - d. Identify infrastructure schemes which would ease the lives of ageing and disabled people.
  - e. Identify schemes which would help us to meet greenhouse gas emission targets or improve the environment.
  - f. Reduce the risk of stranded assets by considering the compatibility of proposed projects (especially energy and transport ones) with carbon budgets and climate change targets.
  - g. Identify schemes which would improve social justice or other aspects of human welfare.
  - h. Improve or replace existing infrastructure nearing the end of its life.
  - i. Using national and regional growth plans, identify possible infrastructure schemes which would assist the achievement of the growth targets in those plans.
26. This is not a definitive list, but we have set it out here because we believe that to be effective, the NIA should include a mechanism for deciding on the relative weights to attach to each of these priorities (and possibly others) when selecting projects. This will require both information and judgement at several levels - political, economic and financial. This is a challenging task but we believe the Commission will need to embrace the challenge in order to produce a NIA that yields optimum benefit for the UK and its population. One possible approach could be to use a 'Quadruple bottom line' framework in which economic considerations are supplemented by social and environmental assessments together with an analysis of the sustainability of all three factors. Another possible approach might be to award points to prospective projects, under each of the priority headings (weighted as necessary), and then to select a short-list of those projects which score most highly, before using judgement to refine this short list into a programme.
27. Another important consideration will be the timing of projects, given scarce resources. It will not be possible to implement every desirable project immediately. Having a clear idea of the nation's most urgent needs will help in deciding which projects should be implemented first, and political inputs may be helpful in making such judgements, as well as prioritisation scores.
28. One issue may be the appropriate scale for priorities. For example, the process for setting priorities should be able to deal with the fact that a national priority for, say, a more comprehensive road network may not apply in some regions.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

29. We have already referred to RAMP, which includes a simple practical model that can produce a probability distribution of outcomes, something which scenario analysis on its own cannot do (consultation paragraph 59). This enables projects to be prioritised according to a "risk-adjusted Net Present Value", and not just according to the expected Net Present Value in the business case. Care needs to be taken in applying an appropriate discount rate, noting that, when assessing public projects intended to benefit society as a whole, it may be appropriate to use a lower rate than when assessing the benefits of a project to a private investor. The model also enables risk mitigation options to be prioritised according to their degrees of cost effectiveness.

30. We would also suggest considering Multi-Criteria Analysis (MCA). MCA approaches enable projects/options to be ranked using an appropriately-weighted combination of criteria. It is particularly suitable for "mixed type" data (i.e. a mix of qualitative and quantitative criteria, with the latter expressed in a variety of units) and where it is desirable to involve stakeholders in the prioritisation process.<sup>1</sup>

**Q10. Do you believe the Commission has identified the most important infrastructure drivers [population and demography, economic growth and productivity, technology, and climate change and environment]? Are there further areas the Commission should seek to examine within each of these drivers?**

31. We believe that most infrastructure needs are generated by one or more of the four drivers suggested.<sup>2</sup> It may also be worth mentioning consumer preferences and political pressures, which are harder to measure than economic factors but which could also have a significant impact on people's perceptions of infrastructure needs. Other factors which might give rise to a demand for more or improved infrastructure, or impact on the detailed design of infrastructure, include social dimensions such as protection against crime, more rigorous safety regulations, and pressures to catch up with improved infrastructure in other countries. Another driver might be the need to redistribute some infrastructure within the country in order to reduce vulnerabilities in "hot spots".

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio? AND**

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

32. *General approach* The IFoA agrees with the broad approach described in the consultation paper. Analysing individual sectors and their interdependencies (which we have suggested could be mapped in a structured way) will help to lead to an initial set of infrastructure priorities.
33. *Measuring social and environmental factors and their sustainability* When comparing both high-level priority areas and specific projects, the Commission should consider using a broad range of metrics which cover not only economic outcomes but also social and environmental measures as well as a sustainability assessment. The IFoA is involved with environmental and resilience questions such as flooding, asset stranding and limitations of resources. We are also aware of increasing social engagement with these issues, and we would encourage the NIC to make an active effort to take account of all members of society in developing the NIA's priority list and portfolio selection.
34. *Scale of projects* The infrastructure portfolio does not need to be limited to large, concentrated projects. Smaller, more local and more geographically spread out projects may increase resilience by containing the impact of unexpected events such as a natural disaster or a terrorist attack.

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<sup>1</sup> See [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/7612/1132618.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7612/1132618.pdf) .

<sup>2</sup> We note that they are closely aligned with the IFoA's Key Policy Priorities (KPPs), which cover issues around the ageing population (similar to 'Population and demography'); investment policy (similar to 'Economic growth and productivity'), the area of risk and insurance (which is broadly related to 'Technology'), and resource and environment issues (similar to 'Climate change and environment').

35. *Optimism bias* The Commission should also study the impact of optimism bias in project appraisals. There is reason to believe that the inclusion of these massive contingency allowances in capital costs distorts the comparative appraisals between one project and another, runs the risk of rejecting worthwhile projects, and provides project managers with too comfortable a budgetary cushion leading to waste. It also discourages the application of comprehensive risk-management techniques which would provide more accurate assessments of project worth, identify opportunities for enhancing the project to increase benefits, and assess which risk mitigation options are cost-effective. Where comprehensive risk management is undertaken, projects will be fully thought through in advance and there will be a strong case for reducing or sometimes even eliminating optimism bias adjustments.
36. *Resource issues* In practice there are constraints on the size of any infrastructure investment programme, because of limits on the resources of people and materials which can be made available at any one time. We suggest that the Commission should study these constraints and consider possible ways in which they could be overcome, both in the short term and the longer term. From a longer term perspective, and given post-Referendum uncertainties about freedom of movement from the EU, the NIA is an opportunity to assess what workforce capabilities are needed and to proactively use projects to build this resource within the UK population. This may increase costs for projects in the short term while bringing total costs down in the long term.
37. *Funding issues* To go from strategic priorities to recommending a portfolio of specific projects, the Commission will need to have a deep knowledge of funding issues. This should include the impacts of different investment vehicles; whether the existence of too many risks would make some projects inaccessible for most investors; and funding sources, including whether these are UK-based or overseas-based. The IFoA would be willing to help the Commission in this area.
38. *Insurance of infrastructure* We also recommend that a study should be made of the insurance products which can be made available for enabling public-sector sponsors of infrastructure to be covered against a variety of risks. This study should cover not only the standard insurance products, but also ways in which additional risks might be insured, for example through Lloyd's. Consideration should be given to possibilities such as the insurance of only a proportion of each risk, enabling the public sector to continue to bear much of the risk itself (if desired) and keeping the cost of insurance premiums as low as possible, but enabling the public sector sponsor to get the benefit of the risk mitigation and risk control measures suggested by the insurer. Such measures could control the costs of a project to a greater extent than sometimes occurs at present. The IFoA has many members working in general insurance and would be pleased to discuss these ideas further.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

39. The NIC should be as open as possible with stakeholders as it seeks evidence to develop the NIA. For example, organisations such as the ESRC's Centre for Understanding Sustainable Prosperity could help the NIC to identify holistic, long-term and resilient projects. The NIC should also ask local and community-based organisations for their views on early drafts. The IFoA would also be happy to be involved with this.
40. Preliminary discussions should be held with HM Treasury so that the NIA can be prepared against a realistic understanding of the present financial situation, and an awareness of

possible enhancements to the NIA which might become possible if some of the financial constraints could be relaxed. Key questions would include whether the Government would be prepared to bear more risk itself in order to get more projects off the ground, and if it will reimburse investors for monies expended in the event of premature cancellation of a project. There is also the question of possible studies on the leasing of existing infrastructure, optimism bias, compensation for people affected, and shadow tolls. The IFoA would be pleased to join in such discussions if that would be helpful.

Should you wish to discuss any of the points raised in further detail please contact [name redacted], [job title redacted] ([email address redacted]/[telephone number redacted]) in the first instance.

Yours faithfully

[signature redacted]

[name redacted]  
[job title redacted]

**Enclosures:**

- i. **A copy of the RAMP Guide**  
<https://www.dropbox.com/s/unupwq4fixqbdok/RAMP%203rd%20edition%202014%20for%20NIC.pdf?dl=0>
- ii. **Appendix 12 of the RAMP Guide 2<sup>nd</sup> edition, *Risks in Major Infrastructure Projects***  
<https://www.ice.org.uk/ICEDevelopmentWebPortal/media/Disciplines-Resources/Best%20Practice/ramp-2nd-edition-appendix-12-major-projects.pdf>
- iii. **Front-end thinking issues paper produced by joint working party of the IFoA and the Institution of Civil Engineers**



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REMIT & PLAN: PRINCIPLES  Q1	<p>The Government has given the National Infrastructure Commission objectives to:</p> <ul style="list-style-type: none"> <li>• foster long-term and sustainable economic growth across all regions of the UK</li> <li>• improve the UK's international competitiveness</li> <li>• improve the quality of life for those living in the UK</li> </ul> <p>What issues do you think are particularly important to consider as the Commission works to this objective?</p>	<p><u>Political Objectives and Stable Regulation</u></p> <ol style="list-style-type: none"> <li>1. To successfully maintain and enhance societies portfolio of infrastructure assets requires <b>stated political direction that is aligned with a core strategy for infrastructure</b>. Without clear political direction there is a policy vacuum.</li> <li>2. It is clear that regulatory uncertainty adversely affects infrastructure investment decisions and adds a risk premium to costs. The consistent political direction needs to be demonstrated by <b>consistent stable regulation</b>, and a predictable cycle of sectorial regulatory change and budget setting.</li> <li>3. <b>The role of the NIC should be to support Government;</b> <ol style="list-style-type: none"> <li>a. <b>To put in place appropriate a core strategy that can deliver the required political direction, and</b></li> <li>b. <b>Understand and assess the implication for national infrastructure of existing regulations and budgets, and of changes to either.</b></li> </ol> </li> </ol> <p><u>Sectorial and Regional Strategies</u></p> <ol style="list-style-type: none"> <li>4. Sectorial and Regional strategies provide the stable framework within which the core strategy for infrastructure can be delivered. They should be written to provide the basis for adapting infrastructure priorities that meet our evolving understanding of the future need for infrastructure services.</li> <li>5. These strategies are essential to mitigate strategic decision risk, and essential to have in place before we can start thinking about individual projects or programmes of works.</li> <li>6. Many infrastructure strategy and project decisions will have consequences that last over a 100yrs. However, anticipating future infrastructure needs becomes progressively more uncertain. Therefore, the current time horizon being applied in the NIA of 30 years is a reasonable compromise</li> <li>7. <b>The NIC should be responsible for validating 30-year Sectorial and Regional Strategies, and ensuring that these are co-ordinated.</b></li> </ol> <p><u>Building Resilient and Flexible Infrastructure</u></p>

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		<p>8. To deliver sustainable growth, international competitiveness and to improve the quality of life, the <b>flexibility and resilience</b> of the country’s infrastructure assets needs to be independently monitored and enhanced where appropriate.</p> <p>9. <b>Flexible</b> infrastructure plays a vital role in providing options and choices when faced by rapid changes in the environment, the economy, social aspirations; or technology. The value of infrastructure is clearly enhanced by having an inherent flexibility to be adapted to meet the potential of future change. However, this flexibility may represent a degree of redundancy in the design that comes with a cost.</p> <p>10. <b>Resilient</b> infrastructure allows the impact of extreme (“tail”) events to be better accommodated. However, benefits only accrue when compared to the potential full cost of “sweeping up afterwards”., and can be difficult to justify in advance.</p> <p>11. The ICE State of the Nation “Defending Critical Infrastructure” (2009) identified how <b>interdependency</b> between different infrastructure can increase the impact of extreme events, and how diversification can play an important role to limiting. Infrastructure interdependencies can be difficult to detect, and require both a knowledgeable and lateral approach to identify whether they enhance or detract from a wider resilience to support a more resilient economy.</p> <p>12. Assessing the full risks and benefit to society of flexible and resilient infrastructure is difficult to recognise when assessing the benefits in new and existing infrastructure assets. The typical sectorial approach typically adopted makes justification for changes to proposed investments</p> <p><b>13. The NIC should provide <u>the</u> independent oversight of major infrastructure decisions, responsible for ensuring that;</b></p> <ul style="list-style-type: none"> <li>a. <b>future optionality and potential value is not given up for the benefit of short term or single sector cost saving (e.g. configuration of city centre railway stations),</b></li> <li>b. <b>objective analysis is undertaken of potential future benefits and costs,</b></li> <li>c. <b>cross sectorial or geographical interdependencies are made not greater by infrastructure investment decisions.</b></li> </ul> <p><u>Governance and Independence</u></p> <p>14. When considering infrastructure strategies and projects, long lead times and lifecycles need to be balanced against the shorter 5-year political cycle, when the political direction and core strategy is re-stated. However, the forecast of demand for infrastructure services, and the</p>

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		<p>condition and capability of existing infrastructure to meet these demands, is capable of impartial and quantified analysis.</p> <p>15. The development of sectorial and regional strategies and major infrastructure decisions should take this analysis as the basis to undertake structured research, that pools knowledge and experience, to understand and reduce uncertainty as far as practical, and to create options as part of an appraisal process.</p> <p>16. To support delivery of Governments core strategy there needs to be an effective process in place to address the uncertainty and risk in forecasting the demand for infrastructure services. These processes should from a robust framework to address our natural cognitive bias that inhibit good thinking about risk.</p> <p><b>17. To reduce risk in identifying and defining infrastructure strategies and projects the NIC should fulfil the role of “critical friend” to UK plc, by providing;</b></p> <ul style="list-style-type: none"> <li><b>a. A regular independent report, direct to Parliament, on the condition of existing infrastructure assets, and of the effectiveness of the sectoral and regional strategies to deliver current political objectives, and</b></li> <li><b>b. An independent, expert challenge of infrastructure strategies and projects, structured in such away so as to minimise the impact of natural bias. e.g. consequences of wrong decisions are considered in detail.</b></li> </ul>
<p>REMIT &amp; PLAN: PRINCIPLES</p> <p>Q2</p>	<p>Do you agree that, in undertaking the NIA, the Commission should be:</p> <ul style="list-style-type: none"> <li>• Open, transparent and consultative</li> <li>• Independent, objective and rigorous</li> <li>• Forward looking, challenging established thinking</li> </ul>	<ol style="list-style-type: none"> <li>1. It is important that the conduct of the NIC should be; transparent, independent, challenge established thinking and take a whole system approach.</li> <li>2. This can be most objectively achieved by utilising a stochastic whole system model that captures; <ol style="list-style-type: none"> <li>a. The current infrastructure assets and their condition,</li> <li>b. The relationship between assets, their capability and other assets</li> <li>c. How environmental factors (rainfall, temperature, sea level, flooding etc) impact assets,</li> <li>d. The forecast capability of assets to provide the services required,</li> <li>e. The forecast demand for infrastructure services,</li> </ol> </li> <li>3. This model should be able to distinguish between different geographical regions of the UK. Later versions could introduce stochastic simulation for local areas.</li> <li>4. Particular attention should be addressed to ensure that modelling of costs and benefits captures the asymmetries, or step changes, that can be associated with demand for infrastructure services. Knowledge of these should significantly influence the design and configuration of infrastructure</li> </ol>

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	<ul style="list-style-type: none"> <li>Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?</li> </ul> <p>Are there any principles that should inform the way that the Commission produces the NIA that are missing?</p>	<p>assets, or the development of alternative solutions and contingency plans, and may not be include in alternative approached e.g. scenario modelling.</p> <ol style="list-style-type: none"> <li>The resulting forecast and analysis should form an obligatory consideration when setting the core strategy for infrastructure.</li> <li><b>The National Infrastructure Commission should initiate the development of a publicly available model of the UK's principle infrastructure assets that allows alternative budgets and strategic decisions to be modelled.</b> (see reference to ETi ESME model)</li> </ol>
REMIT & PLAN: SECTORS Q3	Do you agree that the NIA should cover these sectors in the way in which they are each described?	<ol style="list-style-type: none"> <li>There is a risk that the National Infrastructure Commission becomes perceived as agents of the construction industry.</li> <li><b>The credibility of the National Infrastructure Commission would be enhanced if its terms of reference demonstrate its focus is to prioritise how to best meet the forecast demand for infrastructure services, rather than engaging with specific projects or schemes.</b></li> </ol>
REMIT & PLAN: SECTORS Q4	Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?	
REMIT & PLAN: SECTORS Q5	<p>The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies.</p> <p>Are there are particular areas where you think</p>	<ol style="list-style-type: none"> <li>Interdependencies across sectors have a significant role when assessing needs and risk. For example; new housing, transport, energy, schools and hospitals are highly interdependent. Aspects of the interdependency would be captured in the model that is proposed for the NIC to develop.</li> <li>Whilst some of these sectors are not covered by the NIC, the implication of alternative policies of areas not included (particularly housing) will still need to be structured in quantitative modelling of these interdependencies, enabling a range of alternative scenarios to be considered.</li> </ol>

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	such interdependencies are likely to be important?	<b>3. Therefore, the National Infrastructure Commission should ensure there is an obligation for the areas not directly included under the remit of the NIC are appropriately picked up and modelled, and the implications shared with the appropriate bodies.</b>
REMIT & PLAN: CROSS CUTTING ISSUES  Q6	Do you agree that the NIA should focus on these cross-cutting issues?	<ol style="list-style-type: none"> <li>1. There can be considerable differences in the transfer of risk when considering alternative financing and funding approaches. Ensuring risk is located (i.e. “owned”) where it is best managed, and recognising that this changes over the lifecycle of an infrastructure project is an essential part of a good sectorial strategy.</li> <li>2. This is best addressed by methodically considering as part of the “front-end thinking” in project development. A number of issues infrastructure schemes can be attributed to where insufficient attention has been paid to this, thereby jeopardising success. A paper summarising the issues is referred to in response to Q9, and separately submitted by the IFoA.</li> <li><b>3. The National Infrastructure Commission should ensure infrastructure schemes have clearly defined governance structures in place that ensure appropriate allocation of risk over the lifecycle of the infrastructure.</b></li> </ol>
REMIT & PLAN: CROSS CUTTING ISSUES  Q7	Are there any other cross-cutting issues that you think are particularly important?	
METHODOLOGIES: VISION & PRIORITIES  Q8	Do you agree with this methodological approach to determine the needs and priorities?	<p>As outlined in our responses above - the role of the National Infrastructure Commission should prioritise;</p> <ul style="list-style-type: none"> <li>• <b>Aligning political direction with an infrastructure core strategy,</b></li> <li>• <b>Ensuring effective sectorial and regional strategies are in place, and</b></li> <li>• <b>Providing independent oversight of major infrastructure decisions</b></li> </ul>
METHODOLOGIES: VISION & PRIORITIES  Q9	Do you have examples of successful models which are particularly good at looking at long-term, complex strategic	<ol style="list-style-type: none"> <li>1. We would refer to the ETI’s internationally peer reviewed energy system modelling environment (ESME) – a national energy system design and planning capability helps to identify key areas for ETI investments and also underpins and informs UK Government energy policy. (ref: <a href="http://www.eti.co.uk/project/esme/">www.eti.co.uk/project/esme/</a>) This model gives an indication of how a complex system can be modelled, and how this model can then be used to inform strategic decisions.</li> </ol>

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	<p>prioritisation in uncertain environments?</p>	<p>2. The ICE and IoFA expert Risk Panel has collaborated over a number of years. Particular outputs that are relevant to the work if the National Infrastructure Commission include two included in the IFoA submission that we would highlight;</p> <ul style="list-style-type: none"> <li>a. RAMP Guide (2014) This covers a number of relevant areas, including how to generate risk-adjusted net present values to place alongside the expected net present values in the business case</li> <li>b. Current project considering “Front end thinking”. This addresses the early stage issues around establishing the optimum project definition, budget, governance and critical decisions points.</li> </ul>
<p>METHODOLOGIES: VISION &amp; PRIORITIES  Q10</p>	<p>Do you believe the Commission has identified the most important infrastructure drivers?</p> <p>Are there further areas the Commission should seek to examine within each of these drivers?</p>	<ul style="list-style-type: none"> <li>1. (See previous) Forecasts of demand for infrastructure services will include significant uncertainty.</li> <li>2. Changing social values and aspirations can influence the demand for infrastructure services. For example, a wide dependency on web based services that has emerged in recent years has pushed up demand socially for high speed internet connectivity.</li> <li><b>3. The National Infrastructure Commission should ensure that forecasts of demand for infrastructure services address the potential for changes in social values and aspirations.</b></li> </ul>
<p>METHODOLOGIES: FINALISING THE ASSESSMENT  Q11</p>	<p>The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future.</p> <p>Do you have a view on the most appropriate methodology to determine that portfolio?</p>	<ul style="list-style-type: none"> <li>1. Adapting and changing existing infrastructure may carry a lower risk profile in implementation, and provide more certainty in its operation, as opposed to building “new”.</li> <li>2. To make this type of judgement requires a detailed and impartial assessment of the capabilities and characteristics of existing infrastructure assets.</li> <li><b>3. The National Infrastructure Commission should undertake a periodic quantitative and detailed assessment of the national infrastructure assets.</b></li> </ul>

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METHODOLOGIES: FINALISING THE ASSESSMENT  Q12	In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?	<ol style="list-style-type: none"> <li>1. Significant inefficiencies are associated with industries that faces stop-go cycles. This has often been associated with the construction sector, where teams and capabilities are disbanded during the stop phase, cannot easily or quickly be reassembled for the next go phase. The result is often that the go phase is slow to get started, resulting in project delays and additional costs and uncertainties.</li> <li>2. <b>The National Infrastructure Commission should sponsor studies to consider how the adverse effects of stop-go cycles can be best alleviated.</b></li> </ol>
ENGAGEMENT  Q13	How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?	<ol style="list-style-type: none"> <li>1. The role of uncertainty and risk is central to the effective identification, development budgeting, and management of infrastructure. This is particularly key given that infrastructure assets represent a significant capital expenditure, a long term operational commitment and unique / one of a kind. As this may involve seeking funding from the capital markets where appetite for risk and different asset classes change regularly.</li> <li>2. Ensuring uncertainties are identified, understood (as far as is possible) and communicated is central to ensuring infrastructure assets are maintained and developed that serve societies needs now and in the future. However, public interpretation of uncertainty misinterprets details of proposed schemes, and may be subject to adverse press interpretation.</li> <li>3. <b>Therefore, the National Infrastructure Commission should;</b> <ol style="list-style-type: none"> <li>a. <b>Ensure regular contact is maintained with professionals who understand the viewpoints of long-term institutional investors on risk and return, and</b></li> <li>b. <b>Generally, ensure published details of potential schemes take specific care to ensure to avoid unnecessary or premature planning blight, where schemes may not be authorised for a number of years, if ever.</b></li> </ol> </li> </ol>

FURTHER OBSERVATIONS & RECOMMENDATIONS	The case for an independent National Infrastructure Assessment	
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## InterGen response to The National Infrastructure Assessment

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National Infrastructure Commission  
1 Horse Guards Road  
SW1A 2HQ

NIAEvidence@nic.gsi.gov.uk

5<sup>th</sup> August 2016

Dear Sir/Madam,

InterGen welcomes this opportunity to respond to the NIC's National Infrastructure Assessment. We understand that this response and the information contained herein will be treated as confidential and will not be disclosed to other parties without our prior written consent.

### **Background**

InterGen is one of the UK's largest independent generators, operating a portfolio of three high efficiency, low emissions producing, flexible gas-fired power stations totalling 2,490MW; an investment of some £2.1bn. These stations are located at Rocksavage (Cheshire), Spalding (Lincolnshire) and Coryton (Essex). In addition, InterGen has two new gas-fired generation projects which are "shovel-ready" in Spalding and Essex (Gateway Energy). These new stations will cost around £1billion to construct over their three year build programmes and create around 3,000 jobs locally.

Our response to this consultation will be largely focused on areas that impact the UK energy sector and security of supply. More specifically our response will be focused on the significant amount of proposed new electricity interconnection infrastructure.

### **Detailed Response**

**We set out our responses below (using the numbering set out in 'The National Infrastructure Assessment' paper):**



**Q1. What issues do you think are particularly important to consider as the Commission works to this objective?**

The objectives that the Commission has laid out seem appropriate. InterGen would encourage the Commission to strongly consider the impact of a proposed 9GW, or more, of future electricity interconnection (*ref: 2016 Budget Policy Paper*) on two of these key objectives: 1) *the UK's international competitiveness* and 2) *improving the quality of life for those living in the UK*.

Interconnectors are currently exempt from paying all UK network charges (TNUoS, BSUoS, TLM and CPS) and are in receipt of a number of financial support mechanisms (namely; projects of common interest fund, Ofgem's cap & floor). Furthermore, interconnectors are currently able to benefit from being a quasi-generator and participate in the UK capacity market. This un-level playing field significantly disadvantages the competitive of other domestic GB energy generation and moreover puts in jeopardy government's policy objective of seeing new gas fired generation come forward.

InterGen is owned by two major international investors, representing two key classes of investment which the Government is seeking to attract to UK infrastructure investment, namely, pension funds (Ontario Teachers' Pension Plan) and strategic investors from the People's Republic of China (China Huaneng/Yuedean). This unpredictable and inconsistent treatment towards interconnectors in particular has a detrimental impact on the UK's international competitiveness when seeking to attract foreign investment in the sector. Ultimately, Interconnectors weaken the investment case for new generation, CCGT in particular. Interconnector capacity will displace domestic generation assets to the benefit of foreign assets compromising security of supply.

Regarding the second objective, improving quality of life for those living in the UK, InterGen would encourage the commission to refer to Aurora's report *Dash for Interconnection: the impact of interconnectors on the GB market*. This report offers a challenging view on the positive and negative impact on such a growth of interconnection on GB welfare.

**Q2. Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

N/A

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

InterGen would suggest that Section 44 'Energy' should include electricity interconnection or even a broader review of the role of energy infrastructure in UK security of supply.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

Please refer to our response in Q3.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

N/A

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

InterGen would support these cross-cutting issues.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

InterGen would suggest, in reference to electricity interconnection that issue 54. *Evaluation and appraisal methodology* is given due recognition. As previously discussed, and as highlighted in Aurora's report, a thorough review should be conducted regarding the proposed volume of future interconnection capacity, ensuring in particular that the wider impacts on the UK transmission system, are carefully evaluated.

Aurora's report highlights, using their methodology, that in fact only the proposed interconnector with Norway would have a positive impact on GB net welfare, the others would have a negative impact. Furthermore, when the Cap and Floor assessments were made for a number of these new build interconnectors this was prior to Brexit and the announcement of the French carbon floor to be introduced in 2017. In light of all this, InterGen would strongly recommend the benefit to the consumer is retested.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

Yes, a scenario based methodology seems a sensible approach. InterGen would encourage the Commission to use frameworks that are used by other stakeholders in the sector. For example, National Grid's Future Energy Scenarios are a recognised, and respected, forward look of the industry. If the Commission could base their forward look on similar principles to that of National Grid's FES it would offer some much valued synergies.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

Please see our response to Q8.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

The drivers identified seem appropriate.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

N/A

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

N/A

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

Stakeholders in the energy industry such as DECC, Ofgem and National Grid regularly, and effectively, use the following means of communication to engage with the wider industry and even members of the public;

- Industry Consultations
- Round table discussions
- Operational Forums
- Public consultations

**Yours sincerely,**

**[name redacted]**

**[job title redacted]**



# **Response to the National Infrastructure Assessment: Consultation**

Submitted 5<sup>th</sup> August 2016

Prepared on behalf of ICIF by:

[name redacted] [job title redacted]

[name redacted] [job title redacted]

[name redacted] [job title redacted]

[name redacted] [job title redacted]

[name redacted] [job title redacted]

[name redacted] [job title redacted]



The International Centre for Infrastructure Futures (ICIF) is an interdisciplinary, practice-orientated research centre conducting fundamental research on infrastructure interdependency, policy, innovation, regulation, management and financing. ICIF was created to identify what combinations of actors, regulations and technologies can provide for the effective planning, design, investment, construction, delivery and use of infrastructure services that underpin economic activity and improve citizens' quality of life within modern societies.

ICIF brings together leading academics from six UK universities: University College London, Cranfield University and the universities of Bristol, Brighton, Sussex and Southampton.

ICIF is funded by the Engineering and Physical Sciences Research Council and the Economic and Social Research Council (Grant reference: EP/K012347/1)

For more information please contact:

[name redacted] [job title redacted]

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## Introduction

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This document has been prepared by those listed above on behalf of the International Centre for Infrastructure Futures (ICIF) in response to an open consultation on the ..

## **Summary of Cross Cutting Themes from Consultation Response**

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- We believe that the NIA will deliver the greatest level of new insight if it is a system-level process, aligned to a system-level vision with the purpose of defining infrastructure need not on a sector by sector basis but more broadly at the system-level
- We recommend dividing NIA into 3 distinct parts
  - i. Produce a Systemic Vision for Infrastructure
  - ii. Systemic Assessment of Option-Neutral Infrastructure Need
  - iii. Identify, Evaluate and Select Options
- Interdependence is a substantially broader concept than dependence on immediate inputs.
  - Infrastructure is interdependent with the dynamic context in which it is operates.
  - System properties (e.g. resilience and flood risk), emerge as a consequence (often unforeseen) of interdependence, and are best managed at the system level.
- The conclusions the Infrastructure Commission reaches, when assessing infrastructure needs will have a profound impact on infrastructure provision well into the future. The way in which the needs and related challenges are articulated will define the scope of potential solutions.
- The NIA a transformative opportunity:
  - to guide strategic coordination of infrastructure interdependencies for economic and social gains, rather solely improving cross sector efficiencies.
  - to go beyond shorter-term pilot projects, ad-hoc experiments and lowest-hanging-fruit approaches to cross-sector interactions towards integrated infrastructure planning and policy, for services such as intelligent mobility and intelligent infrastructure as enabling ‘binding’ technologies for cross-sector interactions and activities.
  - to tackle existing limitations of governing infrastructure interdependencies, which do not fall within the remit of any one institution (such as a specific economic regulator) and whose impact will be limited by being placed within the domain of one economic regulator
- The NIA should bring to the fore/place in the centre of its work people (especially in relation to their well-being and needs across space and time, taking into account inter and intragenerational justice), resilience and sustainability.
- A comprehensive, whole system approach of the NIA requires broadening of the definition of core cross-cutting issues such as resilience and sustainability to include consideration of social and environmental infrastructures, and expanding the boundaries of UK infrastructure accordingly, beyond a focus on economic infrastructure.

## Consultation Questions

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### Q1.

The Government has given the National Infrastructure Commission objectives to:

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

What issues do you think are particularly important to consider as the Commission works to this objective?

We agree that Infrastructure can indeed play a significant role in enabling these objectives and in facilitating the creation of a UK economy that as a whole is resilient to, and able to adapt in the face of, future global challenges. We would like to flag these issues as important to the NIC in working to these objectives .

#### **Strategic Vision is a Pre-Requisite to Need Assessment**

Sir John Armitt<sup>1</sup> Ove Arup<sup>2</sup>, Keith Clarke<sup>3</sup> and B Frischmann<sup>4</sup> are amongst numerous civil engineers to have identified the importance of placing purpose at the heart of infrastructure decision making. At the most fundamental level, the purpose of infrastructure is to enable the desired outcomes of valued by society. Establishing consensus around a strategic vision comprising these desired outcomes, will provide a frame of reference with which to align, and against which to justify all infrastructure decision making. However, as consultation point 22 states “[at present] the UK lacks a clear, long-term strategic vision for infrastructure”.

The above objectives, provide useful insight into government priorities, and are the closest we currently have to a strategic vision for infrastructure in the UK. However, as they currently stand they are ambiguous, poorly structured and reflect only one perspective (the government's). It follows, further work is needed to establish an inclusive strategic vision for infrastructure. Therefore, the first step in any NIA must be to establish consensus on a process to develop strategic vision, and apply that process to develop strategic vision that reflects the desired outcomes infrastructure is expected to enable.

#### **NIA Requires a Systemic Approach**

The importance of understanding infrastructure interdependence when working toward these objectives cannot be understated. Interdependence is a substantially broader concept than mere dependence on the immediate inputs that infrastructure requires to function.

Infrastructure is also interdependent with the dynamic context (*social, political, economic, financial, legal, environmental, regulatory, local, global, spatial and temporal*) in which it is

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<sup>1</sup> inaugural speech as the 151st President of the Institution of Civil Engineers (ICE)

<sup>2</sup> In a paper given at the Institution of Civil Engineers in October 1972 (“The Built Environment”)

<sup>3</sup> ICE Triennial Event

<sup>4</sup> Frischmann BM. Infrastructure: The social value of shared resources. Oxford University Press, USA; 2012.

operates. Furthermore, System properties such as cascade failure risk, resilience and flood risk, which are most effectively managed at the system level, emerge as a consequence (often unforeseen) of interdependence.

Specifically, a systemic approach is essential, because if you do not place the management of system level properties at the heart of the NIA methodology, then the above objectives (or indeed any strategic vision for infrastructure) will not be achievable.

### **Infrastructure Need is Distinct from Solution**

Needs Assessment and solution selection whilst closely related must be evaluated separately. An infrastructure need is a broad concept related to what we expect infrastructure to enable. Wherever possible, infrastructure vision and need should be framed in ‘option-neutral’ terms in order to enable (i) the identification of common needs that span multiple sectors (ii) the opportunity for innovative solutions to be considered.

Typically a range of options are available to address any need, in an interdependent context these options can come from any infrastructure sector, or through an intentional change to any element of the context in which infrastructure operates. A set of clearly defined criteria is needed to evaluate the relative merits of each option

### **Whole Life Cost and Value**

Cost and Value provide useful perspectives on infrastructure affordability. Cost is best considered using a whole life cost perspective (TOTEX) rather than a narrow focus on CAPEX. Value is best considered in terms of the outcomes enabled, and the creation of assets with resale value.

### **ICT Transcends Sectors**

ICT is increasingly ubiquitous and the delivery models of many sectors are so tightly bound with ICT as an enabler that an ICT failure could cause significant cascade failure. ICT resilience is at the heart of infrastructure resilience. In effect ICT is a component of all sectors, rather than a sector in its own right. This is particularly relevant when considering the future of Smart Infrastructure, examples of the critical interdependencies between ICT and other infrastructure sectors are discussed in response to Question 5.

### **NIA will Derives Credibility from Methodology**

All elements of NIA must be based on a clearly defined, transparent, evidence based, peer reviewed processes, the design of which embodies the principles stated in Q2. NB: the NIA requires a clearly defined methodology not just a modelling toolbox.

### **NIA Can be Divided into Three Distinct Parts**



Based on the need for a systemic approach and other issues raised here we propose the NIA is divided into three distinct elements, and a clearly defined transparent process is defined for each element.

1. Produce a Systemic Vision for Infrastructure

Develop an explicit statement of the outcomes society expects infrastructure to play a role in enabling. Make the vision systemic by framing the outcomes it comprise at the system level independent of specific infrastructure sectors, solutions or technologies

2. Systemic Assessment of Option-Neutral Infrastructure Need

Develop a process to identify infrastructure need by evaluating the gap between the systemic outcomes stated in the vision and the actual performance of the infrastructure system in enabling these outcomes.

3. Identify, Evaluate and Select Options (infrastructure and non infrastructure)

Develop a process to identify options (possible solutions), and to evaluate the identified options against a set of criteria you expect the solution to satisfy. Define criteria on a case by case basis. Based on the issues flagged in Q1 possible criteria for evaluation include expected impact on overall system Resilience, Carbon footprint, lifecycle cost (TOTEX), is it fit for purpose given the specific local context, does the solution address the root cause of the need. or merely a symptom, amongst others. Significantly, options do not have to be infrastructure, they can be an intentional change to any element of the interdependent context in which an infrastructure need is embedded.

## Q2. (p15 of consultation)

Do you agree that, in undertaking the NIA, the Commission should be:

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

We welcome the principles stated on page 14, and would like to see these principles placed at the heart of a clearly defined NIA methodology (for further thoughts on methodology see Q8).

Additionally, based on our response to Q1 and a recent article in Infrastructure Intelligence<sup>5</sup>, we propose the following additional principles:

- **Purposeful** - aligned to a coherent strategic vision of the services we expect infrastructure to provide and the outcomes we expect infrastructure to enable
- **Evidence based** and **Traceable** - the rationale, assumptions and journey behind decisions should be recorded for future reference.
- **Collaborative** - if input is sought through consultations, how the consultation fits in the methodology and how it will inform findings must be made explicit.
- **Reflexive and Flexible** - the process itself should not be so fixed or rigid to prevent improvement or adaptation to meet changing needs even over short time-horizons. The principle of regular review is essential to the validity of the NIA. Every NIA should begin by reviewing the vision established during the previous NIA, and testing whether previous NIA recommendations remain 'fit for purpose' in the new context. Whether the methodology used remains fit for purpose should also be evaluated prior to each new
- **Option-Neutral** - The terms of reference for the NIA, and need assessment findings should be framed independently of specific options that might be used to fulfil need.
- **Outward Looking** - The NIA should actively seek to learn from related disciplines and international best practice. Lessons learnt by the Committee on Climate Change on risk assessment and the Adaptation Sub-Committee, for example are applicable to the design of NIA methodology.
- **Synergistic** - The NIA should seek to identify complementarity between NIA and other similar activities

While the principles stated in the consultation document are equally as important as another, ICIF would particularly emphasise the importance of taking *a whole systems*

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<sup>5</sup> <http://www.infrastructure-intelligence.com/article/oct-2015/infrastructure-commission-what-are-opportunities-and-how-should-it-work>

*approach* as stated in the original principles (and in Q1 where we state NIA require a systemic approach). This is something advocated by the Institution of Civil Engineers in the recent State of the Nation: Devolution Report<sup>6</sup>, and is strongly advocated by ICIF in this response. There are many reasons why this principle is critical to successfully and efficiently addressing the challenges of infrastructure planning, provision and operation, but it requires particular attention as it has seemingly proven to be a difficult approach to take in the past. This is despite a vast wealth of knowledge and experience in industry and academia, albeit perhaps mainly outside of the infrastructure domain, of applying a systems approach to address complex and dynamic socio-technical problems characterised by uncertainty.

Early iterations of the National Infrastructure Plan (2013/14) began by acknowledging the need for adopting a whole-systems/interdependency-aware approach, but this was somewhat abandoned in later versions for the traditional sector-by-sector approach. The NIA should perhaps take the opportunity to reflect on the internal or external barriers encountered in trying to adopt a whole-systems approach within the National Infrastructure Plan, and the accompanying lessons from this experience.

One potential issue may be the appetite for ‘challenging established thinking’ within the wider industry, as well as governance and regulatory regimes. Without an accompanying transition to an outcome based regulatory approach (as seen in the water sector) or a more joined-up approach to governance, then the innovation within industry may be constrained by the structure of the regulation. Similarly the processes for making decisions when stakeholders reveal conflicting values should be considered as if it is not explicit and transparent it could become a detriment to the principle of adopting a ‘consultative’ approach.

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<sup>6</sup> Institution of Civil Engineers. 2016. State of the Nation: Devolution 2016. [Online: <https://www.ice.org.uk/media-and-policy/state-of-the-nation>]

### Q3.

Do you agree that the NIA should cover these sectors in the way in which they are each described?

Although the sectorial approach to infrastructure is well justified through an evolutionary pathway of regulatory and historical reasons, ICIF would like to challenge this position because of the limitations it brings about in achieving systemic innovation.

We believe that the NIA will deliver the greatest level of new insight if it is a system-level process, aligned to a system-level vision with the purpose of defining infrastructure need not on a sector by sector basis but more broadly at the system-level (see Q1 and Q2). Our proposal that the NIA divides into three distinct parts – each underpinned by a clearly defined methodology is driven by this belief (see Q8).

For NIA purposes sector divisions should be secondary to establishing what is required from infrastructure as a whole. Only once the overall purpose has been defined, and a needs assessment undertaken at the system level, is it ‘safe’ to start taking apart how the system achieves that purpose. We challenge the NIC to embrace paragraph 41 of the consultation document, and to not think in sectoral terms until the final stages of the NIA, and even then to retain a systemic perspective

*“The Commission will cover all economic infrastructure in the NIA but sectors will not be tackled independently from each other. The NIA will be developed by assessing the infrastructure system as a whole”*

We fully accept that there is a tension between focusing on systemic issues and making the work of the infrastructure commission accessible to the way our infrastructure industry is currently structured. However, we counter this as follows:

A truly holistic systemic view of national infrastructure is particularly important when assessing fundamental societal needs as it is arguably not possible to do this adequately from a segmented model. Total societal need is not an aggregate of the needs of each sector. There is a difference between saying (i) the motorway is reaching capacity we need extra lanes, and (ii) a 21st Century economy needs to enable peripatetic workers. The first is framed in such a way as to bound the solution, it places the focus and control of resolution into one traditional sector. The second, while arguably more vague, address a fundamental need. It suggests a **desired outcome** that supports a higher-level objective. The solution may require the collaboration of multiple private groups and government departments. It may require new roads, railway, electricity generation and digital infrastructures. Each of which would present new requirements upon one another.

Framing need against traditional and static sectors can impede the ability to assess the full impacts of future challenges. Furthermore, vital interdependencies that cut across those sectors might be inadvertently hidden by assuming they are not significant to the analysis.

While there are no doubt pragmatic challenges involved in transitioning from a sector-by-sector approach, research has pointed out that there are disadvantages in the monodisciplinary governance systems when designing complex products in the space of infrastructure provision. More particularly, research has demonstrated that the constraints of path dependency, resource allocation and problem-solving can create difficulties in trying to approach decisions in complex infrastructure systems from traditional monodisciplinary (i.e. sector-based) approaches<sup>7</sup>. Because of this evidence, we would advocate an all-inclusive definition of infrastructure, which also includes what is traditionally referred to as social infrastructure, and therefore a reconsideration of the decisions surrounding the remit of the Commission.

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<sup>7</sup> Zerjav, V. (2015). Design boundary dynamics in infrastructure projects: Issues of resource allocation, path dependency and problem-solving. *International Journal of Project Management*, 33(8), 1768-1779.

**Q4.**

Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

As above, we believe that The NIA will deliver the greatest level of new insight if it is a system-level process, aligned to a system-level vision with the purpose of defining infrastructure need not on a sector by sector basis but more broadly at the system-level (see Q1 and Q2).

**Interdependence with Context**

In response to Q1, we emphasised the point that infrastructure is interdependent with the dynamic context (social, political, economic, financial, legal, environmental, regulatory, local, global, spatial and temporal) in which it is operates. Therefore, when evaluating options to address a stated infrastructure need it is important to consider whether an intentional change to this context can resolve the infrastructure need.

## Q5.

The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?

*NB. Some of the responses provided to Questions 5, 6 and 7 are informed by research funded by the ITRC between 2013 and 2015.*

This response is focused on one aspect of infrastructure interdependencies, which puts forward the idea of an integrated approach driven not purely by risk management, infrastructure reliability and concerns about national security (a traditional UK policy focus) but also opportunities for strategic coordination of infrastructure interdependencies for economic and social gains<sup>8</sup>.

The benefit of a forward looking mechanism such as the NIA taking into consideration infrastructure interdependencies is that it can do so in terms that go beyond looking for opportunities for synchronising economic, policy and regulation activities across individual sectors, but attempt to create understanding of how integration between sectors can take place in a way which can help meet policy objectives. Reproducing a siloed sector system, which looks for opportunities for simply improving cross sector efficiencies is short-sighted and limited, and likely to produce ad hoc results. A more forward looking and progressive approach is one which focuses on integrated infrastructure services such as intelligent mobility and intelligent infrastructure as enabling ‘binding’ technologies for cross-sector interactions and activities. These areas of intelligent infrastructure development are built upon the issue coupling and infrastructure integration of energy-transport-ICT, ICT-energy, and transport-ICT.

Smart grids are one type of intelligent infrastructure that depend on infrastructure interdependencies across 2 or more sectors. The Low Carbon Network Fund was introduced by the electricity and gas regulator Ofgem in 2010 to encourage innovation within Distribution Network Operators (DNOs) that would facilitate smart grid development in the UK. In other words the LCNF explored operational and technological interdependencies between the ICT, electricity and private vehicles sectors. However, by placing the £500 million funding opportunity in the hands of ‘the electricity sector’ it severely limited opportunities for innovation, both in terms of technologies and processes involved. The problem of selecting the electricity sector as the primary beneficiary and leader of the smart grid innovations is that in contrast the direction of innovation came predominantly from the ICT sector (i.e. the ICT sector is more innovative than the electricity sector with respect to smart grids). There are several different categories of cross-sector interactions which can be used to distinguish between different types of infrastructure interdependencies. Four core types of interactions identified are: competition, symbiosis, spillover and integration.

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<sup>8</sup> For further discussion on this see: Hiteva, R. and J. Watson, (2016) “Governance of Interdependent Infrastructure Provision”, in *The future of national infrastructure: A system-of-systems approach*, Cambridge Press, pp.294-309.

Spillovers have tended to come from the ICT sector to the electricity sector through the use of ICT platforms, processes and technology by DNOs. While the ICT sector is emerging as a leader in terms of technology innovation for smart grid development, it is DNOs that receive most of the existing government funding for low carbon network innovation and are best represented in governance structures. This is likely to have an effect on the innovation capabilities of the UK in developing smart grids, the speed with which such capabilities can be developed as well as the type of smart grid projects that emerge<sup>9</sup>.

In comparison to the UK, South Korea has placed the ICT sector (i.e. the SK Telecom chaebol) at the centre of its national operational programmes for smart grids development. SK Telecom is coordinating the Test Bed smart grid programme, as well as the development of a Network Operation Centre Building Energy Management System, a smart grid system for commercial use. To a significant extent, South Korea's approach is facilitated by the traditionally close relationship between industry conglomerates (or chaebols) like SK Telecoms and the government, and the less extensive regulatory framework imposed on the ICT sector, in comparison to the UK electricity sector. However, a more active role of the ICT sector in shaping smart grids policy, and direct participation in available funding for smart grid innovations can facilitate the spillover of more knowledge and innovative solutions from ICT to electricity<sup>10</sup>. **The NIA has the potential to take into account these institutional barriers and innovation gaps, and address them through the design of recommendations and guidelines for further integration between these sectors.**

Another area where infrastructure interdependencies are very important and merits a place in the NIA is *intelligent mobility*. The Transport Systems Catapult (TSC) is already working in the area of intelligent mobility and has developed a strategy for growing market opportunities in this area until 2025. Intelligent mobility is a good area of focus for the discussion of infrastructure interdependencies because it allows focus on the infrastructure output and service (mobility), rather than just the asset (railway tracks and roads). TSC (2015) defines the focus of intelligent mobility as one on “*new and emerging technologies that make it possible to achieve more for less by taking advantage of developments in web connectivity, integrated systems, state of the art modelling and visualisation, and the emerging Internet of Things to change how we think about the movement of people and goods*”. However, while the focus of the TSC is on how to create a market for intelligent mobility in the UK, the NIA would need to consider the longer-term planning of integrated infrastructure rather than just focus on shorter term pilot projects, ad-hoc experiments and lowest-hanging-fruit approaches to cross-sector interactions. Furthermore, NIC is better positioned to discuss issues of infrastructure interdependencies which can act as a barrier to the development of integrated services such as intelligent mobility (the term integrated service is used here in recognition of the fact that it requires a certain level of integration between the electricity, ICT and transport

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<sup>9</sup> Hiteva, R. and J. Watson, (2016) Governance of multi-regime interactions in the case of smart grids in the UK, SPRU Working Paper, University of Sussex.

<sup>10</sup> Hiteva, R., Foxon, T., Nightingale, P. and Mackerron, G., 2015, Response to the Parliamentary Energy and Climate Change Committee inquiry into Low carbon network infrastructure.



sectors). Recent research<sup>11</sup> on smart grid pilot projects involving electricity vehicles, revealed that the effective integration of individual sectors is driven/shaped by processes of ordering, such as the direction of spillover from one sector to another (who integrates where). The relationships between the three sectors involved is not equal as certain level of integration between electricity and ICT sectors need to take place before large scale take up of electric vehicles takes place.

There is a growing evidence base of the sorts of economic and social benefits that can be created through the adoption of a proactive whole systems approach to infrastructure interdependency. For example, analysis by Frontier Economics<sup>12</sup> suggested substantial economic benefits, while analysis of High Speed 2<sup>13</sup> and the Lower Thames Crossing<sup>14</sup> projects have also revealed potential benefits.

Historically the focus of infrastructure interdependency has been on resilience and the risk of cascade failures. This has led to a narrow conceptualisation of infrastructure interdependency in terms of spatial proximity and functional reliance. The proactive identification of infrastructure interdependency has revealed many different ways in which it can exist. Rinaldi et al<sup>15</sup>. provide the foundation for the characterisation of infrastructure interdependency, suggesting a framework of six dimensions. Others looked at the structure of the interaction and cooperation<sup>16</sup> while more recent studies have suggested at least eleven dimensions of infrastructure interdependency.<sup>17</sup>

This raises questions over the best means through which to identify and assess infrastructure interdependencies. Functional and spatial interdependencies have been extensively modelled in the National Infrastructure Systems Model<sup>18</sup> produced by the Infrastructure Transitions Research Consortium (ITRC). This should be a key source of information and evidence for the NIA. The identification of other types of important interdependencies may require additional proactive consultation through systems-based approaches. Two examples of these are the **Interdependency Planning and Management Framework (IPMF)** and **Systems Thinking for Efficient Energy Planning (STEEP)**.

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<sup>11</sup> Hiteva, R. and J. Watson, (2016), Governance of multi-regime interactions in sustainability transitions: the cases of water and electricity, and electric vehicles in the UK, Working Paper, University of Sussex.

<sup>12</sup> Frontier Economics, 2012. Systemic Risks and Opportunities in UK Infrastructure - A Report Prepared for HM Treasury & Infrastructure UK.

<sup>13</sup> Rosenberg, G., Carhart, N., 2014. Review of Potential Infrastructure Interdependencies in Support of Proposed Route HS2 Phase 2 Consultation

<sup>14</sup> Carhart, N., 2014. Identification of High-level Infrastructure Interdependencies for the Lower Thames Crossing [Online: <http://www.icif.ac.uk/networks/123/item.html?id=187>]

<sup>15</sup> Rinaldi, S.M., Peerenboom, J.P., Kelly, T.K., 2001. Identifying, understanding, and analyzing critical infrastructure interdependencies. *IEEE Control Syst. Mag.* 21, 11–25.

<sup>16</sup> Raven, R., Verbong, G., 2007. Multi-Regime Interactions in the Dutch Energy Sector: The Case of Combined Heat and Power Technologies in the Netherlands 1970–2000. *Technol. Anal. Strateg. Manag.* 19, 491–507.

<sup>17</sup> Carhart NJ, Rosenberg G., (in print), A Framework for Characterising Infrastructure Interdependencies. *Int J Complex Applied Science and Technology*, 2016;1. Online: <http://www.inderscience.com/info/ingeneral/forthcoming.php?jcode=IJCAST>

<sup>18</sup> Hall, J.W., Tran, M., Hickford, A.J., Nicholls, R.J. (Eds.), 2016. *The Future of National Infrastructure: A System-of-Systems Approach*.

The IPMF incorporates principles and tools grounded in a holistic, open-systems based approach, complementing guidance set out in HM Treasury's Green Book. The principles aim to drive infrastructure proposers and delivery teams to look for beneficial interdependencies to exploit and problematic interdependencies (systemic vulnerabilities or conflicts) to be managed. The framework can be summarised by a set of activities based around problem structuring, measurement and appraisal and creating stakeholder understanding<sup>19</sup>.

Timelines of known UK infrastructure projects and policies up to 2040 were produced by Engineering the Future<sup>20</sup>. An expert-led application of the IPMF to these timelines identified over 90 interdependencies within the projects and policies of each sector and over 80 which acted between sectors. These include opportunities to use waste products as a feedstock for electricity generation via anaerobic digestion, the use of ICT to release transport capacity, opportunities for the co-location of energy and heating projects with existing or planned building projects, the interaction of shale gas policy on other energy markets, airport capacity in the Southeast and related infrastructures, and the need for general cooperation between the energy, waste and transport sectors over changes in policies and use of electric vehicles.<sup>21</sup>

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<sup>19</sup> Carhart, N., Rosenberg, G., Edkins, A., Ward, E., Dean, M., 2014. A Proposed Interdependency Planning and Management Framework: Development and Application for UK Infrastructure. [Online: <http://www.icif.ac.uk/networks/123/item.html?id=186>]

<sup>20</sup> Engineering the Future, 2011. UK Infrastructure Timelines.

<sup>21</sup> The Systems Centre, University of Bristol. 2013. Workshop Application of a Matrix Based Approach to the Identification of Infrastructure Interdependencies - Workshop Report for Engineering the Future.

## Q6.

### Do you agree that the NIA should focus on these cross-cutting issues?

The groupings of cross-cutting issues to be considered in the NIA are useful as far as they provide an insight into the relationships between key issues. Keeping in mind the aims and objectives of the NIC “*to improve the quality of life for those living in the UK*” and to develop a NIA that is “forward looking, challenging established thinking”, as well as “*comprehensive, taking a whole system approach, understanding and studying interdependencies and feedback*” (p. 6 of the NIA consultation document), we would propose changes to the cross-cutting issues 51, 52 and 55. These are as follows:

#### **Paragraph 51: Cost, delivery and resilience**

We propose that resilience is decoupled from cost and delivery, and is a stand-alone cross-cutting issue. In its current form, resilience is interpreted in a limited way, purely in technological terms and as driven by a cost-benefit approach. However, resilience is a much broader and more complex issue of a socio-technical and environmental nature. For example, in practical terms resilience can be achieved through technical solutions (such as the construction of flood defences), social activities (building knowledge sharing networks between institutions in charge of critical infrastructures and civil society) and the development of green infrastructure (such as rain gardens and bio-retention ponds) as a form of natural/sustainable urban drainage system. Resilience is unlikely to be achieved through technical solutions alone. Furthermore, although the remit of the NIC mentions only economic infrastructure, resilience cannot be achieved or discussed in a piece-meal way (i.e. only as a function or a characteristic of economic infrastructure). Thus, a comprehensive, whole system approach requires that resilience in relation to economic infrastructure is part and parcel of solutions that include social and environmental infrastructure..

#### **Paragraph 52: Sustainability**

We propose that sustainability is defined in broader terms that include providing a balanced treatment of the triple bottom line of economy, society and the environment, thus including a wider range of issues beyond the compatibility with UK’s carbon and environmental commitments. In line with our comments to the set of cross-cutting issues discussed in paragraph 51 (on cost, delivery and resilience) a wider definition of sustainability would include issues such as inclusion of civil society groups in infrastructure decision-making and evaluation. For example, consumer satisfaction and the value derived from infrastructure underpin many of the relationships that can “*improve the quality of life for those living in the UK*” (NIC objective). In the context of energy infrastructure, this could mean recognising the sustainability outcomes of meeting and managing demand through decentralised energy services, non-traditional business models and support for mission-oriented businesses, rather than large scale national projects<sup>22</sup>.

#### **Paragraph 55: Performance Measures**

It is right for the NIA to acknowledge and attempt to address the issues that current infrastructure performance indicators “*fail to account for the value and quality of the*

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<sup>22</sup> ICIF/SEG/CIED, 2015, Consultation response to Ofgem’s discussion paper on ‘Non-traditional business models: Supporting transformative change in the energy market, May 2015

*services provided*". The ICIF & iBUILD projects have previously looked at issues with the UK's previous approach to infrastructure performance measurement under Infrastructure UK (IUK) concluding:

The underlying data from which the indicators were compiled was outside the control of IUK and therefore came with no guarantee that it would continue to be available, nor that the way in which it was collected and reported would not change over time;

The indicators did not have a clearly articulated purpose or purposes; despite the statements in the early national infrastructure plans, it was not evident how the performance indicators were intended to inform the actions of any stakeholders;

The indicators were at best loosely coupled with the values and requirements of society. While in some instances it was implied, for the vast majority of the indicators there was no clear link between the data and the direct, experienced outcomes of those relying on the infrastructure systems they measured;

In attempting to provide a national performance picture, there were risks that local problems may have been masked; and,

There were questions over why indicators were normalised to 2005, and the impact this had on the trends that the indicators track.

A number of countries (such as the UK, USA, New Zealand and Australia) are currently doing work on infrastructure performance metrics aimed at improving matters. Despite approaching this in different ways, the USA, New Zealand and Australia all make the connection between infrastructure and its performance in delivering complex, multi-faceted, high-level, societal outcomes such as wellbeing. New Zealand, in particular, has initiated a considerable process of stakeholder engagement in order to better understand the purposes of infrastructure systems and how they produce/contribute to these high-level outcomes.

A consultation with infrastructure practitioners enquired about the current usage of infrastructure performance indicators and identified several challenges impeding the extent to which the indicators are used. It was strongly felt that **there is uncertainty over the purpose of the Indicators stemming from a lack of shared vision for national infrastructure**. In addition to this the Indicators were seen as a **backwards looking statement of observable fact, which can limit innovation**, whereas there is a **need for the indicators to look forwards**. Related to this was the observation that they **did not reveal the gap between what exists and what is desired**. Furthermore, the indicators could be **difficult to interpret** and overly constrained in practice by regulatory time horizons. The national indicators were **not connected to adaptation**, and they were **not felt to be aligned with existing industry indicators**. Furthermore **the presentation of the data, its granularity, aggregation and normalisation, may limit its benefits** and little consideration had been given to the **perverse incentives** they may cause.

The engagement also investigated the characteristics of innovative performance indicators, suggesting that they need to: relate to public expectations and needs; take account of the

dynamics and interactive complexity of systems; allow for intelligent design; identify opportunities; have purpose and vision; account for different audiences; and communicate uncertainty. Useful indicators of national infrastructure performance need to account for the whole infrastructure system, whole lifecycle and the wider context. Additionally, good indicators need to be joined-up, transparent, flexible, forward-looking and outcome-orientated.

This stakeholder engagement, combined with a study of international best practice, resulted in a framework for the transparent development of forward-looking, solution-neutral, outcome-orientated strategic performance indicators for infrastructure. The application of the framework has been demonstrated within the rail, water and energy sectors, though it is advocated that it should be applied at the whole system level<sup>23</sup>.

Additional suggestions for cross-cutting themes are discussed in more details in the response to Q 7.

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<sup>23</sup> Carhart, N., C. Bouch, T. Dolan, C. Walsh, 2016, A Process for the Formation of Outcome-Oriented Performance Indicators for Infrastructure, ICIF & iBUILD, February 2016 [Online: <http://www.icif.ac.uk/networks/123/item.html?id=335>]

## Q7.

### Are there any other cross-cutting issues that you think are particularly important?

We feel that the list is missing several cross-cutting issues with direct impact on critical and economic infrastructure. Therefore, we recommend that the list is expanded to include the following issues:

#### **People, well-being, quality of life and unequal distribution of benefits from infrastructure**

The NIA should consider the unequal distribution of benefits from infrastructure and its services across space (within the territory of the UK) and between different groups of people in the same locality, and the impact they have on people's well-being and quality of life. Considering that one of NIC's core objectives is to improve the quality of life of those living in the UK, the latter should be explicitly included as a cross-cutting issue. The inclusion should also be done in recognition of the great division between parts of the country that can benefit from world class infrastructure services (such as Canary Wharf in London) and areas of chronic underinvestment in infrastructure (such as coastal areas in Wales). The NIA should also seek to understand how economic infrastructure can be used as a vehicle to deliver not only economic growth but value in people's lives more directly, such as safe, efficient and affordable mobility within cities and between urban and peri-urban areas. Recent problems with timetables and passenger safety and well-being on trains and train stations run by Southern Rail are a case in point. In pursuing a comprehensive, whole system approach the NIA should also explore the relationship between well-being, quality of life and the distribution of benefits from infrastructure and the linkages that exist between economic infrastructure on one side, and social and economic infrastructure (services) on the other.

#### **Demand management and hotspots**

The NIA should map and consider the range of existing drivers for demand management in infrastructure and their distribution within the UK. These should be mapped against existing and future hotspots of infrastructure services, identifying geographic and issue areas that need to be prioritised, as well as the distribution of gaps and overlaps between them. Hotspots<sup>24</sup> are critical infrastructure locations, measured by the number of directly or indirectly dependent Infrastructure customers. This analysis should also include exploring the relationship between infrastructure interdependencies, demand management and hotspots. Infrastructure interdependencies and hotspots tend to co-locate/congregate and thus they have a direct spatial relationship) which needs to be explored in more detail and be at the heart of demand management policy and strategy. This relationship between demand management, infrastructure interdependencies and hotspots underpins many of the core drivers intended to be used in the NIA and are key for meeting NIC's objectives.

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<sup>24</sup> Thacker, S., Pant, R., Hall, J.W., Barr, S. & Alderson, D., 2015, A multi-scale analysis of interdependent national infrastructure network criticalities, vulnerabilities and risks, , paper presented at the Society for Risk Analysis, Annual Meeting, Engineering and Infrastructure Speciality Group

### **Security of infrastructure assets and services, and data protection**

The NIA should map and examine the growing range of security issues in relation to national, personal and business security of infrastructure assets and services, and their distribution impact. With the rapidly growing digitalisation of infrastructure assets and services, and the more active role of consumers and users in their delivery and use, the range of security and data protection issues are expanding. Many innovations have unintended consequences, while issues around security and protection are catching out existing institutions and are left outside of anyone's remit.

### **The distribution of costs and benefits across users**

The evidence from smart grid literature on the benefits of demand side response, for example, highlight that there could be users who cannot shift their energy demand to off-peak times due to their lifestyles, their geographical and infrastructural location (e.g. off-gas network) or lack of capital to access smart technologies. Some studies point to user perceptions on smart grid technologies being exclusive to homeowners (Balta-Ozkan et al., 2013).

### **Infrastructure delivery alignment**

Infrastructure interdependencies and transition towards a smarter system mean that costs and benefits may not necessarily align with the owners or operators of these infrastructures (Jackson 2011, Balta-Ozkan et al., 2014b). Some authors argue liken this to a public good provision problem where the benefits are realised by the entire industry and as a result are non-excludable (Kim and Shcherbakova, 2011). In recognition of this challenge, some studies highlight the importance of coordination among system actors and call for a 'system architect' (IET, 2013).

## **Q8.**

### **Do you agree with this methodological approach to determine the needs and priorities?**

Regardless of the specific methodology chosen, the NIA must be based on a clearly defined, transparent, evidence based, peer reviewed methodology designed to embody all principles stated in Q2.

Moreover, in response to point 66 we would like to propose that where models are used as part of this methodology, the model's purpose, how it fits in the broader methodology, the reason for the particular modelling approach chosen, how the model works (the assumptions made by the model) and how model outputs will inform decision making must all be explicitly stated as part of methodological design.

Based on the need for a systemic approach and other issues raised in response to Q1 we further propose the NIA is divided into three distinct elements, and a clearly defined transparent process is defined for each element.

#### **1. Produce a Systemic Vision for Infrastructure**

Develop an explicit statement of the outcomes society expects infrastructure to play a role in enabling. Make the vision systemic by framing the outcomes it comprise at the system level independent of specific infrastructure sectors, solutions or technologies

#### **2. Systemic Assessment of Option-Neutral Infrastructure Need**

Develop a process to identify infrastructure need by evaluating the gap between the systemic outcomes stated in the vision and the actual performance of the infrastructure system in enabling these outcomes.

#### **3. Identify, Evaluate and Select Options (infrastructure and non infrastructure)**

Develop a process to identify options (possible solutions), and to evaluate the identified options against a set of criteria you expect the solution to satisfy. Define criteria on a case by case basis. Based on the issues flagged in Q1 possible criteria for evaluation include expected impact on overall system Resilience, Carbon footprint, lifecycle cost (TOTEX), is it fit for purpose given the specific local context, does the solution address the root cause of the need. or merely a symptom, amongst others. Significantly, options do not have to be infrastructure, they can be an intentional change to any element of the interdependent context in which an infrastructure need is embedded.



In light of these points, based on our interpretation of the proposed methodology, we are not sure whether the methodology is fit for purpose we would like to offer three points of feedback aligned to 1-3 above

- We have argued that a coherent strategic vision of the services we expect infrastructure to provide and the outcomes we expect infrastructure to enable is an essential prerequisite without which meaningful needs assessment is not possible. We are not convinced the proposed methodology does this.
- We have emphasised that a systemic approach that defines need at the system level is essential if interdependencies and emergent system level properties are to be managed. This is significant because inadequate management of these properties makes it difficult to achieve any strategic vision. The proposed methodology doesn't address this
- We proposed that any infrastructure need can be resolved by multiple possible actions and that therefore need assessment is independent of the process through which solutions are selected. At present we are unsure whether the proposed methodology makes that distinction.

**Q9.****Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

In line with the response to Questions 7 and 8, models are only as useful as the methodological basis that underpins them. We therefore believe that a dedicated effort should be undertaken in developing a robust NIA methodology. This methodology is likely to include aspects of modelling, but we believe it would be misleading to give precedence to modelling as it should be treated as a toolbox of a more comprehensive assessment methodology.

Situations with a high degree of complex interaction between the elements have been described as ‘messy problems’<sup>25</sup> and, where this has been compounded by multiple conflicting viewpoints, as ‘wicked problems’<sup>26</sup>. These are characterised by an evolving set of interacting issues, requirements and constraints which render them intractable and subject to uncertainty. Overcoming such challenges is critical to realising value at the planning, delivery and operations phases, but particularly in relation to shaping and executing national strategies and policies for infrastructure. They require substantially different approaches to the types of problem characterised by sequential, deterministic processes and broadly agreed, known outcomes<sup>27</sup>.

The consultation document clearly recognises the need for a systems approach to infrastructure planning. It should be noted that the systems approach, and the models and tools associated with it, have evolved not only to deal with understanding and designing networks of complex relationships, but also strategic decision making in complex uncertain environments<sup>28</sup>.

A new methodology for portfolio structuring within urban infrastructure investment has been proposed by members of ICIF and could be very relevant to the NIA in addressing this issue.

The **Interdependency Planning and Management Framework**, discussed in response to Question 5, has been developed to embody the principles of the systems approach and draws upon the tools of systems engineering. System Dynamics and Causal Loop Modelling have also been used in this area to understand the complex underlying mechanisms that influence infrastructure use and demand. Hierarchical Problem Structuring is used as a tool within the aforementioned STEEP Methodology within three European Cities to inform their energy master-plans.

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<sup>25</sup> Ackoff, R.L., 1997. Systems, Messes and Interactive Planning. In: Trist, E., Emery, F., Murray, H. (Eds.), *The Social Engagement of Social Science: A Tavistock Anthology: The Socio-Ecological Perspective*. University of Pennsylvania Press, Philadelphia, pp. 417–438.

<sup>26</sup> Rittel, H.W.J., Webber, M.M., 1973. Dilemmas in a general theory of planning. *Policy Sci.* 4, 155–169.

<sup>27</sup> Hancock, D., 2010. *Tame, Messy and Wicked Risk Leadership*. Gower, Farnham, England.

<sup>28</sup> ICIF. 2016. ICIF White Paper Series: Evidence for the value of a systems approach to infrastructure planning, delivery and operation, UCL Press, London

Work on **Transforming Utilities' Conversion Points** (TUCP) used theories from complexity science and agent based modelling to understanding interdependencies and inefficiencies in order to exploit opportunities to adapt infrastructure at points of conversion where two or more utilities might benefit from the change.

## Q10.

Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?

The identified drivers are sensible considerations, however they cannot be taken in isolation from one another, or from the infrastructure systems themselves. In particular the complex mechanisms of cause and effect need to be examined. It is right to acknowledge the feedback effects that infrastructure systems can have on all of these drivers, not just those relating to population and demographics. Changes in the drivers will not exist in isolation from one another. Technological changes can affect productivity and the natural environment for example.

There are deeper methodological issues that must be considered alongside the identification of key drivers. The methodology should not assume that the future is largely an extrapolated continuation of the past. Disruptive technology is of course just one recognised way in which this assumption can be undermined. The methodology should consider the possibility that the drivers themselves may change, that is to say new drivers may emerge beyond the four listed in the consultation document.

The interaction between the identified drivers and the cross-cutting themes listed on page 19 of the consultation should be considered. This is not a simple process, but tools such as Causal Loop Modelling may provide some insight.

The NIC and the consultation document discusses the need for a “vision” for the UK. This should go further than an extrapolation of the identified drivers, complementing this with a consideration of the aspirational outcomes society desires, and the role infrastructure plays in facilitating them. This draws heavily on the notion of *behaviours* touched upon in the consultation document in discussing population and demography. While perhaps somewhat outside the traditional consideration of infrastructure, the NIA has an opportunity to engage with industry and the general public to articulate a truly ambitious vision for the future, based not just on what could happen, but what they would like to happen. In this sense the vision could foster a truly proactive approach to delivering the infrastructure society wants rather than simply taking an effectively reactionary approach, albeit one that is reacting to predictions.

Population, the economy, technology and climate do not reveal the nuance of how people will (*or would like to*) be working and living in 2050. While average broadband speeds have increased significantly over the last ten years, for many people they kept up with demand. This is not necessarily a factor of population growth, or even technological changes, as much as it is a product of **how** and **why** people want to use infrastructure.

It is right for the NIA to focus on changes in **population and demographics** as these can be a major factor in determining infrastructure requirements. However, particularly at a strategic national level, population growth should not be given undue precedence in isolation

from other factors. A focus on population growth can lead to a focus on infrastructure capacity, which can in turn lead to addressing the challenge through the provision of ‘more-of-the-same’. A larger population puts pressure on existing roads, leading to more roads being constructed. This in turn can create the widely observed paradox of *induced demand* whereby the provision of additional capacity leads to increased usage<sup>29,30</sup>. **An understanding of population and demographic changes as infrastructure drivers should be done in such a way as to not foreclose innovative solutions.**

Similarly, as discussed in the consultation document, it is widely believed that infrastructure can be a key determinant in **Economic Growth and Productivity** and vice versa. It would be useful in this context to consider the changing and innovative business models for infrastructure. The same physical assets may be used to deliver different values to users to those they deliver today through new business models. These can be closely connected to developments in **technology**, and the new abilities they enable. The growth of 4G cellular coverage has been influential in the growth of new sharing-based business models such as those used by Uber. Electric vehicles may place new demands on the energy system, but concurrent technological developments and Smart Meters may improve energy efficiency of existing products, reducing energy demand. The spread of the internet of things and other new technologies may create significant and profound disruptions to individual and collective behaviours, leading to new infrastructure demands. Technology can disrupt existing infrastructure use-cases in obscure and unexpected ways. Potential breakthroughs in renewable energy could alter the demand for electricity generation and distribution.

As the pace of change increases the future is increasingly dynamic and uncertain. The desire to make predictions about the future must be balanced by the development of the capability to be adaptable and resilient. It is not recommended to rely solely on extrapolation and forecasting at the expense of developing the capabilities of resilience, lest the process be disrupted by so-called Black Swan events. This raises questions about the lifecycle of infrastructure systems. These issues are equally true in relation to *Climate Change and the Environment*. Clearly the natural environment and climate can be a driver of the type and nature of the infrastructure society requires, but the uncertainty underlines the need for a resilient infrastructure, and a resilient approach to infrastructure planning and decision making.

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<sup>29</sup> Goodwin P. Empirical evidence on induced traffic. Transportation (Amst). Kluwer Academic Publishers; 1996;23: 35–54. doi:10.1007/BF00166218

<sup>30</sup> Noland RB. Relationships between highway capacity and induced vehicle travel. Transp Res Part A Policy Pract. 2001;35: 47–72. doi:10.1016/S0965-8564(99)00047-6

## Q11.

The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

The portfolios of closely connected complementary projects is a good approach. Rarely should projects be framed in isolation. In line with our response to Question 1 of this consultation, **the portfolio should cut across sectors and each of those should have a strategic programme of development.** One-off projects should be a part of the strategic programmes of work that provide a direction and pipeline of future work, assuring that synergistic outcomes are realised.

It is important here is to appreciate both the vertical interdependencies (portfolio-programme-project) as well as horizontally (programmes within the portfolio and projects within the programme). Designing the investment portfolio with these links in mind can enable the realisation of synergistic effects that will promote the high-level goals of the Commission: economic growth, international competitiveness, and improving the quality of living. Several ongoing and future research projects are looking into this area: ICIF, iBUILD, ITRC, UKCRIC, Infrarisk (EU funded) and the ESRC project Business Infrastructure Dynamics in Infrastructure Projects.

## Q12. (p24 of consultation)

In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

The response to this question summarises the points discussed in response to Question 8. As acknowledged there the individual methods and processes discussed (from understanding the current situation and drivers, through analysis and evidence review, to prioritisation) are sensible but the consultation document does not provide sufficient detail of the proposed methodological approach to provide meaningful comment. The methodology and choice of methods is of importance because the credibility of the NIA recommendations rests on their quality. With this in mind there are some specific additional factors that the Commission may wish to consider.

Understanding the baseline should not be limited to articulating the quality and condition of the current infrastructure assets and services. As described in responses to previous questions, there is a need to understand the fundamental desired and valued outcomes that society expects infrastructure to help facilitate, now and in the future. From this starting point **it is necessary to evaluate not just the efficiency of the current infrastructure systems, but their effectiveness in facilitating the outcomes valued by society.**

Evaluating the drivers of infrastructure need should also reflect on these desired outcomes and how they may change in the future. **Understanding future infrastructure needs must go beyond a simple extrapolation of current demands.**

The consideration of the feedback mechanisms through which infrastructure systems can affect the drivers of infrastructure is particularly welcome, as are detailed considerations of the interdependencies between infrastructure systems. **System Dynamics or Causal Loop Modelling may provide simple collaborative methods through which to explore the important feedback mechanisms.**

## Q13.

### How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

A clear, logical, purposeful and transparent methodology is needed when undertaking engagement with the wide variety of stakeholders. How this societal engagement fits within the broader methodology of the NIA must be made explicit such that it is clear how the findings will inform the NIA. Engagement should not occur in isolation from the broader assessment but as an important part of the approach. Stakeholders should be involved in all stages, from understanding the infrastructure baseline through to prioritisation. The most appropriate methodology may vary depending on the exact purpose of engagement.

One example of an effective industry and policy engagement instrument was demonstrated in the interactive workshops sandpits. Previous research has demonstrated the potential of participatory decision making across various disciplines to co-create knowledge that transcends traditional disciplinary boundaries. This research has found that domain knowledge ownership, frequency of interactions, actor responsiveness and cross-disciplinary knowledge brokering are the important elements of designing such cross-disciplinary interactive engagement tools. Experience with ICIF and related research has indicated that industry and policy engagement is the most powerful relevance tool of research-driven knowledge<sup>31</sup>

The NIA could seek to learn from the industry and governance focused stakeholder engagement and group model building conducted in the aforementioned STEEP project and in the development of the infrastructure Interdependency Planning and Management Framework. The Urban Living Partnership pilots recently funded by the EPSRC in Birmingham, Bristol, Leeds, Newcastle & Gateshead and York, each taking a unique “whole city” approach to the evolution of UK cities, may provide an avenue for effective public engagement. The plan for the United Kingdom Collaboratorium for Research in Infrastructure and Cities (UKCRIC) also includes Integrated Urban Infrastructure Laboratories that could provide a route to understanding societal needs and relationships with infrastructure.

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<sup>31</sup> Zerjav, V., Hartmann, T., & Van Amstel, F. M. (2014). A leadership-as-practice perspective on design in architecture, engineering and construction projects: interaction analysis of a collaborative workshop. *Engineering project organization journal*, 4(4), 209-221.



## **National Infrastructure Commission consultation on the National Infrastructure Assessment**

### **Isothane Limited Response**

#### **Background to Isothane Limited**

Isothane Limited are based in Accrington Lancashire and are a leading manufacturer of polyurethane systems. Polyurethane technology is vital to a wide range of applications and across many industries. Our in-house technical and development staff work with customers to design polyurethane solutions that meet their needs. We supply products to companies both in the United Kingdom and across the world and in 2010 we were listed in The Sunday Times International Track 100, recognising our growth as an exporter. Many of our products have certification from UKAS accredited organisations to support their use including our polyurethane insulation products which have been used throughout the Energy Companies Obligation schemes in properties which otherwise would have been unable to have “standard insulation”

#### **Background to this response**

As a company we warmly welcome the creation of an independent National Infrastructure Commission and now the opportunity to respond to this consultation in the areas that the commission will look at in formulating the National Infrastructure Assessment and how by looking at this as a whole rather than separate areas real change and benefits can be achieved. We particularly welcome the statement that the commission will explore the role increasing energy efficiency could potentially play in meeting the objectives of:

- Foster long-term sustainable economic growth across all regions of the UK
- Improve the UK’s international competitiveness
- Improve the quality of life for those living in the UK

#### **Question Responses**

***Q1 the Government has given the National Infrastructure Commission the objectives to:***

- ***Foster long-term sustainable economic growth across all regions of the UK***
- ***Improve the UK’s international competitiveness***
- ***Improve the quality of life for those living in the UK***

***What issues do you think are particularly important to consider as the Commission works to this objective?***

Isothane welcomes the stated objectives of the Commission. One area where we feel can play a large part in achieving these objectives is in the area of energy and the increasing of energy efficiency across the country. Increasing energy efficiency, particularly in domestic properties results in both economic growth (to all areas of the United Kingdom) and helps to improve the quality of life for those living here. There could be significant benefits to other aspects of the United Kingdom particularly in helping reduce the carbon emissions and achieving environmental targets, through cost savings in health services caused by cold homes and through economic growth due to lower fuel bills meaning more disposable income and also through the employment impacts of a strong energy efficiency supply chain.

**Q2 Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

Isothane agree that the Commission should be:

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks

In its decision to take into consideration interdependencies we feel that it is important that this looks at not only where an infrastructure programme can provide benefits in several sectors but includes the wider implications of that programme when making its decision.

**Q3 Do you agree that the NIA should cover these sectors in the way in which they are each described?**

We agree with the sectors indicated in the consultation document. We strongly urge that the point in section 41 which states that *“the sectors will not be tackled independently from each other”* is followed through and becomes a key part in looking at the various sectors. This is vital in order to take advantage of the links between the sectors, for example energy and flood defences. There are the obvious links between energy efficiency and carbon reduction (and their associated benefits which will work towards achieving the stated objectives of the commission) but if the correct methodology is used some areas in this sector can result in improvements in other sectors e.g. flood defences. There are products available that can result in energy efficiency improvements and improve the flood resilience of properties which have been tested by UKAS accredited organisations. Whilst this may seem quite detailed for this consultation response we feel it is important that these sorts of links are at the forefront of the commissions thinking when putting together their next steps.

**Q4 Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

We believe that the commitment to explore the role that increasing energy efficiency can potentially play as an infrastructure provision is a key aspect. The benefits associated with improved energy efficiency can play an important part in the commission achieving its objectives through economic growth and improving the quality of life for those living in the UK. A focus and commitment to improving energy efficiency can help to reduce fuel poverty and the associated health impacts of cold homes for those living in them and the cost to the health services that this results in. In addition to this reducing bills for domestic and commercial customers can help to encourage economic growth in areas as money is redistributed. A strong commitment to energy efficiency measures will also help the industry to plan for the future again providing the economic growth the commission sets out to achieve. If the right energy efficiency measures are used where flooding is an issue, as mentioned above the benefits can be even greater.

**Q5 The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?**

As per the details in Q3 and Q4 provided we believe there are interdependencies across sectors which need to be recognised. Often these interdependencies provide the “best value” options towards achieving the commission’s objectives but have previously been over-looked by “narrow focused” schemes and incentives.

**Q6 Do you agree that the NIA should focus on these cross-cutting issues?**

Isothane believes that the cross-cutting themes indicated in the consultation document are important considerations.

**Q7 Are there any other cross-cutting issues that you think are particularly important?**

We also feel it would be beneficial for the commission to look at the range of organisations that exist in the United Kingdom that can help plan and deliver these national infrastructure projects/solutions and not focus on the usual big players/most obvious organisations. There are skills, knowledge, experience and ideas across the whole of the United Kingdom and by looking away from the larger organisations and groups this also has the additional benefit of improvements in those locations/industries which may otherwise be overlooked through economic growth.

**Q8 Do you agree with this methodological approach to determine the needs and priorities?**

Yes we agree with the methodological approach being used to determine the needs and priorities. Large amounts of data already exists, for example to improve energy efficiency there is the National Energy Efficiency Database and national housing condition surveys which can be used. In relation to flooding, information is held by the environment agency on those areas at risk. We again stress the point that this information needs to be considered together to achieve infrastructure improvements which achieve the objectives, there is no point in insulating a property within a flood risk area with materials that do not offer flood resilience as any gain achieved through energy efficiency will be quickly eradicated in the event of a flood.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

Due to our position as a manufacturer we don’t have examples however we do believe that the Commission should look to engage with a wide range of stakeholders including local authorities and charities who will hold information that could be fed into the decision making process.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

Overall we believe the Commission has identified the most important infrastructure drivers but as we have indicated in response to previous questions we believe energy efficiency is an important driver which impacts on economic growth and productivity as well as climate change through carbon reduction and the environment.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

Isothane believes a balanced portfolio using the appropriate information and methodology for that sector whilst taking into considerations cross-sector opportunities is the most appropriate.

***Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?***

We believe it is important the Commission takes into consideration the learnings from previous more narrow focused schemes through consultation with Government departments particularly where the schemes have had a negative impacts on some areas/industries and where the lack of long term planning has caused uncertainty. From an energy efficiency perspective it is important that the Commission consult with the Department for Business, Energy and Industrial Strategy Committee on Fuel Poverty,

***Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?***

We welcome that the Commission wants to capture the expertise and opinions of a wide range of stakeholders and that the development of National Infrastructure Assessment will be done openly and consultatively. Where Isothane can provide expertise and assistance in areas of infrastructure improvements we would be more than happy to do so. We urge the commission to consider using the many “not for profit” organisations that can help bring together various stakeholders who would work together to achieve results and can also help to engage the various sections of society through their unique position. These organisations also often have access to large amounts of data and examples of projects that could be useful.



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Date 5 August 2016

Dear Lord Adonis

We welcome the opportunity to provide comment on the proposed National Infrastructure Assessment.

As currently framed, the NIA offers an opportunity to shape a high level strategic view on infrastructure over the long term – a valuable piece of work in its own right and critical to supporting a robust future growth strategy for the UK. However, the NIC has an opportunity with the Assessment to understand and help unlock the practical application of such infrastructure to supporting the existing and new communities it is intended to benefit.

As such, a key theme of our response to the consultation questions is the importance of understanding how infrastructure interacts with growth across the UK. Although the consultation document references that there will be consideration given to new housing growth, it is much more fundamental to understanding the spatial demand for infrastructure than the proposed approach to the NIA appears to suggest.

Kent County Council has long recognised the critical importance of infrastructure to support quality growth and communities. Recently, KCC published the Kent and Medway Growth and Infrastructure Framework, which we would encourage the NIC to consider in developing the NIA and its methodology and approach to considering infrastructure in a more holistic and integrated way. The GIF can be found at [www.kent.gov.uk/gif](http://www.kent.gov.uk/gif). We are now aware that there are other counties across the Southeast taking a similar approach, and similar pieces of work are now being undertaken in Surrey, West Sussex and Essex.

In Kent and Medway, we are planning for 160,000 new homes and just under 300,000 population increase to 2031, and we have identified a resultant need for £6.74bn in infrastructure investment across a range of infrastructure, from road and rail, to education and social care, to green infrastructure and utilities. The work has enabled KCC to understand much more clearly than ever before the scale and the geographical spread of required infrastructure to support growth. It has also enabled the Council to work with partners in districts and the development industry as well as

other infrastructure providers to start to explore some of the key constraints and issues holding back the provision of the necessary infrastructure to support growth.

The GIF has also allowed us to work more closely together with our colleagues in the South East and London to understand and plan for the wider implications of growth, bearing in mind that Kent is dependent on infrastructure elsewhere in the South East and vice-versa.

Given our unique position having already undertaken our own comprehensive growth and infrastructure study, we would welcome the opportunity to work with the Commission to explore and test the new NIA. Should you wish to speak to us further or seek our input to this piece of work, please do not hesitate to contact me at [e-mail address redacted] or on [phone number redacted].

Yours sincerely,

[signature redacted]

[name redacted]  
[job title redacted]

## **ANSWERS TO QUESTIONS**

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

Principal amongst the issues which the Government should consider in working to these objectives is the need to use the NIC and its work to achieve quality, sustainable growth, as opposed to just growth. The right infrastructure is critical to ensuring that growth is not just delivering housing numbers, but rather is delivering communities.

The link between infrastructure and growth cannot be overstated. The timely provision of “foundation” infrastructure such as water and energy is essential not only to enable sustainable growth but to make growth possible in the first place - it is fundamental to the very viability of growth.

Although not specifically within the remit of the Assessment, the NIC should not lose sight of the importance of infrastructure in facilitating growth in its widest sense – including enabling the growth of employment space as well as housing.

Further, it should be stressed that the focus should not just be on infrastructure to support new development but rather should consider infrastructure to support existing development. One of the key issues facing local authorities and other infrastructure providers is the growing cost and diminishing resources for maintaining existing infrastructure – from roads to schools to green spaces to local waste management – all of which are fundamental to the NIC's third objective.

It is also critical that the NIC considers the role of design in facilitating achievement of these objectives.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

Embracing technology is a key principle which is missing from the consultation document, and one that has the potential to drive real change in the way we deliver against the needs of national infrastructure. With growing financial constraints on the public sector and increasing growth pressures, it is vital that the Commission

considers how we deliver infrastructure – not just as we have always delivered infrastructure, but in genuinely new ways.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

KCC welcomes the inclusion of the strategic infrastructure sectors the consultation document proposes, but would wish to comment on the scope proposed for these sectors, as well as suggest gaps in the current proposed scope of the NIA.

**Digital and communications**

Digital and communications infrastructure is critical for enabling economic growth and for ensuring long-term competitiveness of the UK's economy. As such, the Council agrees that digital and communications should be a key sector for the NIA's work.

It will be important to ensure, given the current pace of technological innovation, that the UK's digital infrastructure anticipates future needs (e.g. broadband speeds, infrastructure requirements for wider adoption of internet of things technologies), as without this consideration, the ability of the UK to benefit from new high growth digital sectors and applications, and for existing sectors to adapt and adjust their business models in light of increased competition from new market entrants using digitally disruptive business models (e.g. Uber, Airbnb), will be hampered.

As a result, there is a need for the NIA to focus on ensuring that mobile and fixed digital communications have sufficient capacity, availability, affordability (especially for SME where current lease line costs can be prohibitively expensive) and data upload/download speeds.

In addition to considering 'next generation' digital communications, there is a need to consider digital communications connectivity in new developments. Currently, there is no mandatory requirement for developers to provide fixed high-speed broadband access into new sites. This is leading to cases where some new developments have either no or slow broadband connectivity. Work that KCC has undertaken with developers across Kent has also identified challenges for developers looking to provide the required infrastructure which needs addressing.

**Transport**

The importance of transport infrastructure to the sustainability of future growth in the UK and the competitiveness of the economy is critical. KCC welcomes a multi-modal approach, and we agree that this must include looking at how key road, rail, ports, airports and other transport arteries support the movement of people and freight into and across the country. Given the Commission's objectives to facilitate sustainable growth and competitiveness, it is critical that such assessment prioritise key national and international corridors. Such an approach is of the utmost importance in Kent due to its strategic location at the gateway to mainland Europe. The international transport artery through Kent to the busiest short sea shipping route across the Strait of Dover with both the Port of Dover and the Channel Tunnel (with forecast growth of around 5% per annum) requires supporting national road and rail infrastructure. This is in addition to improvements to the entry points themselves as problems at the ports cause a blockage throughout the transport artery, affecting the whole of Kent, the Southeast and the wider UK.

The National Infrastructure Assessment must also include consideration of the wider network enhancements required to enable efficient movement of people and freight from expanded ports to the rest of the UK, including those that have led to the need



for a new Lower Thames Crossing and Strategic Road Network (SRN) improvements to the M2/A2 and M20/A20 arteries. Increased rail capacity is also needed for modal shift of both passengers and freight, especially increased high speed rail services to support growth along this artery which is also part of the Thames Estuary Growth Commission area.

### **Water and drainage**

KCC welcomes the contribution of the NIA in the water and drainage sector although we tend to find that many of the most difficult problems are very localised in nature; as such, the NIA will need to consider this local dimension if it is to add value to our understanding of this sector.

KCC is already quite advanced in work to address the challenges concerning water and drainage in Kent: We have identified the long term risks and opportunities relating to local water systems, undertaken a spatial risk assessment for these and developed a work programme to address specific risks relating to water supply for agriculture and horticulture. We are currently undertaking a study entitled Water for Sustainable Growth which is further examining the challenges and infrastructure solutions to accommodate growth and this will feed in to our broader infrastructure assessment – the Kent Growth and Infrastructure Framework.

Within paragraph 45 of the consultation document the focus appears to be mainly on water supply. In KCC's view, long term planning is quite well developed for the public water supply system and it is not clear what the NIA would be able to add to the Water Resource Management Plans that are already in preparation for the period 2020 to 2045. However, it would be useful to thoroughly examine the energy demand and carbon implications of the remaining water supply solutions for water scarce areas such as Kent (for example water reuse and desalination) and to consider the strategic impacts of water availability for agriculture and horticulture in relation to national food security.

In KCC's experience wastewater infrastructure is often more challenging and long term wastewater planning is less evident and less transparent: Improvements need to be made to the quality of many local water courses at the same time as accommodating additional wastewater effluent resulting from future growth. However, the necessary treatment processes are not yet sufficiently developed to achieve this and the problem is expected to be exacerbated by reduced dilution as a result of climate change impacts on summer river flows. Many of these problems are very localised but a strategic consideration of the technological issues of wastewater treatment as part of the NIA would be very useful.

### **Waste**

KCC welcomes the inclusion of waste as a sector, but as with other sectors, it is vital that the Assessment is mindful of the local context in which provision is made for such infrastructure. It will be vital that the NIA considers the Waste Hierarchy when undertaking the assessment of waste infrastructure. Again, many of the issues and solutions in providing waste infrastructure are determined at a local level in response to patterns of growth. Local Plans such as Minerals and Waste Local Plans thus should be considered when preparing the NIA.

From KCC's perspective as a Waste Disposal Authority, the requirement for a fit for purpose Household Waste Recycling Centre and Waste Transfer Station network is vital. Disposal processors for both trade waste and household waste should be considered – local authorities are often limited by current waste disposal infrastructure in their geographical area and may therefore be limited in the extent to

which they can adhere to circular economy models e.g. processors of specific material streams may not be available within a suitable distance.

## **Energy**

Again, KCC welcomes the inclusion of energy in the NIA, but would suggest further considerations are made in scoping this element of the Assessment.

For instance, KCC would recommend that the Commission consider District Heat Networks and the work underway nationally and locally across the country to develop such alternative energy provision. The Government are consulting on how best to use funding identified at the last budget for heat network investment and we welcome this.

The Commission should also be mindful of the role that Salix Finance has played and could continue to play in enabling energy efficiency. KCC has been a recipient of this funding since 2004 and have invested over 3 million pounds in energy efficiency projects making life time savings of around £10 million. We have also been able to use the Salix funding to invest in our streetlighting portfolio and upgrade our lights to LED as well as provide more control on when they are on and off. We would welcome any moves to be able to use such funding for other energy investment such as boiler upgrades and renewable heating systems.

We are also aware of the restrictions on grid supply with regards electrical connections in the Kent area. We recently were told that to connect our District Heating scheme to the grid it would mean buying a super connector at a cost of £11m from UKPN. We would like to see more investment in the grid locally to allow for new development and more localised generation systems like District Heating.

There is great potential in Kent for off grid renewable and battery storage systems, in which we think the Commission's Assessment could offer great insight. The NIA should consider the potential for investing in such sustainable energy options, and whether there is a need for greater investment in R&D and investment in actual onsite projects with regard battery storage.

### **Gaps in the current scope of the NIA**

- **green infrastructure** – Whilst green infrastructure may not currently be in scope of the NIC's current NIA scope, it is increasingly recognised as vital to quality communities. It is increasingly recognised that green infrastructure provides value not only to the quality of life for communities but also to providing ecosystem services which in and of themselves can actually reduce the infrastructure burden – e.g. flood management, water quality etc.
- **health and social care** – Although extensively examined in other parts of Government and through the STP process currently being undertaken across the country, the healthcare system and its fundamental links to social care have very real and pertinent physical infrastructure needs which are currently viewed in a very siloed way from other infrastructure. Critically, the provision of such care is necessarily shifting to more preventative care, which inevitably has implications for communities and technology. Increasingly, health and social care is becoming integrated, and this will fundamentally impact the infrastructure that is provided to support communities along with those infrastructure sectors provided for in the consultation document.

- **education** – Equally important to providing quality communities as the infrastructure sectors detailed by the consultation document, education and particularly the provision of schools is fundamental to getting quality and sustainable growth right, and is critical to integrate with the provision of other infrastructure

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

The consultation document indicates that although the Commission is not to consider housing supply, that it will be looking at the interaction between infrastructure provision and housing growth. The importance of this interaction cannot be overstated. Understanding how communities currently interact with infrastructure in place is essential to planning how it should be provided to support future growth and tackle current deficits/market failure.

As the Kent and Medway Growth and Infrastructure Framework (GIF) has identified, the importance of infrastructure in the broadest sense to delivering the Government's objectives in housing growth is absolutely vital, and yet, this provision of infrastructure is perhaps one of the greatest barriers to housing growth, even above planning.

In fact, it should arguably be part of the Commission's remit to explore how local authorities, in their role in facilitating housing growth, can and should be empowered to enable such infrastructure to be delivered. Particularly upper tier and unitary authorities are well-placed to identify growth locations and phasing of likely growth, and in the case of authorities like Kent County Council and Medway Council, have already started the process of strategic infrastructure mapping.

Although hinted at in the NIA sector list, there is a real need for the NIC to look at utilities in the round and the way in which utilities are now delivered alongside and theoretically to support growth. There is a fundamental disconnect which has been identified in Kent, but is certainly not unique to the area, between the pace and pattern of new development and the investment made in and connections provided which can lead to real barriers to growth. Kent County Council has established a sub-committee of its Scrutiny Committee to examine the barriers to providing utilities to support growth and the way in which we and local partners can engage with national regulators in providing solutions. The NIA offers a strategic national framework in which some of these issues, where systemic, can be highlighted and where fundamental change is needed in the way in which utilities infrastructure is invested in and delivered, can be addressed.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

As above, the fundamental interdependency between new development and infrastructure is vital – ensuring that infrastructure provision is prioritised according to the needs of communities both new and existing.

Taking a holistic view of infrastructure, it is possible to deliver greater efficiency and value for money in providing infrastructure to support growth. The opportunity for single trenching, for instance, providing a single route for multiple infrastructure alongside new development allows providers to achieve the same infrastructure for less cost, given only one trench is being dug. By extension, the fundamental links

between infrastructure that the Commission already recognises like transport, waste, and utilities on the one hand, and schools and health and social care on other, provides a further opportunity to maximise value for money.

The interdependency between utilities and new housing growth in particular is a fundamental link recognised by Kent County Council and now overseen by the Council's newly established Utilities Engagement Sub-Committee. With its remit for reviewing and identifying barriers and solutions to enabling utilities to be delivered to support sustainable growth, the Sub-Committee is exploring utility by utility the particular issues facing the way in which this important infrastructure is delivered to support new development. Equally, the Sub-Committee is looking at where utilities delivery can prove a blocker to new development.

At the moment, there are key issues with the way in which new utilities are invested and delivered that mean that although there is an obligation for water companies, for instance, to provide water supply to new homes as identified in an area's Local Plan, it is regulated by Ofwat not to "speculatively" invest in new infrastructure. As such, a water company currently has to await the actual delivery of new homes to provide infrastructure, when more often than not, this is too late to truly enable new development – rather the delays caused by waiting until this point can be detrimental to the viability of new development.

Finally, the interdependencies between health and social care infrastructure are particularly important, given the ageing population and therefore rising demands on both of these sectors, and the fluid movement of members of the public across and between both sectors, commonly accessing both simultaneously. It would be illogical, short sighted and certainly not affordable, to consider either of these sectors' infrastructure needs independently.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

These cross-cutting issues are important considerations, but not the only issues – see answer to Q7.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

As mentioned previously in this response, the issue of maintenance of both existing and new infrastructure is absolutely fundamental to providing robust infrastructure that will support not only new communities but existing communities. There are a number of mechanisms for attracting funding to provide new infrastructure, which although still far short of the total infrastructure bill, provides greater levers than what is available for the maintenance of infrastructure once in place, or already in place.

Further, we welcome the Commission's proposed consideration of local growth and the impact of infrastructure provision in shaping economic geography. In considering the role of devolution, it should have regard to the requirements for economic impact of local infrastructure across the UK, including in areas not currently subject to Devolution Agreements.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

The kind of high level analysis that the NIC is proposing in the consultation document is welcome but only part of the answer to understanding infrastructure barriers. Again, it is important to stress the need to understand growth priorities and trajectories within functioning economic areas such as Kent and Medway.

As Kent and Medway Councils have already put together a Growth and Infrastructure Framework for the area, it would be useful to test the findings of the NIA against the comprehensive local study to understand where the findings of the NIA are reflective of local on-the-ground realities and where there may need to be further refinement.

The NIC should also not forget to include an assessment of maintenance requirements for infrastructure in its understanding of the infrastructure baseline.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

No examples of such modelling, but we would encourage the Commission not to forget to use the existing planning system to gain an understanding of growth patterns which are as much a determinant of infrastructure needs and investment requirements in the future as complex but otherwise potentially esoteric modelling. High level modelling is important but ensuring that the implications of such analysis can be applied practically in planning for infrastructure in the medium term is equally if not more important to the future generations this work is intended to benefit.

Although not a “complex model” the Kent and Medway Growth and Infrastructure Framework ([www.kent.gov.uk/qif](http://www.kent.gov.uk/qif)) offers an example of a methodology of drawing infrastructure needs from planned growth and identifying the implications of such infrastructure needs.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)?**

- Population and demography
- Economic growth and productivity
- Technology
- Climate change and environment

**Are there further areas the Commission should seek to examine within each of these drivers?**

Population growth is certainly a key driver but it is not clear whether the expectation is that the NIC consider how to accommodate population growth as forecasted by the ONS or whether the intention is to shape this growth with an informed strategy about where infrastructure may be provided.

A further fundamental driver of infrastructure is geographical location. Certain areas around the UK provide major corridors either for intra-UK or international trade and movement of people. Whilst these areas receive particularly high demand for their infrastructure, particularly transport infrastructure, there is no distinction between these high demand corridors and other parts of the UK in the way that infrastructure need is currently assessed.

Although indirectly linked, the patterns of housing and commercial growth are fundamental to understanding how these drivers will impact on existing and future infrastructure. In particular, there needs to be some care in making the direct link between population forecasts and household numbers, as this is a trend which can change over time, and it is important to recognise that the local planning system through Local Plans provide a more accurate indication of likely draw on infrastructure than population growth per se, at least in the medium term.

Viability of development is also therefore key to understanding where development pressures are likely to arise, and where there may need to be increased prioritisation of infrastructure provision. Given the significance of new development and developer contributions to the provision of infrastructure, the viability of development is absolutely vital to understanding where demand for infrastructure is most likely but also where financing of such infrastructure is likely to be more challenging. For instance, in Kent, land values in the West of the county are up to ten times the value of land in parts of East Kent – leading to real challenges in the way in which infrastructure is practically delivered on the ground.

For a number of infrastructure providers, whether local authority or otherwise, legislation is a further key driver of our service provision and the infrastructure we provide. For example, should waste legislation change, and a stronger emphasis/targets be placed on recycling rather than recovery (i.e. burning waste for energy), this will have a significant impact on the disposal infrastructure that we require. Furthermore, changes to legislation could have a profound effect on current disposal infrastructure and the contracts KCC has in place with these disposal processors. Indeed, there is already proposed EU legislation as part of the ‘Circular Economy Package’ which places greater emphasis on recycling targets – clearly the uncertainty following the Brexit decision should also be considered as part of the development of the NIA. Already, changes in taxation laws in mainland Europe are creating restrictions on the exporting of waste as a result of Brexit, which impacts on infrastructure provision.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

It is clear that in the current and likely future financial climate that there will not be the funding available to provide all the infrastructure that is determined to be a need to support UK growth. Within Kent and Medway alone, the funding gap for new infrastructure to 2031 is approximately £2bn; this figure does not include the gap in funding for much needed maintenance of existing infrastructure.

It will therefore be important that the Assessment develops a methodology for investment prioritisation which takes into account the geographical distribution of – and capacity for – future growth.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

Although referenced throughout, there is a need to engage with the housing growth that is planned through Local Plans across the country – understanding that the demand that is driving this work by the NIC is as much about the Government’s growth agenda as it is about supporting existing communities.

We would encourage the NIC to consider how it builds into the NIA an assessment of existing and emerging Local Plans, and particularly growth areas, to ensure that the NIA has a complete picture not only of an abstract assessment of national infrastructure need, but an assessment that enables us to understand where this demand is likely to come from and the implications thereof. This picture will come not just from population forecasts, which are more changeable than the local planning system, but also an understanding of Local Plans and what they are saying about where housing and employment growth is going, and therefore, the geographical patterns in which communities will be demanding infrastructure.

It would also be appropriate to consider a categorisation and prioritisation of infrastructure depending on its sphere of importance - international, national, regional and local as part of the methodology to help establish/reinforce the portfolio.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

We would encourage the Commission to consider how it collaborates with local planning authorities in engaging local communities and stakeholders. The question of infrastructure is fundamental to much of what local planning authorities and upper tier authorities are providing by way of services to their citizens; as such, there is a danger that the work of the NIC is seen or understood in isolation or in abstract. Rather, the work of the Commission is fundamental to delivering communities and sustainable growth which should have a practical application in the communities that local authorities are supporting to build.

It is critical to consider not only the role of public sector bodies in providing infrastructure, but also the private sector view of where demand for housing and employment growth is going and its needs for infrastructure. In Kent, we have a private-public partnership, the Kent and Medway Economic Partnership, which we would be keen to see involved in any engagement. Further, the Commission will likely want to consider the role of Local Enterprise Partnerships, and for Kent, the Southeast Local Enterprise Partnership, in engaging with this agenda.

Further, the Commission can engage with different parts of society by closely working with all Central Government Departments to ensure they reach different sectors through established and effective sectoral networks. Additionally, engagement with Local Government should emphasise that cross-authority thinking is required, in order to ensure local networks beyond housing, and planning are accessed and engaged.

We would also encourage the Commission to consider engaging through different forms of media, given the shifting patterns in which all stakeholders receive information.

In Kent, we would be delighted to work with the Commission to help build its evidence base. The Government's establishment of the Thames Estuary Growth Commission provides a new focus on an area with great growth potential, but extensive infrastructure needs. The Commission may wish to consider piloting its emerging methodological approach within the Thames Estuary, and we would be very happy to work alongside the NIC in support of this.

**[email address redacted]**

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**From:** [name redacted] [email address redacted]  
**Sent:** 29 July 2016 15:24  
**To:** NIA Evidence  
**Cc:** [name redacted]  
**Subject:** Consultation response for National Infrastructure Assessment Consultation

**Importance:** High

Please find below a consultation response for and on behalf of Kingspan Insulation Limited for the National Infrastructure Assessment Consultation.

Consultation Response from: Kingspan Insulation Ltd

Completed by: [name redacted]  
[job title redacted]  
Kingspan Insulation Ltd  
Pembroke  
Leominster  
Herefordshire  
HR6 9LA

If you have any queries regarding our answers to any of the consultation questions, please contact us via: [email address redacted] or by telephone on [phone number redacted].

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

**What issues do you think are particularly important to consider as the Commission works to this objective?**

Energy efficiency can be an extremely powerful lever and a major energy resource to achieve greenhouse gas emissions reductions, reduced costs and reduced air pollution and can assist with achieving sustainable economic growth and energy security.

Energy Efficiency measures can also significantly help improve quality of life, with positive outcomes for health and wellbeing as well as a variety of other positive outcomes (including where works involve area regeneration, improved social cohesion and reduced levels of crime).

The following full picture of the benefits that can come from investment in energy efficiency is taken from [http://www.energysavingtrust.org.uk/sites/default/files/reports/1-424-15\\_Payne.pdf](http://www.energysavingtrust.org.uk/sites/default/files/reports/1-424-15_Payne.pdf):



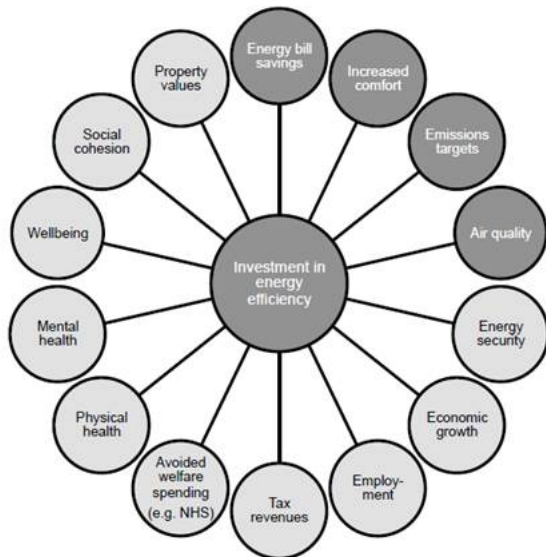


Figure 1. The "multiple benefits" of energy efficiency investment in the UK.

The key issue for Infrastructure, is that energy efficiency reduces demand, which can lead to significant additional value beyond the energy savings alone. Once the costs of additional generation, transmission, and distribution capacity, and their losses are accounted for, reduced demand becomes extremely significant as it equates to reduced expense. The greenest method of generation is the one avoided.

What is needed is a government supported, long term, joined up approach to policy with energy efficiency at the heart of the infrastructure strategy, with support and investment needed to drive a number of complimentary approaches, policies and incentives. If developed and supported cohesively, this could act to improve the efficiency of the building stock and as a significant driver towards reduced future infrastructure requirements, whilst also significantly contributing to increased employment and the wider economy.

Energy efficiency reduces demand loads for homes and businesses; the utilities would therefore not have to supply these avoided demands with generating facilities, saving on additional new generation and costly replacement and also on losses (and additional transport) between generation and the consumer; this in turn would also reduce the level of support needed from government and external investors to service that avoided demand.

The UK imports significant quantities of natural gas (still the most common heating fuel), and reductions in energy consumption can contribute to energy security by reducing demand for foreign imports. Predictions are that by 2030, the UK will be importing 75% of its gas (future relationships with Europe and Russia become more significant and the idea of reducing this demand level becomes even more desirable).

Energy efficiency investment offers high value for money, especially if wider ancillary benefits are also taken into account. Analysis suggests that energy efficiency appears to be self-financing to the public purse, once macroeconomic impacts are taken into consideration, with high value-for-money compared to other infrastructure projects (Refer to Cambridge Econometrics & Verco, 2014 report 'Building the Future: The economic and fiscal impacts of making homes energy efficient' <http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf> and also to 'Energy efficiency: An infrastructure priority' by Frontier Economics <http://www.frontier-economics.com/documents/2015/09/energy-efficiency-infrastructure-priority.pdf>)

We see considerable merit in the recommendations and suggestions presented in these two reports.

As part of this work, the Commission should consider the reduction of energy demand and assess the full costs and benefits that can come from reducing demand and weigh that against the required investment and measures necessary to deliver it and against the costs of additional supply side alternatives.

Q2. Do you agree that, in undertaking the NIA, the Commission should be:

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

We fully agree that the Commission should be orchestrated following the principles as discussed.

Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

We agree that the NIA should consider housing supply as part of deliberations as regards to the demand requirements that new developments create and to consider how the additional infrastructure demands might be met.

We welcome the focus on the energy system and how it can help deliver our carbon reduction and environmental objectives.

Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

The built environment and energy efficiency are key to reducing demand and therefore reducing the level of new generation required. Investment in energy efficiency to reduce demand is therefore essential and should form both one of the key themes of the review, with its own dedicated expert panel and work stream, as well as being represented across the other infrastructure sectors.

See Question 1.

Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?

Energy efficiency is a theme that can provide benefits across many sectors.

Q6. Do you agree that the NIA should focus on these cross-cutting issues?

Yes.

A long term co-ordinated approach for delivery will be essential and will likely need to be supported by joined up policies, with legislative nudges as necessary.

Q7. Are there any other cross-cutting issues that you think are particularly important?

Energy Efficiency cuts across a number of issues.

Q8. Do you agree with this methodological approach to determine the needs and priorities?

Yes.

A combined approach considering quantitative and qualitative evidence is required.

Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

No.

Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?

The Climate Change and Environment section should fully explore the benefits of reducing demand through an improved building fabric as well as more efficient means of meeting that demand. Stronger targets, with mechanisms and policies to support their implementation would reduce the level of Infrastructure demand.

The commission should examine the costs of policies that could reduce demand across the building stock by at least 50% and consider this against the full potential benefits to the economy of prioritising energy efficiency, including the savings that come from avoided demands with savings on required additional new generation and transport losses between them and the consumer. This review should include wherever quantifiable the additional benefits that can come from improved energy efficiency from better health and wellbeing, increased employment and benefits to the economy, and ancillary benefits such as improved social cohesion, area regeneration etc.

The Government and the National Infrastructure Commission should fully assess the potential benefits of designating energy efficiency as a national infrastructure priority.

Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

No view.

Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

As Question 1 response, the review should consider building and housing energy demand and the effects of reducing that demand on future infrastructure requirements, with close involvement from energy efficiency experts to assist in the development on the NIC's future priorities and assessment.

Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

Full and open consultation, with progress reports and opportunity to feedback at key stages. Alongside expert panels and workgroups including membership from across all involved sectors.

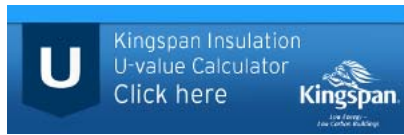
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### Knauf Insulation -Background

Beginning life as Pilkington's Insulation in 1946 before being bought by a German family owned construction materials company, Knauf Insulation is now the number one insulation manufacture in the UK and the world's third largest insulation manufacturer. With revenues in excess of €1.5bn, Knauf Insulation is part of the wider Knauf Group.

A recent focus for the company has been exploring a move away from simple building material supply, primarily sold through distribution channels, toward a model offering solutions, and potentially energy services, direct to building owners. This journey toward offering energy solutions and services has prompted our response to this consultation.

#### **Question 1 - What issues do you think are particularly important to consider as the Commission works to this objective?**

A central plank of National Grid's modelling of Future Energy Scenarios is the energy demand linked to UK Housing whether gas or electricity. The scenarios they model consider different policy appetites to drive change within our housing stock – from ambitious management of heat and power demand to 'business as usual'. Yet the current direction of travel from Government has shown little sense of which strategy it wishes to drive – if any. The absence of a strategy offers little to invest against and ultimately means the UK business losing out to partner companies overseas when the annual capital investment budget is up for grabs.

Rather than an energy efficiency strategy, policy has lurched from one short term approach to another with a backdrop of a series of aborted grand plans. Amongst these decisions include abandoning the Green Deal – the programme intended to support private housing take action on home efficiency - and the halving of the one remaining policy supporting existing home renovation – the Energy Company Obligation. Indeed, it is the Government's declared intention of focussing this policy in the future on the 4 million fuel poor households rather than the 27 million UK homes in the wider stock. While this is an understandable policy ambition, it moves a policy fundamentally designed to drive energy security and carbon emissions reduction in all UK households into a policy to support the most vulnerable.

This approach leaves a yawning gap in home efficiency policy, one of the three key energy demand sectors, which means the UK will soon have an offer for renewable electricity and renewable heat for every household to assist with generating energy but not a universal offer to improve efficiency – usually a far more cost-effective option.

Government has also removed the ambition driving UK Building Regulations toward zero carbon low energy new homes. This approach means that even National Grids 'Business As Usual' modelled scenario in their Future Energy Scenarios for housing sector energy demand is optimistic. Yet we wouldn't ask for a return of some of the policy instruments that drove energy efficiency over the last decade. Specifically, the design of the Energy Company Obligation drives efficiency work at lowest cost focussing on the efficiency of walls or roofs at a UK housing stock level rather than incentivising the best outcome for that house, its occupants and the local energy infrastructure.

We as Knauf Insulation want to be asked "what does a 'smart home fabric' solution look like alongside smart meters, fridges and energy storage?" We want to show that any managed energy solution in buildings explores how ensuring

homes can be heated, lit and powered for less energy input. We also want to show it can be done significantly more cost competitively when compared with investment solely in distributed generation and storage or upstream distribution networks and generation capacity.

The benefits to the UK economy of a large scale energy efficiency programme have been well documented. Frontier Economics showed that a national programme of investment in the energy efficiency of the building stock in Britain, over a period of ten years, is capable of delivering major economic and social benefits in the order of £8.7 billion. This net benefit is comparable to other major infrastructure road and rail projects, including HS2 (Phase 1). The report concluded that there is a strong case for Government to make home energy efficiency an infrastructure investment priority and to develop an infrastructure programme to deliver it.

Analysis by Cambridge Econometrics and Verco in 2011 also demonstrated that for every £1 invested in energy efficiency, £3.20 is returned to the economy. In terms of jobs, a report by the UK-Green Building Council in 2014 also highlighted that major investment in energy efficiency could almost double the number of people employed in the energy efficiency industry to 260,000. In summary, that report also concluded that the economic case for making the energy efficiency of the UK housing stock a national infrastructure priority is strong.

The reasons investment in energy efficiency of buildings can create jobs and growth are very simple:

- Energy efficiency reduces consumer demand for energy, freeing up energy capacity more cost-effectively than building new power stations, gas and electricity distribution networks and storage.
- The work required to maintain and improve the building stock, including installing energy efficiency measures such as insulation, results in jobs and growth.
- Consumers living in energy efficient homes, and energy efficient businesses, have significantly lower energy bills, allowing them to spend money on other goods and services (particularly in the “able to pay” market).
- Energy efficiency provides a great range of public services, such as helping to protect consumers over the long term from energy price volatility, from fuel poverty and the health impacts associated with fuel poverty. And it substantially reduces the UK’s carbon emissions

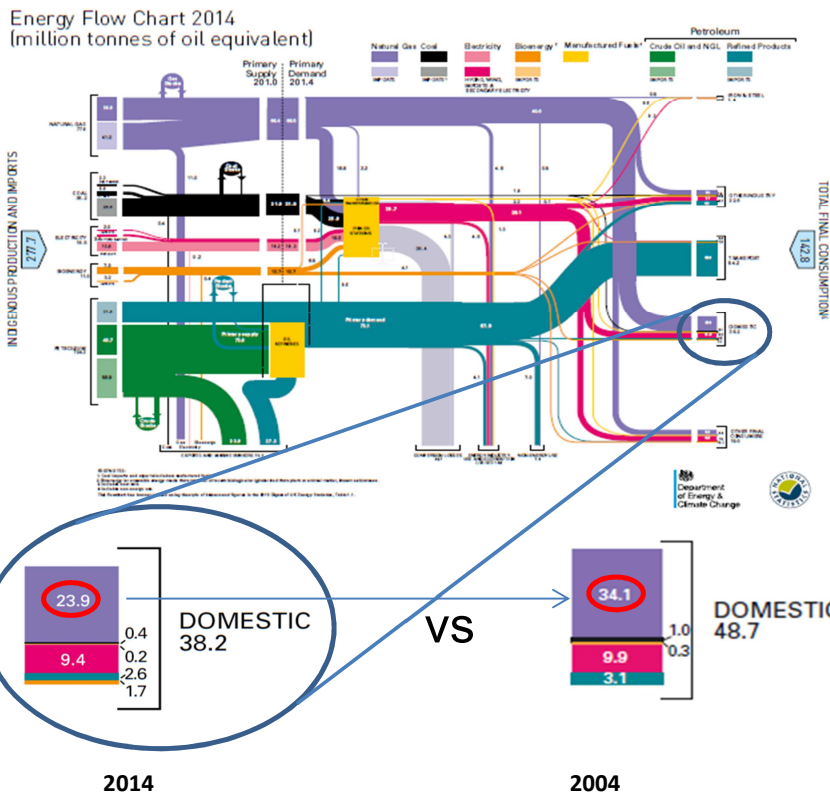
**Question 3** - Do you agree that the NIA should cover these sectors in the way in which they are each described?

It is good news that the NIA ‘will cover the energy system as a whole’ and address some of the siloed thinking identified in the consultation. The intention not to consider ‘upstream energy extraction and processing’ is understandable although the assumption is that buildings, and especially the UK’s 27 million homes, and reducing their current energy demand will be a key infrastructure area to explore. As the 2014 UK energy flow diagram<sup>2</sup> below shows, the focus for historic energy analysis almost always simply describes demand and then explores how that demand is satisfied with different supply sources. There are rarely attempts at describing energy demand with no ‘page 2’ disaggregating the energy using sectors identified and exploring where efficiencies can be gained.

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<sup>1</sup> Building the Future, the economic and fiscal impacts of making homes more energy efficient, 2014  
<http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf>

<sup>2</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/449060/Energy\\_Flow\\_Chart\\_2014.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/449060/Energy_Flow_Chart_2014.pdf)



If UK energy flow diagrams stop at simply describing demand sectors such as ‘Domestic, Industry and Transport’, the simple comparison above between the 2014 domestic demand and the 2004<sup>3</sup> domestic demand shows a **dramatic fall of around 30%**. This equates to a fall in over 10 million tonnes of oil equivalent per annum in domestic gas within a decade with a significant, if less substantial, drop in electricity consumption.

Weather adjusted analysis by the Department of Energy & Climate Change<sup>4</sup> has shown a similar 30% reduction in domestic gas use between 2003 -2013. This fall in consumption is huge and constitutes an infrastructure programme that has gone unnoticed. Rough estimates suggest it has delivered savings in the region of £5bn pa off householder bills and dramatically improved UK energy security. Part of the issue in claiming such a success is the Government’s inability to tie down the exact reasons behind the fall. However, DECC offer three main drivers to this downward pressure on UK domestic gas consumption;

1. Government legislated home energy efficiency programmes driven through energy suppliers
2. Efficient boiler regulation introduced into UK Building Regulations in 2005
3. Some austerity-driven thermostat adjustment although the trend starting well before the 2008 recession

Despite this success story, the job of retrofitting the housing stock is only partially completed while, as set out in our response to question 1, public investment in energy efficiency has dramatically reduced and the focus of the one remaining energy efficiency policy will move to a much smaller subset of UK homes (4m rather than 27m) with occupants in fuel poverty who are more likely to see improved internal temperatures rather than energy savings. Also, the energy savings seen over the last decade through improved boiler efficiency will tail off as ageing inefficient boilers will mostly have been replaced by now.

<sup>3</sup> [https://archive.uea.ac.uk/~e680/energy/energy\\_links/statistics/dukes/flow\\_charts/2004\\_file11248.pdf](https://archive.uea.ac.uk/~e680/energy/energy_links/statistics/dukes/flow_charts/2004_file11248.pdf)

<sup>4</sup> National Energy Efficiency Data Framework, Analysis report 2015 – Department for Energy and Climate Change

In essence, the downward pressure on national gas consumption, and some electricity consumption linked to direct heating and avoided top-up electric heating will have dramatically reduced as support policies fall away. Yet this is not recognised by key actors in the energy system. As mentioned in our response to question 1, National Grid actively considers home energy efficiency in its Future Energy Scenarios 2016<sup>5</sup> modelling - as we are strongly arguing the National Infrastructure Commission should. However, they have assumed in their modelling a continued reduction in heat demand in the housing stock while the primary drivers for that falling demand may well have ground to a halt.

Despite the implementation of a string of government programmes over the decade, the UK's housing stock remains amongst the "leakiest" in Western Europe. We are exploring what a smart home fabric solution looks like to offer alongside smart load management and smart meters in homes, but without a clear strategy at a national level offering a 'landing platform' for such an innovation it is difficult to justify the levels of investment the solution requires.

**Question 4** - Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

An important, but less acknowledged reason for investing in building energy efficiency as infrastructure is the significant benefits it can have in "de-risking" other major government strategies and policies. These include;

- **De-risking smart meter roll out** – While smart meters will offer generators and grid operators a greater understanding of when, where and how much energy is used, and indeed offer consumers some control to manage their consumption, the next logical step is to 'persuade' consumers to move away from using energy at peak times. As Paul Lewis, from BBC Moneybox, has put it – that ultimately means '*paying poor people to not eat dinner at dinner time*'. This principle applies to heating too. While under 10% of UK homes exclusively heat their homes with electricity, a much larger proportion have to 'top up' heat from plug-in electric heaters. If price signals are to be the key mechanism to manage people away from peak load (and it's difficult to imagine any other mechanism), then occupants must be able to heat their homes away from peak times but still be confident their home will retain that heat and maintain comfortable winter temperatures. This can only be done by ensuring the fabric is as energy efficient as possible allowing early morning or early afternoon 'non-peak' heating or improving the building fabric to a level at which a home gas central heating system can now manage the full heating load rather than having to rely on plug-in electric heaters to get rooms up to temperature. As described elsewhere in our response, this type of solution is only likely to occur where energy strategy drives energy services rather than energy, or energy efficiency product, supply.
- **De-risking a low carbon heat strategy** – Many solutions have been proposed for 'de-carbonising' heat, from electrification of heat and a mass roll-out of heat pumps to wider use of heat networks. If heat pumps are part of the solution, then the home fabric must be efficient for the low-temperature distribution heat pumps to operate efficiently. A similar argument exists for heat networks.
- **Avoided grid reinforcements** – When 'horizon scanning' for infrastructure needs, it is vital policy makers also consider what 'smart fabric' improvements might look like as well as considering the concept of other smart home options such as internet linked fridges and storage. Consider the potential for fabric energy efficiency to avoid upstream grid reinforcement costs. Energy efficiency policy to date dis-incentivises innovation, with policy mechanisms written into primary legislation slow to change, even if officials can be persuaded of an innovation's benefit. Similar challenges exist in persuading DNOs to incentivise demand efficiency before network reinforcement – as touched on in the NIC Smart Power report. It would be an exciting prospect if a trial contract were let that stated; 'these homes attached to this sub-station use x base load and y peak load of electricity and z gas load. We are inviting bids that will help occupants in those homes undergo 'smart retrofit' to reduce all of those loads to a level where we don't need to reinforce that substation. Those

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<sup>5</sup> Future Energy Scenarios 2016, National Grid



homes must also make measurable improvements in terms of other metrics including fuel bill reductions and comfort. Bidders must package together all the benefits and demonstrate how to measure them and price them. If that price is within reason, we will scale up 'procuring this outcome' through a variety of policy mechanisms whether regulation or incentives. This simple approach to 'procuring an outcome' rather than dictating an approach would unlock millions in company innovation. Were the NIA to support such a strategy, it would take a huge step toward helping Government out of its current siloed approach to offering separate strategies for heat, low carbon electricity and energy efficiency. It would also drive the market toward the much imagined, but as yet unrealised, domestic energy services company (ESCO) model. ESCOs would ideally build businesses that fund energy efficiency works to homes by packaging together funding streams from; future avoided household energy bills, avoided grid reinforcements, CO2 abatement and cheaper mortgage finance costs due to improved homeowner affordability resulting from lower monthly energy bills. Each aspect of these 'services' has been proposed as part of a solution by other actors to improve home efficiency but until there is a route to understanding these numbers and aggregating them in to a revenue stream no such business model will prosper. Yet with the 'smart' revolution, we believe the challenge to offer such a service is now less a technical one, but rather a policy one to incentivise the various actors, such as home owners, DNO's and finance providers, to ask for it and pay for it.

**Question 8** - Do you agree with this methodological approach to determine the needs and priorities?

Yes. A combination of evidence reviews, qualitative scenarios and quantitative modelling is a sensible approach although like all modelling – the outputs are limited by the quality of the inputs.

We would argue that the qualitative scenarios must consider the type of business models that might thrive within certain scenarios. If innovation funding is to be driven in certain directions, it must see a 'market pull' for the services it hopes to offer.

**Question 12** - In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

We reiterate the importance of including energy efficiency experts and evidence (specifically of buildings and our housing) in the development on the NIC's Vision and Priorities paper for 2017, and in the NIA itself in 2018.

## **National Infrastructure Commission**

### **The National Infrastructure Assessment – Process and Methodology**

#### **Consultation Response**

#### **Prepared by KPMG LLP**

#### **Introduction**

KPMG has consistently supported the formation of the National Infrastructure Commission (“NIC”) and we welcome the opportunity to contribute to the consultation in relation to the National Infrastructure Assessment. We are under no illusion how challenging this task is but we believe it is a critical objective. We applaud the aim to set out the vision of the infrastructure that the UK will require by 2050. It is only from that vision that shorter term infrastructure planning and delivery can occur confident that there is alignment with the longer term plan.

Since the consultation was published the UK has undergone significant political change in the form of the referendum to exit the EU and a change of Prime Minister and Cabinet. These changes only serve to underline the need for longer term stability in relation to the planning of infrastructure investment and we sincerely trust the new administration continues to ensure the NIC is allowed to continue to deliver its objectives.

We have provided our thoughts on the specific questions as set out in the consultation paper and we remain keen to support the Commission in its work through 2017.

#### **Responses**

*Q1. The Government has given the National Infrastructure Commission objectives to:*

- *Foster long-term and sustainable economic growth across all regions of the UK*
- *Improve the UK’s international competitiveness*
- *Improve the quality of life for those living in the UK*

*What issues do you think are practically important to consider as the Commission works to this objective?*

We believe that these objectives are clearly sound but the key practical issue that threatens the plan to deliver the infrastructure required to meet these objectives is one of affordability. We are aware that under the proposed legislation, the Chancellor will set a fiscal remit for the Commission which in effect will set the affordability envelope for the NIA. It is not clear when this fiscal remit will be set for the initial NIA and furthermore the basis by which the fiscal remit will be defined. In the earlier consultation on the setting up of the NIC we supported defining this remit by reference to a % of GDP which would provide an objective metric that could be compared to other countries. However, we also note that the actual measurement of infrastructure investment remains surprisingly difficult to quantify. It is also important that the future funding envelope is based on the feedback of infrastructure investment into the GDP forecast ie it should be based on a GDP which reflects the infrastructure investment proposed.

It is only by setting realistic fiscal targets that the real challenge of prioritising infrastructure investment can be considered.

We also note that we think the NIC should define a quantitative framework setting out how it intends to measure its success against the three core objectives which we think is important to validate the effectiveness of the Commission.

We believe that the final outcome of the NIA should contain not just an investment plan over the 30 year period but also detailed consideration of the funding and financing of the plan which in turn will inform the affordability of the plan to the taxpayers and consumers.

*Q2. Do you agree that, in undertaking the NIA, the Commission should be:*

- *Open, transparent and consultative*
- *Independent, objective and rigorous*
- *Forward looking, challenging established thinking*
- *Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?*

*Are there any principles that should inform the way that the Commission procedures the NIA that are missing?*

We fully support these objectives and we do not believe there is anything additional to add, other than the need for a diverse approach to decision making to allow the most well balanced, optimum recommendations to be formed. However, we would encourage the Commission to consider in detail how they will meet these objectives. For example, how the Commission will ensure the plan is indeed forward looking and challenges established thinking, taking into account the impact of disruptive change over the next 30 years.

*Q3. Do you agree that the NIA should cover these sectors in the way in which they are described?*

We agree with the sectors as set out in the consultation document, and would like to suggest that 'Digital Infrastructure' is separated from 'Communications' to allow for better clarity, and focus on the user . We note that the work will exclude housing supply but the assessment will inform Government on the likely impact on housing of the implications of the plan.

We believe that the omission of housing is a potentially serious flaw in the remit of the NIC and development of the NIA. There is an inseparable linkage of population, demographics, transport and housing and therefore, if housing supply is omitted then a key driver in the infrastructure demand is absent.

We are also concerned that the remit of the Commission excludes any consideration of social infrastructure, particularly in relation to education and healthcare. We acknowledge that education and healthcare delivery are complex areas but they are critical to the objective of the Commission's assessment "to improve the quality of life of those living in the UK". The infrastructure required to deliver these critical services will be considerable over the next 30 years and should be included within the fiscal remit to ensure that the true cost of infrastructure investment is recognised.

*Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?*

We believe it is important for the NIA to cover the full extent of infrastructure provision as set out in the consultation document. However, as we have stated in Q1, the key challenge is how infrastructure investment should be prioritised. It is inevitable that difficult choices will need to be made and it is not clear that a framework exists that enables Government to prioritise investment. We would encourage the NIC to consider the basis by which infrastructure investment can be

prioritised, noting this will need to consider all of the objectives set out in Q1. We would propose that the prioritisation be underpinned by a clear quantitative methodology such as economic value added, to provide a comparable metric.

*Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?*

The connection of transport to urban development and housing is rightly recognised in the document. The other area we would encourage the NIC to consider is interdependency within sectors. For example, modal shift in transport which will affect the investment in road and rail and the impact of energy efficiency and decentralised energy on the need for larger power generation.

*Q6. Do you agree that the NIA should focus on these cross-cutting issues?*

The cross cutting issues stated are considered to be very broad and wide ranging. This list demonstrates the level of detail required within the NIA. In our view some of these issues are more important than others and it may be beneficial to prioritise some of these areas ie funding & financing, sustainability and geography and local growth.

We believe some of the issues have been considered to some extent by the IPA (and previously by IUK) and we assume this work will be used as a foundation of the NIA ie. cost, evaluation & appraisal methodology and governance.

*Q7. Are there any other cross-cutting issues that you think are particularly important?*

For the reason as stated above we believe that the list set out is adequate and it is important the specification of the NIA is achievable and deliverable in the timeframe allowed to 2018 rather than necessarily fully comprehensive. It may be helpful to note that the cost and delivery theme lends itself to a project and programme management approach,

*Q8. Do you agree with this methodological approach to determine the needs and priorities?*

The methodology as set out is very logical although it also serves to highlight the scale of the challenge involved. For example, the first step of understanding the infrastructure baseline is not straightforward and we are not aware this currently exists at the level of detail required.

We are a little concerned at the ability to develop long term analytical models even within sectors. We believe modelling may have a role in some sectors to forecast growth/demand say in transport or in energy, however these models only tend to work under a set of overarching assumptions and typically are not designed to deal with disruptive influences. The latter can only really be analysed through the use of defined scenarios which we would endorse.

One example of such work is the recent KPMG report "2050 Energy Scenarios – Future of Gas in a 2050 energy system". This comprehensive piece is built off four defined scenarios which are based on the 2015 National Grid's Future Energy Scenarios.

The section in the document on evidence base points to a need for extensive collaboration with government departments, regulators, corporates, academics and consultancies and we believe this will only succeed if there is a total collaborative agreement across the private sector with all entities aligned to a common objective. We would strongly encourage the Commission to consider how this can be practically achieved in an effective and manageable way.

*Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?*

We have been working closely with the ICE on the National Needs Assessment and therefore very familiar with the work at Oxford University and the ITRC. This model has been very much developed for the purpose of the NIA and has a role to play but it does tend to focus on “how much of something” is required as opposed to the “what”.

There are also complex data analytical methods employed across industry that may be able to offer some guidance. KPMG has an alliance with McLaren who have developed proprietary technology to optimise decision making in a complex environment. KPMG would be delighted to facilitate an introduction to McLaren to help support the NIC’s work.

*Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?*

The drivers (population/demographics, economic growth, quality of life, technology and climate change) are an excellent base from which to determine the strategic need for infrastructure investment and we would agree they are the most important.

We would argue that the most challenging of these is technology and predicting advances over the next 30 years will be impossible if we consider the changes in technology since 1986. Therefore, we would encourage detailed analysis of changes that are perhaps more certain and the impact they may have on a range of sectors ie electric, driverless vehicles, smart grids etc.

*Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?*

We do not have a strong view on the most appropriate methodology but we support an iterative basis through a building block approach. Once a portfolio of investments is derived it will become easier to test against the various cross-cutting issues, not least overall cost. The simplest starting point would be to create an investment profile within each sector across a wide range of sub-sectors. Each sub-sector investment profile would be derived taking into account the current infrastructure baseline and the impact of the four key drivers identified. It would also be useful to use data from infrastructure investment over the past 20-30 years to provide benchmark data to ensure the future plans are not inconsistent with historic delivery or if so, then an ability to demonstrate why.

*Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?*

We believe all the relevant factors have been addressed although the document does not provide any detail relating to the specific detailed methodology that the Commission intends to utilise and we assume this will be refined as a result of this consultation process.

*Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?*

As we stated in our response to Q8, we noted the need to in effect unify the work of many different parts of the industry, even before the wider public is consulted. We would strongly support the use of expert roundtables, panels of experts and social research. However, this will all need to be carefully co-ordinated. Furthermore, we would strongly encourage collaborative working between industry groups which are generally quite disparate. This will need careful co-ordination and

management from the Commission to achieve this. We believe that critical mass could be formed through working with ICE, ACE, RICS and The Infrastructure Forum which will ensure that a wide cross-section of stakeholders are involved.

**LLOYDS  
BANKING  
GROUP**



**National Infrastructure Commission Consultation  
2 Orange  
HM Treasury  
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London  
SW1A 2HQ**

**5 August 2016**

Dear,

Lloyds Banking Group (LBG) welcomes the creation of the National Infrastructure Commission and is pleased to respond to the Consultation launched in May 2016. We are supportive of the objective of enabling a long term strategic approach to decision making on infrastructure in the UK.

As part of our "Helping Britain Prosper" plan, Lloyds Banking Group is the only major bank to make a public commitment to provide financial assistance to infrastructure initiatives within the National Infrastructure Plan with a target of total project value of £30bn by 2017; We exceeded our 2015 target of £10 billion and in the first half of 2016 facilitated over £7.9 billion of financing to support UK government infrastructure projects, including the construction of the Beatrice Offshore Wind Farm that is expected to power more than 470,000 homes, create around 5,000 new jobs and provide significant long-term economic benefits to the UK.

The availability of funding for the infrastructure sector is an essential aspect of the review and we welcome the government's commitment to ensure this is considered as part of the cross-cutting issues critical to infrastructure development.

We further welcome the NIA's commitment to continuous engagement with the finance sector and note that panels and workshops are planned throughout the consultation leading to the publication of the NIA in 2018. We would be happy to contribute to these, and myself and my team are at your disposal if you would find it helpful to be briefed on any aspect of Lloyds Banking Group's involvement in the infrastructure sector.

We await the outcome of the consultation with interest, given our interest in and commitment to the sector.

Should you require any input from us on any topics related to infrastructure or infrastructure finance we would be delighted to support.

Yours Sincerely, [signature redacted]

[name redacted]  
[job title redacted]  
Lloyds Banking Group

## Coastal Special Interests Group

NIA Evidence  
National Infrastructure Commission  
1 Horse Guards Road  
London  
SW1A 2HQ

8 August 2016

### LGA Coastal SIG response to National Infrastructure Assessment: Consultation

Dear Sir or Madam

This response is on behalf of the Local Government Association (LGA) Coastal Special Interest Group (SIG) which seeks to represent the collective interests of coastal, estuarine and maritime communities by increasing awareness and debate on environmental, economic and social issues at all levels. It works in partnership with other organisations with complementary aims and brings pressure on the Government to secure local government's full involvement at all levels of policy formulation concerning the coast. The LGA Coastal SIG currently represents over 60 English coastal local authorities.

Thank you for agreeing to accept this response beyond the set deadline. Our members were keen to submit comments but were not aware of the consultation until three days prior to the closing of the consultation.

The Local Government Association Coastal Special Interest Group would like to be included in any further discussion and consultation on this work.

For and on behalf of the Local Government Association Coastal Special Interest Group

Yours Sincerely

[signature redacted]

[name redacted]

[job title redacted], LGA Coastal Special Interests Group  
<http://lgacoastalsig.com/>

Telephone: [telephone number redacted]

Email: [email address redacted]



In response to your questions is from the 'Coastal SIG', individual local authorities may express other perspectives:

1. The National Infrastructure Assessment presents one of the most significant opportunities to shape the future direction of the UK.

Flexibility needs to be retained as new opportunities and challenges materialise over the next 30 years especially in local areas.

The utilisation of both public and private finance must be cost effective

2. One of the overarching issues facing the NIC in its approach is the extent to which the National Infrastructure Assessment will be reactive or proactive. Will the 2017 vision document set out what the NIC thinks will happen or thinks ought to happen? Suggest that if the NIC is to fulfil its third objective of improving quality of life, then its vision should be proactive and ambitious.

We welcome that NIA will challenge established thinking esp with regard to environmental (blue and green) infrastructure.

Infrastructure needs to be considered as a whole regardless of current ownership or statutory responsibility – it should be look at holistically.

3. The main issue that will inform much of the direction the country takes is the extent to which climate change features – not only in delivering the 2050 carbon emission target but also in ensuring the resilience of infrastructure to a changing climate, sea level rise.... This is a more significant factor than the three objectives set out.

National capacity research / development, technology, education and skills training also need to be included.

4. The importance of maintaining and refurbishing existing infrastructure should not be underestimated and the NIC should not focus entirely on the delivery of new projects but ensuring existing infrastructure is fit for purpose – e.g. flood defences.

Climate change adaptation for existing settlements also needs to be included.

5. Supporting infrastructure for regionally important economies must also be considered.

6. The environment should play an important part in decision making – not just the impact of infrastructure on the environment but the role natural capital / ecosystem services can play in delivering society’s needs – e.g. renewable energy, clean water, flood protection...
7. Agree with principles as set out, and particularly support it being ambitious and innovative. (For example) the sand engine for coast protection, an innovative Dutch creation designed to manage the coast line. A man-made sand or shingle bar which will reduce flood risk and erosion pressure by moving naturally with wave and wind pressure. The scale of this means beach replenishment is reduced from annual to a twenty year cycle and is effective in cost and reduced damage to environment.
8. Proper public engagement needs to be part of the first principle of ‘consultative’.
9. A key principle should be that the NIA is not driven by current financial/funding models. The contrast between some sectors largely being funded by the public sector and some by the private sector should not mean that the NIC focuses on one rather than the other; the assessment of need for infrastructure should take minimal account of how it will be funded. The importance of making the NIA a document designed to attract private sector investment should not be underestimated.
10. There is a need to consider coastal communities as a special case. Information from the LGA Coastal SIG position statements has been included in Appendix A.
11. The success of the 30 year vision will be dependent on a clear assessment of the need and deliverability of infrastructure, the capacity for future growth and adaptability in response to change.

The importance of providing energy and food security for the UK should be considered as factors determining the need for infrastructure. E.g. food security relies on flood and coastal defences and the availability of suitable water.

12. Steps should be taken to incorporate a high level assessment of natural resources as a separate sector, recognising both the constraints and opportunities presented by natural resources and building on an “ecosystem services” approach.

Regionally important opportunities need to be supported in the methodological approach.

Flood defences need to refer to coastal protection too.

Would it be more appropriate to consider flood risk beyond the period of the assessment, since infrastructure developed up to 2050 will be expected to have a design life well beyond that date? The current planning horizon for flood and coastal management is 80-100 years and the NIA should work to this too.

Innovative linkages between sectors need to be considered for example:-

Waste – energy

Flood management and water supply

Digital communications – reducing need for transport because of remote working...

It is difficult to understand the link between the NIA and local land based planning. Does local housing and economic development drive the need for infrastructure or does the provision of infrastructure drive local growth?

It is also not clear regarding the links to marine/offshore developments and the emerging Marine Plans?

Many large infrastructure projects are delivered by the private sector. The skills and capacity within this sector needs to be considered and could influence the allocation of public sector resources (as we see in FCERM).

## **Appendix A**

### **From LGA Coastal SIG position statements**

All position statements can be accessed online at <https://lgacoastalsig.com/on-the-edge-the-coastal-strategy-position-statements/position-statements/>

#### **Coastal Regeneration and Economic Prosperity:**

Coastal communities have distinct problems - arising from their position 'on the edge' and at the 'end of the line', with only a 1800 hinterland. Coupled to this are the difficulties associated with living within a vulnerable environment. So, whilst social and economic deprivations are not unique to the coast, coastal communities need specific solutions tailored to their needs.

Local Authorities have new tools to promote growth, we are now in a new partnership with business in the LEPs, and there are major reforms to planning and housing.

Coastal communities to be treated as a separate policy category alongside urban and rural areas, recognising that:

- Coastal communities have a greater proportion of social deprivation than the national average and specific challenges due to changing demographics.
- Planning policy and implementation of adaptation to climate change needs to examine the opportunities for positive change and recognise the dynamic nature of the coastline.
- Risk management funding needs to take a more holistic approach, recognising the complete community value and the natural environment and the peripheral location of the coastal zone and its peripheral location.
- There is a need for better co-ordination between all organisations involved in coastal regeneration.
- Coastal communities can benefit from improved infrastructure to enable more efficient movement of people and freight in and out of coastal regions.
- Support to develop the special qualities of coastal communities e.g. building on the extensive and distinctive heritage of the area..

#### **Integrated Coastal Zone Management (ICZM):**

Local authorities have long been champions of ICZM and recognised as leading practitioners of the integrated approach – one of the earliest models for partnership working.

- The pressure for development and unsustainable exploitation of natural resources will continue to place enormous pressure on our coastal ecosystems potentially leading to biodiversity loss, habitat destruction,

pollution, as well as conflicts between potential uses, and space congestion problems.

- Climate change and natural hazards, risks include flooding, erosion, sea level rise as well as extreme weather events requires a “joined-up” approach –the impacts of all these are far reaching and are already changing the lives and livelihoods of coastal communities.

To support progress of ICZM the SIG seeks:

- Identification by Government of priority areas for coastal management and funding support for local partnerships delivering ICZM commensurate with that importance.
- A statutory recognition of the need for coastal strategies to complement the marine and other spatial plans.

# National Infrastructure Assessment process and methodology Consultation – LGA Response

Date: 05/08/2016



## Introduction

1. The Local Government Association (LGA) is the national voice of local government. We work with councils to support, promote and improve local government.
2. We are a politically-led, cross party organisation that works on behalf of councils to ensure local government has a strong, credible voice with national government. We aim to influence and set the political agenda on the issues that matter to councils so they are able to deliver local solutions to national problems. The LGA covers every part of England and Wales, supporting local government as the most efficient and accountable part of the public sector.
3. We welcome the opportunity to comment on the process and methodology of the proposed new National Infrastructure Assessment however our comments are more focussed on the areas that our members would consider priorities for investigation and the role local government can play in this work. Our responses also cover many areas in which local authorities could play a role in reducing the demand for future infrastructure by using existing infrastructure more effectively and changing behaviour.

# Submission

## Principles

**The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

*The LGAs view is that the best way to foster long term economic growth is to give areas more power over their own ability to help plan for built infrastructure and create the environment for growth.*

*As such we believe that the commission should give thought to not only the infrastructure that is required but also ensuring that existing and emerging sub-regional and subnational bodies are effectively engaged, have meaningful influence, and if appropriate should be leading on the planning*

*and delivery of major new infrastructure investment. We believe that there should be an obligation to work with statutory sub national bodies. Local authorities are best placed to build consent for nationally significant schemes and therefore must play a meaningful role in developing plans.*

*We would also welcome the commission considering the impact that inadequate infrastructure is currently impacting on strategically important businesses. For example, traffic congestion can result in the shutting down of production lines which in turn causes significant loss of productivity. We would like the commission to consider how current infrastructure capacity constraints could be affecting productivity.*

**Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

*We are pleased that the Government has not restricted the NIA to new infrastructure being built. In particular we believe the commitment to a comprehensive approach should examine more effective demand management, more efficient practices and behavioural or regulatory solutions may be cheaper and more effective. Local authorities have a major role to play in this approach.*

*National infrastructure projects should recognise the local impacts schemes will create, in particular transport disruption, and should be conscious of building mitigation into plans. It is important that national infrastructure delivery bodies consult with local authorities on potential impact of construction on local networks and local people.*

*The impacts of national projects often involve significant local disruption which local authorities are often blamed for. Much disruption could be mitigated through consultation and engagement with local authorities. There should be a clear expectation that schemes considered for inclusion in the NIA should commit to tackling local impacts alongside local authorities.*

*The assessment should also give serious consideration to how plans could change with the development of disruptive technology or societal change. The assessment will need to be able to deal with the unforeseen changes that will take place over the course of a document with such a long remit. The assessment should consider a scenario planning approach to ensure the assessment remains appropriate for changed circumstances.*

## **Sectors**

**Do you agree that the NIA should cover these sectors in the way in which they are each described?**

*We are disappointed that the commission has no role in examining the*

*interaction between housing supply and new transport infrastructure. The location of new transport hubs is key to delivering new homes in a way that is sustainable and ensures new or expanding communities have access to jobs and services. Many authorities' local plans recognise this interaction and prioritise housing growth around new and existing transport infrastructure. We are disappointed that this interaction will not form part of the commission's work.*

**Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

- **Transport**
- **Digital and Communications**
- **Energy**
- **Water, drainage and flood defence**
- **Waste**

### *Transport*

*The LGA would welcome greater certainty in funding decisions. There is currently a wide disparity between the funding for national transport schemes and the funding available for the local networks, without which national schemes could not function. In particular the commission should look at the role of local networks in managing the 'last mile' of movement of people/ freight accessing or leaving main/ national transport arteries. Consideration must be given to investment in local networks when looking at options for investment in national networks.*

*The LGA would also welcome the commission's view on the funding and financing regime for public investment in infrastructure and how best councils can contribute to regionally significant infrastructure. Local authorities need the certainty of funding as enjoyed by Highways England and Network Rail and access to revenue streams to finance long term investment. We would welcome five year funding envelopes with an indicative funding commitment for years 5-10.*

*The role of sub-national bodies, including Combined Authorities and Sub-National Transport Bodies should be considered. In particular we would like the assessment to comment on who should be commissioning major infrastructure investment. This is an area of particular interest to local authorities as we would welcome the commissions input into how new governance arrangements in transport could lead to better investment decisions and more local commissioning. As stated we believe there should be an obligation to consult these bodies in formulating the assessment.*

### *Digital*

*The public money invested in the superfast broadband market has seen provision improve across England. However, whilst the average national coverage figure rises, there are underlying and profound inequalities in coverage and speeds between different areas. This sees some council areas where superfast coverage has reached over 95% of premises compared to others where up to 30% cannot achieve the same superfast speeds. This is even more pronounced at ward level where in some cases whole villages can be cut off from superfast speeds. This digital divide, mainly between urban and rural areas, could become even more significant*



*in the near future if hard to reach areas are excluded from the Government's ambition to rollout ultrafast broadband of at least 100Mbps to premises across the country.*

*The LGA would welcome the NIA looking at how the difficult to reach final phase of high speed broadband connections will be achieved. In particular whether other technological approaches need to be examined and the extent to which greater digital connectivity could avoid the need for other infrastructure investments as well as encouraging the spread of economic growth across the entire country.*

*The LGA would also welcome consideration from the NIA on how digital infrastructure can be embedded into all new infrastructure projects. All major infrastructure should consider the likely increased digital demand that improving infrastructure will create through economic growth. This should then be reflected in planning for major projects. We welcome the fact that the NIAs 30 year remit will enable it to consider how we can future proof digital infrastructure. This poses a particular challenge for digital infrastructure given the rapid increases in demand for digital infrastructure which very often outpaces the speed with which major infrastructure projects can be planned and built. As stated earlier in our response there is potential for disruptive technology and changes of behaviour to lead to major changes to what digital infrastructure is needed. The assessment needs to be mindful that changes may occur at a quicker rate that it can respond to. The assessment should reflect a range of possible scenarios especially in regard to digital infrastructure.*

*The LGA would also welcome consideration of how the country's existing digital networks could be better utilised. The country currently supports a number of separate networks which could be integrated in order to boost capacity.*

*The LGA would welcome the NIA commenting on the availability of mobile connectivity. In particular the progress of the roll out of 4G mobile internet. We need to ensure that the benefits of enhanced mobile connectivity are shared across all areas of the country. In particular we would welcome the commission looking into the roll out plans of the mobile network operators and identify where there are likely to be gaps in coverage and what could be done to minimise these gaps.*

## **Energy**

*Councils need long term clarity of funding and policy intentions over energy generation. Many authorities had to significantly scale back long term renewable energy projects after changes to feed in tariffs. Given the need for investment in new energy sources to meet emission targets and local authorities significant housing stocks local authorities would welcome consideration of how government could set long term policy in this regard. The assessment needs to clarify whether the regulatory framework can act as a barrier for growth, in particular whether it inhibits smaller providers and developments.*

*The LGA does not take a view on whether fracking is the right solution for our energy sector. However if fracking schemes are included in the assessment they should be a matter for local decision making and therefore be considered through the local planning system. Local communities should decide, through their democratically elected councils,*

*whether or not to host fracking operations in their areas and local attitudes to fracking should not be overridden by national policy. Local authorities will need to be assured, to enable communities to feel safe, that the issues covered by relevant regulatory regimes (for example seismic activity, water pollution, disposal of waste water, well construction and integrity) can and will be adequately addressed before they can consider granting planning permission.*

*The LGA would also like the assessment to look at the role in which energy efficiency can play in reducing demand for new energy infrastructure. Local councils are involved in a huge variety of energy efficiency projects including retrofitting its own housing stock, incentivising homeowners to make their homes more energy efficient and ensuring new housing meets high design standards in its use of energy. We would welcome the assessment giving consideration to whether energy infrastructure investment would be better focussed on more schemes like these in order to make greater and longer use out of existing energy infrastructure.*

*Councils are significant users of energy and one of our key priorities is achieving a reliable price for the energy we use and working to minimise the use of energy across the vast array of buildings that the sector owns and uses. We therefore have a direct stake in both a stable price and minimising demand both of which will be impacted by the infrastructure decisions that the government takes.*

*The sector is also increasingly becoming directly involved in energy retailing through innovative schemes such as RobinHoodEnergy and Peterborough Energy as well as acting as a collective broker through schemes like the big London energy switch. Local authorities are uniquely placed to respond from multiple perspectives.*

#### *Water, drainage and flood defence*

*There is currently a great deal of work being done by central government on flood resilience. The LGA has participated in much of this work and we believe the commission should be mindful of the continuing work that is being done. In particular the National Flood Resilience Review and the Climate Change Risk Assessment are both ongoing pieces of government work which will examine the current state of flood prevention infrastructure and what plans should be made in the future. Every effort should be made to avoid replicating this work but instead use it to inform recommendations on future needs.*

*The assessment will need to ensure they work with regional flood committees when considering all aspects of planning for growth. The assessment should also consider how the regulatory framework impacts on growth.*

*Whilst feeding into these reviews the LGA has emphasised the fact that current flood prevention funding is focused on preserving people and property. This has meant that funding criteria has often worked against schemes that protect vital infrastructure. Failure to protect infrastructure from flood risks could have a serious economic cost in the future and should form part of the assessment.*

*We would also welcome the commission examining ways in which devolution of flooding funds could allow local authorities to access to other*

*sources of funding in particular leveraging in funding from the private sector. It may also allow local authorities to align the planning of flood infrastructure with their regeneration programmes ensuring that flood management is embedded in new developments.*

## Waste

*Councils' main interaction with waste infrastructure is as a customer. The majority of waste infrastructure in the country is in the hands of the private sector. Central Government currently leaves decisions about disposal of household waste to individual authorities, the only policy steer is to disincentivise landfill through landfill tax. Investment is mostly made by private companies on the basis of what technologies or infrastructure they believe will be profitable. The current model of local authority doorstep collection is delivered very efficiently and given the pressure on council budgets most authorities have made changes to waste collection that has been focussed on saving money and increasing recycling. In the absence of clear government steer on a preferred method local authorities have used a variety of collection methods and frequencies.*

*However one thing they have in common is the fact that the cost of waste collection is focussed on council tax payers, who fund it through council tax payments. Very little of the cost is focused on the packaging industry and retailers. This means that incentives to reduce waste packaging are weak. The LGA supports greater use of the 'producer pays' principle. Producer pays principles are based on establishing an equitable division of responsibility for dealing with the costs that a particular product has in delivering its function or at the end of this life. It establishes a key relationship between the design, production and consumption of a product and the cost of dealing with its aftermath. Without such a principle, where all costs are absorbed by the tax payer, manufacturers and consumers would have no incentive to reduce the waste created by their product or purchasing.*

*This in turn creates unnecessary demand on waste infrastructure which could be avoided altogether through better incentives. This may well prove to be a more effective investment than large capital investment in increased waste disposal infrastructure as well as having considerable environmental benefits.*

**The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important.**

*As mentioned above there is a key interaction between transport and housing that is not currently recognised in the remit of the assessment. It is a vital part of local authority's plans for housing and transport infrastructure that these issues are considered together.*

*In order to build local consent for new housing local authorities need to be able to demonstrate that consideration has been given to what new infrastructure will be needed and how existing infrastructure will cope with the increased demands that will be placed upon it. Work in looking at these issues could help local authorities build a compelling case for regeneration work. It will be easier to meet this challenge at a subnational level and should form part of any obligation for the commission to work with subnational bodies.*

## **Cross Cutting Issues**

### **Do you agree that the NIA should focus on these cross-cutting issues?**

*The LGA would support the issues identified. In particular we would welcome a focus on the funding that is already committed by local authorities and how greater certainty can be provided to local authorities to help them meet the challenge of infrastructure investment.*

*Currently there is a disconnect between large scale national infrastructure projects and the smaller local projects, that are often locally funded, which these larger projects rely on for their success. A particular example is the funding of the road network, the Government has earmarked £1.1 million per mile for maintenance of the strategic roads network over this parliament, but only £27,000 per mile for the local roads over the same period. Whilst it would be unreasonable to expect parity of funding across all types of road, the current discrepancy makes little sense. Very few journeys begin and end on the SRN and the problems of congestion cannot be effectively addressed on the SRN.*

*A significant level of funding for vital infrastructure is currently being channelled through LEPs. While it is only right that businesses have a voice in deciding how best to invest in local economies, as new sub-national governance structures such as combined authorities have emerged, it must be the case that democratically accountable local leaders are able to ensure strategic alignment across all public sector investment within an area. In the short term we propose that the government undertake whatever steps necessary to ensure that critical infrastructure decisions, particularly in areas with multiple LEPs, such as the West Midlands, are made strategically with democratic oversight. In the longer term and in line with the renewed call to better connect growth and opportunity with the needs and ambitions of local communities, we suggest that national government may need to look again at the form, function and geographic fit of LEPs in helping build an economy that works for everyone.*

*We would welcome consideration being given to the interface between local and national infrastructure. Local authorities would welcome greater ability to direct traffic in particular. This would mean that local authorities would need a greater ability to direct the timings of major works in order to ensure the transport system as a whole retains sufficient capacity to cope with major work.*

*As part of the commission's work on performance measures we would welcome more work being done on establishing who the customers of major infrastructure are. To what extent nationally significant infrastructure is also being used to make local trips. For example, what is the extent of junction hopping on motorways? Accurate identification of customers must be key to forming performance indicators that reflect the impact of transport infrastructure.*

### **Are there any other cross-cutting issues that you think are particularly important?**

*There is a risk that the construction industry will not have the skilled*

employees in order to deliver on government's ambitions for infrastructure growth. Construction qualifications have declined at a time when the demand for skilled construction workers is increasing. There were 58 per cent fewer completed construction apprenticeships by 2015 than in 2009. The LGA has highlighted the problem with skills in the construction industry in a report published last year titled *Skills to Build* ([here](#)). The NIA should examine the deliverability of its programme in the current skills market and what improvements would be needed to deliver the programme in its entirety. The LGA is calling for the devolution of skills budgets in order to help address skills shortages such as those identified in the report.

**Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

*The LGA believes that the commission should specifically look at not only how infrastructure impacts climate change and the environment but how infrastructure investment could be used to improve the environment. A particular example would be optimising transport infrastructure to encourage modal shift. Planning new infrastructure around greater use of public transport and demand management rather than simply responding to increased demand particularly around car transport can improve infrastructure whilst making a significant impact in dealing with air pollution, congestion and emissions. This could take the form of improved public transport infrastructure, increased digital connectivity or adapting existing infrastructure to give public transport greater priority.*

## **Engagement**

**How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

*Early engagement with local authorities will enable the NIA to set out robust recommendations and reach its full potential. The LGA is happy to work with the commission to facilitate engagement across the sector.*

## National Infrastructure Assessment Consultation

### Response from The London Borough of Bexley

#### Observations/Background

The National Infrastructure Commission (NIC) currently has Interim Commission status as it is yet to be legally formed through a Parliamentary process. However, Government has set out the NIC's remit.

As a result, the NIC is intending to produce a National Infrastructure Assessment (NIA) involving two key stages:

1. VISION AND PRIORITIES ... to determine a vision up to 2050 of long-term infrastructure needs and to highlight priority areas for action in the medium term. A call for evidence will be made in autumn 2016 and a Visions and Priorities report will be published in summer 2017.
2. THE NIA ... wide consultations on the Vision and Priorities report will be undertaken and the NIA report will be published in 2018 containing the final view of the UK's infrastructure needs and priorities to 2050 and to put forward recommendations to address them, drawing upon responses to the consultation on the initial Vision and Priorities document.

The consultation contains set questions on specific elements of the scope for and approach to producing the NIA. However matters of management and governance are not included in the consultation as they form part of the Government's remit for the NIC. It is stated that the NIC would welcome any general comments as well as answers to the set questions.

The Government has outlined the objectives of the National Infrastructure Commission as follows:

"The National Infrastructure Commission will provide expert, independent advice on pressing infrastructure issues, and produce an in-depth assessment of the UK's major infrastructure needs on a 30-year time horizon. Its objectives will be to:

- Foster long-term and sustainable economic growth across all regions of the UK
- Improve the UK's international competitiveness
- Improve the quality of life for those living in the UK"

#### Responses / Explanations

The specific questions from the NIA Consultation, proposed answers to them and explanations are set out below.

***Q1 What issues do you think are particularly important to consider as the Commission works to these objectives?***

***Answer: The issues will vary from location to location for each objective. The information collected through the call for evidence in Autumn 2016 should identify the important issues.***

The Commission will develop a NIA in line with these objectives, whilst ensuring that the recommendations are consistent with the UK's carbon and environmental commitments.

In the consultation document it is stated that in developing an NIA consistent with the objectives given above the Commission will be:

- Open, transparent and consultative
- Independent, objective and rigorous

- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks

**Q2. Do you agree that, in undertaking the NIA, the Commission should follow the above principles?**

**Answer: Yes**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

**Answer: The list appears to be complete**

The NIC has identified that the critical drivers of infrastructure need are:

- Economic growth and productivity
- Population and demography
- Technology
- Climate change and environment

The Commission will cover all economic infrastructure in the NIA, but sectors will not be tackled independently from each other. The NIA will be developed by assessing the infrastructure system as a whole. It will look across sectors, identifying and exploring the most important interdependencies and resilience implications, showing both opportunities and risks of interaction between different infrastructure sectors. In terms of the individual sectors, the Commission propose to cover:

- Transport
- Digital and communications
- Energy
- Water and drainage
- Flood defences
- Waste

The consultation document sets out in detail how the NIC will approach assessing each of the above sectors.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

**Answer Q3-Q5: The report covers some interdependencies such as transport/energy. In addition, Digital and Communications links strongly with the other sectors for management and monitoring and the provision of information – the whole area of “Smart Infrastructure”, with data being put at the centre of consideration of both capital and revenue spend.**

At page 18 of the consultation document it states “The built environment: The Government have decided that the Commission’s remit will not include housing supply directly. However, infrastructure can affect the viability of housing projects both large and small, and housing supply is an important driver of infrastructure need.”

As such, the Government's remit envisages that "the Commission will consider the potential interactions between its infrastructure recommendations and housing supply. Information about the potential locations of strategically important housing allocations, such as new settlements and urban extensions when they come forward, will be an important component of the evidence base collected by the Commission, which it may use to assess infrastructure needs and make recommendations that co-ordinate the timing and delivery of new infrastructure with the delivery of new housing."

***Answer Q3-Q5: The Council believes that it should say "will" rather than "may" and would also suggest that major employment developments should also be taken into account. Specific infrastructure interventions, especially transport (such as a Crossrail Extension through the Borough), are essential to support Housing, Employment and Growth.***

There are a number of systemic or cross-cutting issues which will need to be considered as the NIA is developed as set out below.

- Geography and local growth
- Funding and financing
- Cost, delivery and resilience
- Sustainability
- Governance and decision making
- Evaluation and appraisal methodology
- Performance measures

***Q6. Do you agree that the NIA should focus on these cross-cutting issues?***

***Answer: Yes***

***Q7. Are there any other cross-cutting issues that you think are particularly important?***

***Answer: No***

The first stage of the NIA process, which will aim to establish the UK's future needs and to understand key issues, will incorporate the following main elements:

- Understanding the infrastructure baseline
- Studying the key drivers of infrastructure
- Modelling and analysis
- Sector and geographical evidence reviews
- Prioritisation

The consultation document includes details on how each of the above elements will be approached

***Q8. Do you agree with this methodological approach to determine the needs and priorities?***

***Answer: Yes***

***Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?***

***Answer: No***

***Q10. Do you believe the Commission has identified the most important infrastructure drivers set out earlier as:***



- **Economic growth and productivity**
- **Population and demography**
- **Technology**
- **Climate change and environment**

**Are there further areas the Commission should seek to examine within each of these drivers?**

**Answer: The list appears to be complete**

The Vision and Priorities document, to be published in summer 2017, will set out the Commission's proposed long-term vision: the priority areas for action and options to address the needs identified. This document will form the basis for a full public consultation, with the responses used to both test judgments made and to further input into the development of recommendations.

There is a large amount of inherent uncertainty that must be dealt with due to the long-term horizon of the NIA. Strategies will need to be tested across scenarios to allow the Commission to determine a portfolio that is as robust as possible to these uncertainties. With this in mind, during the second stages of the NIA process the Commission expects to undertake the following tasks.

- Modelling and analysis
- Sector and geographical evidence reviews
- Detailed analysis of specific issues

The consultation document provides details on each of the above tasks.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

**Answer: No**

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

**Answer: There appear to be no gaps in the methodology**

The NIA will be developed through an open, transparent and consultative Process with engagement through:

- Public consultations and publications
- Call for evidence
- Expert roundtables
- Social research
- Panels of experts

Alongside this engagement programme the Commission will identify and meet key stakeholders from across infrastructure sectors and related disciplines as we seek input across the development of the NIA.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

**Answer: Through intensive national and local publicity and early engagement with the known key stakeholders and local authorities who will be able provide details of further possible contacts. The London Borough of Bexley would welcome the opportunity of early dialogue**

***with the NIC, prior to the Autumn 2016 call for evidence, to discuss the emerging Bexley Growth Strategy and the Council's views on infrastructure requirements.***

### **General Comments**

It is noted from chapters 8 and 9 (page 6) that, currently, social infrastructure is not within the remit of the NIC. However, the Council believes that social infrastructure, including schools, should be included in the NIA due to the strong interdependencies with the infrastructure currently included within the NIA.

[name redacted]  
London Borough of Bexley  
5<sup>TH</sup> August 2016

# ▶ London Councils' Response

## ▶ National Infrastructure Assessment Consultation

London Councils represents London's 32 borough councils and the City of London. It is a cross-party organisation that works on behalf of all of its member authorities regardless of political persuasion.

**Q1. The government has given the National Infrastructure Commission objectives to: foster long-term and sustainable economic growth across all regions of the UK; improve the UK's competitiveness; improve the quality of life for people living in the UK. What issues do you think are particularly important as the Commission works to this objective?**

Sustainable economic growth and improved quality of life are achieved by proper focus on place-making. We are concerned that the NIC's proposed approach for the NIA – that of sectoral basis analysis – could mean the NIC fails to achieve its objectives. Single pieces of national critical infrastructure will never achieve the same as a holistic approach to infrastructure for a place. If the NIC wishes to pursue a sectoral based analysis of need, it would be more appropriate for the NIC to have targets relating to infrastructure and asset resilience, which will be more achievable.

To achieve its objectives, the NIC needs to ensure the NIA can respond to challenges of providing employment, improving both digital and transport connectivity, future proofing the nation's infrastructure, transitioning towards a circular economy, and meeting the pressures of a growing and ageing population.

**Q2. Do you agree that, in understanding the NIA, the Commission should be: open, transparent and consultative; independent, objective and rigorous; forward looking, challenging established thinking; comprehensive, taking a whole system approach, understanding and studying interdependences and feedbacks? Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

We support these principles. Whilst the Commission should consider a good range of options that are in the best interests of the country, we think some consideration of the likelihood of delivery should also be part of its analysis. We note the NIA plans to prioritise investment across infrastructure sectors. We feel this is likely to be undesirable or difficult in practice for two reasons. Firstly because savings, efficiencies and better outcomes may be achievable if there is a holistic approach to infrastructure needs in a specific place or area. Secondly because

in practice the good of the nation does not always align with the needs, especially the employment needs, of any given place where infrastructure may be prioritised or not. We envisage a continued high level of interest and involvement by politicians at all levels in these cases.

### Q3. Do you agree that the NIA should cover these sectors in the way in which they are described?

**Transport** - the consultation document references impacts on the energy sector of electrification, but we feel the NIA also needs to consider the impact of changes to transport systems on the climate and environment, including the impact on air quality. The impacts of technology also need to be considered here, for example in the rise in van deliveries of goods purchased online, and of the impact of driverless vehicles.

**Digital and communications** – the consultation document references that digital infrastructure could deliver more efficient use of other infrastructure assets such as energy, to which we want to ensure the link to reducing transport demand is also considered.

**Energy** – we are pleased that the Commission will consider the future of heating and the shift to low carbon solutions and energy efficiency. We think the NIA should have a stronger remit to promote the uptake of green and clean energy, otherwise the government risks being behind the market. Consideration of the UK's energy needs due to climate change should be considered, for example if air conditioning units will become necessary in every home and business; how would they be powered? We also believe there should be links made to waste when considering the UK's energy infrastructure.

**Water and drainage** – in addition to the links already identified by the Commission, the impact of population growth on the availability of water should be considered alongside climate change.

**Flood defences** – there should be an overarching consideration that new infrastructure should not worsen flood risk. In addition we are concerned in this section that the proposals the NIA intends to undertake are already being considered by the Environment Agency and/or Defra. It is already a requirement on Lead Local Flood Authorities to map strategic assets and ensure they are protected from flooding. There is already a detailed process in place to ensure flood defence projects are funded that are cost-effective. Major projects such as the Thames 2100 Programme is already looking at how to continue to provide flooding protection from the River Thames to 2100. Whilst we welcome the NIC's interest in flood defences, we caution against duplication. We note that the House of Commons Environmental Audit Committee recently recommended that infrastructure asset owners be required to report their target resilience, justify it, and work towards this level of protection. We encourage the NIC to consider such an approach in its work.

**Waste** – we welcome the consultation references to the circular economy but think the NIA should also consider whether the UK wants to be self-sufficient in its waste management infrastructure.

#### Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

We envisage that transport will already have quite a high profile, including its links to the wider growth agenda.

#### Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?

We have outlined our views on interdependencies in our answer to Q3.

#### Q6. Do you agree that the NIA should focus on these cross-cutting issues?

We consider the seven cross-cutting issues that the NIC has outlined in its consultation to be very important. We have the following comments to make on each:

**Geography and local growth** – we hope the NIA will do more than ‘seek to understand’ how economic and physical geography relates to infrastructure provision. We are concerned that the NIC risks an absence of knowledge about real local communities which cannot be gained from a map, and the NIC must draw on local intelligence about communities where it is considering siting new infrastructure or potentially removing investment. Infrastructure makes places, and it is important to capture where local political leadership can deliver consensus with more success than national leadership. We welcome that consideration of economic devolution can shape infrastructure development, but believe this needs to be extended to political devolution as well, especially with the election of new regional Mayors on the horizon. Just as the Mayor of London has demonstrated, these regional Mayors will likely have their own views about their area’s infrastructure and priorities.

**Funding and financing** – we acknowledge that the NIA’s fiscal remit will be set by the Chancellor, but encourage the NIC to be bold in its consideration of alternative funding mechanisms for infrastructure. There may be lessons that could be learnt from the funding of smaller infrastructure projects, and learning from the funding of large infrastructure projects should be made available for use on smaller projects as well. Additionally, the holistic assessment of infrastructure problems in a place may reveal financing opportunities that could be missed if only analysed by sectors or aggregated at the national level. The NIC should also make reference to the importance of funding certainty. This acts as perhaps the greatest barrier to infrastructure delivery in the UK. HM Treasury has a role to play in providing long-term capital funding certainty to projects or places. Its preference to transfer the risk onto others slows delivery and increases long-term costs.

**Cost, delivery and resilience** – we feel the NIC needs to consider in this section the issue of maintenance of assets once constructed, and any potential barriers to delivery; for example through skills shortages that need to be addressed strategically.

**Sustainability** – as well as carbon commitments, we want the NIC to take into account the impacts on air quality, biodiversity, water quality and availability and flood risk management. Sustainability factors need not prevent

infrastructure construction, as long as adequate mitigation measures are in place and infrastructure provision is made with environmental commitments in mind.

**Governance and decision making** – we note that reviewing the planning system is a project in itself, and suggest this focuses only on the Nationally Significant Infrastructure Project route and its effectiveness. The NIC should also give consideration to which organisation(s) maintain an asset after its construction.

**Evaluation and appraisal methodology** – we welcome the plans by the NIC to include wider benefits, including system effects, in appraisal methods for large projects. The recent work by TfL and PwC on Crossrail 2 will be of interest to the NIC. As the NIC plans to assess the appraisal methods and frameworks for Nationally Significant Infrastructure Projects, we suggest that it might also want to consider whether the definition of Nationally Significant Infrastructure Project is still fit for purpose.

**Performance measures** – we suggest that one way to measure the performance of infrastructure assets and services is to consider what would happen if they no longer existed or operated as intended.

## Q7. Are there any other cross-cutting issues that you think are particularly important?

We want the NIC to consider population growth and the pressure this places on infrastructure together with changing demographics in the population. The impact of growth and/or recession on infrastructure is also important for the NIA to consider, as the Vision to 2050 will not operate in a vacuum.

Skills are another cross-cutting issue the NIC needs to consider in its NIA. The UK needs to train enough people in the right skills for the construction and operation of infrastructure for the future. We also note that the UK's decision to leave the European Union could have skills implications, especially in the infrastructure sector as many of the organisations involved will employ global staff.

## Q8. Do you agree with this methodological approach to determine the needs and priorities?

The methodological approach set out on pages 21-24 of the consultation is sensible but could be more forward thinking. We have the following comments on the methodology:

- Past trends are not always reliable indicators of what will happen in the future.
- We suggest that the scenario-based approach taken in the Thames 2100 programme may be of interest to the NIC. For the Thames 2100 programme, three courses of actions have been mapped out, and the one that is eventually chosen will be determined by the extent to which sea levels have risen at a given point. This avoids making a 'best guess' estimate decades earlier that could subsequently prove to be wrong.
- It seems highly likely that stakeholder opinion on infrastructure investment in the UK is already known. Consultation, whilst very important, should not be an excuse to delay further important decisions about the UK's infrastructure needs which the private sector is good at articulating.

- We suggest that agreeing a definition of what an infrastructure asset is may be a necessary starting point for the baseline. We also want to understand where the National Infrastructure Pipeline and National Infrastructure Delivery Plan fit into the work of the NIC, as it is poor value for money for the taxpayer for all three to exist in parallel.
- We note that 'geography' and 'geographical' seem to be used throughout the consultation, including in the methodology, as a proxy for 'regions' or 'local', and as stated above, we caution against the NIC making decisions about communities it has no knowledge of, without drawing upon local understanding. In the same way, we query what 'sub national analysis' is, as we assume this is not a reference to the devolved administrations and England.
- We do not feel the NIC has outlined how it plans to prioritise infrastructure investment. We acknowledge this is a difficult area but do not feel a methodology has been outlined on this.

### **Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

We are not aware of any such models.

### **Q10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?**

We believe the four drivers outlined by the NIC are accurate. However, defining regions and cities as 'disaggregated geographical levels' of nations is an inadequate description of the importance of these areas to the UK's economy as a whole. Such a description belies an understanding of infrastructure as place-making and necessary to the successful functioning of a city as a whole, not just in its contribution to the country.

The NIC needs to consider how the uptake of technology can be promoted and physical barriers to technology can be overcome, as technology is itself an infrastructure form, as well as influencing other types of infrastructure.

Climate change is not the only challenge that our infrastructure needs to be resilient to. It needs to be resilient to rising population growth, demand for services and changing demographics as well. We suggest that in answer to the NIC's question about how resilient we want our infrastructure to be to future extreme events, in light of climate change predictions we want our infrastructure to be very resilient. Extreme events are likely to become the 'new normal' and our infrastructure needs to be able to withstand this.

### **Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

We do not have a view on this.

## Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

The opportunities an approach of geography of place (place making) and the role of infrastructure bring have been missed by the Commission. So too has the role of market conditions in bringing forward infrastructure investment and securing contributions and confidence from the private sector. We want the NIC to engage in constructive and open dialogue with industry and local government in the places where the NIC is considering infrastructure needs can be met.

We also note that the vast majority of infrastructure in the UK (by volume and value) is delivered locally, is relatively small and therefore outside the remit of the NIA. Devolution across England may see metro-Mayors with responsibility for infrastructure delivery, and funding to achieve this, in common with the Mayor of London. We therefore want the NIA to have a stated commitment to holistic place-making by ensuring that the NIC addresses the bias to deliver large and iconic infrastructure projects compared with networks of smaller schemes; addresses the need to join up infrastructure between sectors in places rather than a siloed approach; and addresses the economic and political drivers of local places when reaching decisions.

## Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

We believe the proposals outlined by the NIC are wide-ranging and to be welcomed. We note that the diagram provided in the consultation on page 30 does not reflect the statement at paragraph 79 for a call for evidence in autumn 2016. We look forward to sharing with the Commission our research into Londoners' attitudes towards infrastructure. We would like the panels of experts (paragraph 82) to include sustainability, environmental, and climate change experts as well.

## Wider comments

We also wish to comment on the work of the NIC. We seek further clarification on how long the NIC estimates it will take to produce an NIA each Parliament and what the NIC and its staff plan to do for the rest of the Parliamentary term (which by definition, has to be at least one year, as the government has 12 months in which to respond). The NIC is charged with producing an NIA once each Parliament. A period of perhaps less than three years will have passed before the NIC begins to write a new NIA. We seek clarification on whether the NIC will start the entire process again, or seek to build upon the evidence it has already gathered. At best, the outlook will shift to the next five years beyond the previous NIA produced, the period of time furthest away and hardest to establish credible proposals for. We seek to understand whether the NIC intends to update and sharpen the NIA evidence and priorities in previous versions of the NIA, especially with regards to the medium-term.

We continue to remain concerned that the NIC will duplicate work that should already be happening in government departments and regulators, particularly regarding infrastructure prioritisation. We seek assurances that the NIC is not adding an additional team of civil servants to central government, but drawing out from government departments the civil servants already working on these plans and priorities.



National Infrastructure Commission Consultation – response of the London Forum of Civic & Amenity Societies

The London Forum is a voluntary umbrella group for over 100 Amenity and Civic Societies in London.

Our responses to consultations are overseen and co-ordinated by our Planning & Transport Committee.

*Q1. The Government has given the National Infrastructure Commission objectives to: I foster long-term and sustainable economic growth across all regions of the UK I improve the UK's international competitiveness I improve the quality of life for those living in the UK What issues do you think are particularly important to consider as the Commission works to this objective?*

Address capacity issues by provision of diversionary rail routes (eg Oakhampton line for Cornwall)

Identify and address capacity pinch points for passenger and freight

Increase capacity on existing lines, once diversionary routes are in place

Improve connectivity where needed, e.g. HS3

The over-riding principle should be to minimise the distances passengers need to travel, with complementary planning policies alongside and more equitable fuel costs for rail cf. air. For freight, the over-riding principle should be to achieve modal shift from road to rail, particularly where residential roads are subjected to high levels of freight

*Q2. Do you agree that, in undertaking the NIA, the Commission should be: I Open, transparent and consultative I Independent, objective and rigorous I Forward looking, challenging established thinking I Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks? Are there any principles that should inform the way that the Commission produces the NIA that are missing?*

We agree with motherhood and apple pie: the principles noted above should apply

*Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?*

Not entirely – you cannot plan the infrastructure without reference to planning policies and the built environment. Affordable housing has to be within its remit.

*Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?*

See response to Q.1

*Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?*

We cannot afford predict and provide (it doesn't work) so we must plan to minimise the need for transport infrastructure, recognising that new infrastructure will still be needed.

*Q6. Do you agree that the NIA should focus on these cross-cutting issues?*

They certainly need to be addressed.

*Q7. Are there any other cross-cutting issues that you think are particularly important?*

The full implications of any proposal have to be assessed. The cost of mitigating measures must be included in the cost of the project before its value for money can be fairly assessed.

*Q8. Do you agree with this methodological approach to determine the needs and priorities?*

Yes, as long as stakeholders have the opportunity to express their views clearly, rather than responding to questions that make contentious assumptions

*Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?*

Sadly no; but we could highlight the outstandingly successful infrastructure projects (e.g. Manchester Tram, Thameslink, London Overground orbi-rail, contra-flow bus lanes) and draw comparisons with future proposals.

*Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?*

Government housing policy could have a massive effect on future demography and we can only reiterate our concern that housing supply has been excluded from the remit

*Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?*

*Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?*

We have no observations relating to this section

*Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?*

It will command respect if it can demonstrate that it is listening to disinterested experts rather than promoters of schemes or politicians over-wedded to vanity projects



**Response to the National Infrastructure Commission  
consultation:**

**The National Infrastructure Assessment**

**5 August 2016**

## 1. Introduction

- 1.1 MAG welcomes the opportunity to comment on the National Infrastructure Commission's consultation on the *National Infrastructure Assessment*.
- 1.2 We also welcome recent contributions from the Commission in the form of its reports: *Transport for a world city* and *High Speed North*, which demonstrate that the COMMISSION can have a key role to play in delivering consensus on a programme of infrastructure investment across the UK, particularly on road and rail, which are primarily driven by Government spending. While we would have liked to see additional recommendations to address shorter term requirements at Stansted, in particular, there was appropriate recognition of the need to connect better the UK's strategic infrastructure assets.
- 1.3 Manchester Airports Group (MAG) owns and operates four airports in the UK (Manchester, London Stansted, East Midlands and Bournemouth), handling some 50 million passengers per annum. Our airports are nationally significant infrastructure assets, providing essential connectivity both for the regions they serve and the wider UK economy, contributing over £4 billion in GVA each year.
- 1.4 Aviation is a key driver of economic growth, creating jobs and facilitating trade. The sector contributes over £50bn to the UK economy and supports more than a million jobs directly. Airports, as the physical infrastructure that underpins the sector, should be considered vital national assets and therefore fully integrated into any national infrastructure plans set out by the Commission in due course.
- 1.5 The way these transport assets, in particular, connect with each other is crucial to driving growth in the UK, through better productivity and more effective utilisation. In assessing the UK's infrastructure investment priorities and enabling the integration of those spending plans, the Commission will address a long-term weakness in UK infrastructure planning, where too often a siloed, project by project, approach to capital investment has failed to harness the true value of the UK's network of infrastructure assets.
- 1.6 While airports invest heavily in their own infrastructure, this needs to be complimented by supporting surface access to provide for the needs of passengers wishing to travel for business or leisure. Road and rail access to UK airports very often defines both their catchment area for potential passengers and, in turn, their competitive position in attracting new airlines.
- 1.7 Investing in these schemes, therefore, that connect cities with major airports as well as each other, may stimulate stronger growth as well as greater regeneration potential. It will enable the most productive use of spare capacity and connectivity from all UK airports, inducing a catalytic effect for the regional and national economy.
- 1.8 The National Infrastructure Commission (the Commission), therefore, has a key role to play in fully assessing the network of transport assets across the UK, the way they

should be connected and how, in doing so, these assets will drive growth through better productivity and more effective utilisation. In assessing the UK's infrastructure investment priorities and enabling the integration of those spending plans, the Commission will address a long-term weakness in UK infrastructure planning. Too often, a siloed, project by project approach to capital investment has failed to harness the true value of the UK's network of infrastructure assets.

- 1.9 By taking a comprehensive look at the kind of connectivity the UK needs and ways of supporting more effective network planning for domestic transport infrastructure, the Commission will be in a position to co-ordinate the investment programmes required to get there. This consideration must, as a matter of course, include airports, airspace and air freight.
- 1.10 For airports, full integration of road and rail schemes will be key to delivering the wider surface access needs of passengers wishing to travel seamlessly for business or leisure. Failure to do so will limit connectivity and hamper growth, not least because road and rail access to UK airports defines both their catchment area for potential passengers and, in turn, their competitive position in attracting new airlines. This will stimulate stronger growth, offer greater potential for regeneration and enable the most productive use of spare capacity and connectivity from all UK airports, inducing a catalytic effect for the regional and national economy.

## 2. A national needs assessment

- 2.1 MAG supports the Commission's wider remit – 'to identify the UK's strategic infrastructure needs over the next 10-30 years' – and welcomes the intention to bring stability to long-term infrastructure plans through a robust assessment of need. However, it should also undertake to assess the ability of each sector to determine and deliver these investments themselves. As a matter of policy, it would not be appropriate in all cases to go as far as determining the 'solutions' to address each of these needs and consideration of infrastructure requirements across many different and diverse sectors will be problematic unless there is clear recognition of the competitive and privately funded nature of some sectors.
- 2.2 Following the break-up of BAA, the UK airport sector is a well-functioning market which should be allowed to flourish. Indeed the Competition and Markets Authority reported the significant consumer and competitive benefits from its decision to break the airports monopoly in 2009<sup>1</sup>. In common with other UK airports in this period, MAG has invested significant private capital in the development of its airports to respond to growing and changing customer needs. Neither Manchester nor Stansted are regulated, and none of the investment has been paid for by Government or overseen by a regulator. It follows, then, that the Commission should not make recommendations that disrupt well-functioning competitive markets, particularly where they are delivering high levels of private investment in infrastructure.

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<sup>1</sup> <https://www.gov.uk/government/news/cma-report-shows-benefits-of-baa-break-up>

- 2.3 We believe that the scope of the Commission's consideration of airports within its National Infrastructure Assessment should be limited to setting out the demand-side needs for capacity and investment, the value and importance of infrastructure investment in the sector and then to advise Government in devising a market-driven policy framework that supports growth to meet that need.
- 2.4 Within an increasingly competitive airport sector, this market-driven approach will continue to drive the right outcomes for consumers.
- 2.5 In this environment, the right approach must be for the Commission to use the national needs assessment to forecast demand and identify the growth challenges for the sector, including the impact of associated infrastructure needs (for example, road, rail and energy). Thereafter, the Government should look to support growth through competition, enabling the market to decide how the industry should develop and bring forward solutions to those challenges, as appropriate.
- 2.6 To that end, creating a National Policy Statement for aviation that includes a clear objective to develop a strong network of competing airports across the UK will enable airports to bring forward proposals for new capacity in due course, providing they can be shown to be consistent Government's policy framework and meet the conditions and environmental limits for growth.

### 3. Consideration of airports in the National Infrastructure Assessment

- 3.1 On the issue of airport infrastructure requirements, the Airports Commission undertook a huge volume of work to determine the near-term capacity needs in the South East. However, there is certainly more to do over the 10-30 year horizon the Commission is considering in this assessment – both in terms of airport capacity and surface transport integration.
- 3.2 The Airports Commission considered airport capacity requirements to 2030, primarily for the South East of England, and did not explore the wider requirements of the industry beyond that timeframe or more widely across the UK. The primary reason for this decision is the considerable uncertainty that exists in demand forecasting, consumer preferences or airline modelling for the future.
- 3.3 Neither did the Airports Commission fully assess the economic benefits of airport growth at Manchester Airport, for example (indeed at any airport other than Heathrow and Gatwick). This is a weakness that ought to be addressed by the Commission and it should be feasible to adopt the suite of models used by the Airports Commission to complete this work as part of the National Needs Assessment. We appreciate that there is a challenge in such long range forecasts but believe that it is a worthwhile exercise for the Commission, particularly in light of the likely need for an additional two runways within the next 20 years.
- 3.4 With this in mind the national needs assessment must:
- a. be truly national in focus, setting a framework for investment

- b. identify airport sector 'needs', rather than specific solutions – i.e. the Commission should not be specifying the location for future runway capacity development
  - c. recognise the differences between markets in road, rail, aviation and ports - taking into account the distinctive competitive dynamics of the aviation industry to avoid potential distortion of the market.
- 3.5 For guidance on the treatment of policy development in a competitive market, the Commission should look to the Government's policy framework for the ports sector. The Ports NPS explicitly acknowledges that the market is dynamic and that seeking to predict future trends would be problematic. The NPS also recognises and welcomes the fact that different ports compete, advocating that this will lead to the best outcomes for industry and consumers. The NPS for Ports states (para 3.4.12):
- "The forecasts...did not attempt to predict the locations where demand would manifest, partly because this is dependent on changes in the market, which are difficult to predict now. For the same reason, the Government does not wish to dictate where port development should occur. Port development must be responsive to changing commercial demands, and the Government considers that the market is the best mechanism for getting this right, with developers bringing forward applications for port developments where they consider them to be commercially viable."*
- 3.6 The approach adopted by Government in the NPS for the ports sector would create a more durable and enduring framework for the delivery of new capacity, enabling solutions for future capacity requirements to be defined and delivered by the industry. The Commission should, therefore, be focused on identifying the outcome Government should be striving for without specifying how private investment should be directed.
- 3.7 Furthermore, it is critical that any policy framework remains in place across Parliaments. The inability to deliver major new runway schemes in the UK over the last decades has been largely due to policy instability and political change, rather than a failure of the market to deliver investment. Between 2003 and 2010, while Government policy was in place, BAA committed significant financial resources - running into hundreds of millions of pounds - working to deliver two new runways at Stansted and Heathrow.
- 3.8 The period of policy ambiguity since 2010 has been disruptive to the sector. The Government must now address these urgent challenges with a co-ordinated, integrated policy framework that enables the market to progress plans for growth over the coming years. The Government must also respond promptly to the Commission recommendations in due course.

## 4. Consultation questions

- 4.1 In line with the consultation document, please find below selected responses to the Commission's questions:

*What issues do you think are particularly important to consider as the Commission works to this objective? (Foster long-term and sustainable economic growth across all regions of the UK, improve the UK's international competitiveness, improve the quality of life for those living in the UK)*

- 4.2 We fully support the outlined objectives. In working towards these our view is that the Commission should place particular importance on examining interconnectivity and interoperability between different forms of infrastructure, rather than examining these in isolation. This applies particularly to the more customer focused transport infrastructure, where interoperability between airports, rail and road assets play a crucial role in achieving the Commission's objectives, and the movement of goods and services.

- 4.3 At Stansted, an immediate priority in the short term should be to implement another of the Airport Commission's recommendations by improving the rail links to Stansted Airport. Providing faster journey times will enable the airport to play a bigger role in meeting London's capacity needs, encouraging greater choice, new routes and a boost to the region's economy. With faster passenger growth than at any other UK airport, it is clear that both the business case and strategic case for this investment are strong. All changes to the line can be made incrementally, delivering step changes in service and performance by 2020, whilst fully supporting the delivery of four-tracking and Crossrail 2 in the longer term.

- 4.4 Manchester Airport is the global gateway to the North and has the ability to be a driver of growth in the region, supporting inward investment and tourism. Over the long term, this role should be strengthened further with the delivery of high speed rail both to and across the North, enabling the airport to offer more passengers direct connections to a wider range of destinations. This would transform connectivity for cities both sides of the Pennines, radically reducing journey times both between those cities and from those cities to global markets.

*Are there any principles that should inform the way that the Commission produces the NIA that are missing? (1. Open, transparent and consultative, 2. independent objective and rigorous, 3. forward looking, challenging established thinking, 4. comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks).*

- 4.5 Where parts of infrastructure are primarily run by private companies, the Commission should operate on a principle of guidance. It is important that the Commission does not seek to 'pick winners' but instead define current and future need, allowing the market to invest and meet the expected demand, as well as criteria to ensure Government priorities are met.



- 4.6 In addition to supporting the principles outlined in this consultation, it is important to add that the Commission should prioritise an evidence-led approach to calculating the benefit of a project when making recommendations. This is important when examining the benefits of larger scale infrastructure projects which may initially face local opposition, but will later go on to benefit that area, as well as the wider locality and the country. Equally, taking such an approach will allow the COMMISSION to take account of the projected impact of new technologies and ways of working, as well as economic benefits such as future job creation.
- 4.7 The Government doesn't have a good track record in 'picking winners' and delivering their priorities. By prescribing need rather than guiding sectors, it could make it more difficult to meet the UK's long term capacity needs, as well as focus investment inflexibly and in the wrong way, without taking account of consumer tastes or possible innovations in operating models. When looking at aviation specifically, it would suppress competition between airports and airlines to the detriment of consumers, business and the UK economy. The UK's record in this area over the last 30 years strongly suggests that the conventional approach of Government 'picking winners' is simply not the right way to go about developing new airport capacity. A long-term, market-driven policy framework would be of enormous benefit, communicating a clear message that the UK is open for business and injecting much needed competition into the delivery of new capacity. Competitive rivalry would create strong incentives for airports to bring forward capacity at the right time, in a way that best meets the needs of users in terms of cost and quality, and without recourse to state support.

*Do you agree that the NIA should cover these sectors in the way which they are each described?*

- 4.8 We welcome the Commission's plan to adopt a "multi-modal approach" and examine how "infrastructure supports the movement of freight and people across the country". When analysing the case for new infrastructure and where investment can yield the greatest benefit, the wider economic impact, such as job creation and the creation of future investment opportunities should also be taken into account.
- 4.9 To take a working example, whilst a local rail line may facilitate the movement of people and freight from A to B, an airport also creates a significant number of jobs and opportunities for both additional investment and supporting businesses. Airport City in Manchester will comprise approximately 5 million sq ft and will encompass offices, advanced manufacturing and logistics facilities, along with hotels and ancillary retail. Situated close to the airport it will be able to act as a hub for investment. Airports and other infrastructure assets act not only as transport links, but hubs, and their wider benefit should be taken into account.
- 4.10 Furthermore, the definition provided within the consultation seeks to support "the movement of people and freight". This definition is accurate up to a point, but does not appear to distinguish within these groups in order to define and shape 'transport need' for the country. When looking at rail passengers in particular, a shifted set of

criteria is needed to ensure that “need” is not decided purely by volume, but by value as well. Commuter services are vital services for the country, but in order to “foster long term and sustainable economic growth across all regions of the UK”, an objective stated under the Commission’s remit and scope, some value must be placed on different passenger groups. Tourists, for example, are high value passengers which contribute billions of pounds to the UK economy each year, especially in cities, coastal towns and areas of outstanding natural beauty. Both tourist and business travellers will have different ‘peak periods’ to commuters, and their needs should also be taken into account.

*Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?*

- 4.11 The consultation document notes that a focus for the Commission will be to understand future transport provision (i.e. greater rail electrification). Whilst this should remain a priority, interconnectivity between differing types of transport infrastructure should be a key focus.
- 4.12 It is vital that rail and road links are well integrated and operate reliably around hubs such as airports, ports and major railway stations, allowing freight and passengers to move quickly and efficiently to the benefit of the wider economy. Furthermore, by integrating transport modes they are able to support each other at peak times, and facilitate greater movement of goods and people.
- 4.13 The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?
- 4.14 From an airport operator perspective, it is vital that rail and road links are well integrated and operate reliably, allowing the movement of freight as well as passengers quickly to the benefit of the wider economy. Furthermore, we would reiterate the points raised in section three, in that provision should be provided for different passenger groups, not simply passengers as a whole.

*Are there any other cross-cutting issues that you think are particularly important?*

- 4.15 **Third Party Funding** – McKinsey estimated in 2011 that the cost of maintaining, renewing and expanding the United Kingdom’s transport infrastructure would be around £350 billion over the next two decades.<sup>2</sup> Given the scale of the investment required, additional work is needed to develop a framework that will encourage third-party investment in the delivery of infrastructure enhancements. This is a particularly pressing need within the rail sector, where no simple mechanism exists to ensure that third party investors are able to see a return on any partially funded investment.
- 4.16 **Geography and Local Growth** – In areas outside the South East of the country, much infrastructure lacks the speed and efficiency of the South Eastern networks, which

<sup>2</sup> McKinsey UK strategic transport infrastructure model, February 2011

themselves are overloaded. The result can be constrained economic activity, and a greater understanding of how improving infrastructure provision can create a virtuous circle would be welcome, and should be factored in to decisions on future provision.

- 4.17 **Evaluation and Appraisal Methodology** – Forecasting future usage in transport is notoriously difficult, however, the consequences of underestimating growth can have a long term impact. Stansted was left off the Airport Commission's shortlist in 2013 because it was incorrectly judged that the airport would continue to have spare capacity until at least 2040. However, under MAG ownership Stansted has grown so quickly that within that short period we now forecasting that the airport will be full between 2025 and 2030. Therefore, changes in methodology for major infrastructure projects should be updated to improve accuracy, with opportunities to re-examine a decision if circumstances change built in to processes.

*Do you have examples of successful models which are particularly good at looking at long term, complex strategic prioritisation in uncertain environments?*

- 4.18 There is inherently a high degree of uncertainty in forecasting aviation demand over the time horizon envisaged by the COMMISSION. Indeed, it was the challenge of projecting forward beyond 2030 – taking into account changes to passenger demand, airline models and competitive pressures across the industry – that caused the Airports Commission to stop short of making recommendations beyond a single runway.
- 4.19 We believe this leaves a significant gap in the evidence base underpinning the long-term assessment of need as the AC did not assess in any detail the future growth scenarios at other major UK airports, including Manchester and London Stansted. As such, we believe there is a need for the Commission to take a more broadly focussed analysis of the economic potential of a wider range of UK airports and the infrastructure required to support their growth. However, taking the National Air Passenger Allocation Model (NAPAM) used by the Airports Commission would be a consistent way to model passenger allocation and project demand between airports across the sector.
- 4.20 While the Airports Commission focus was clearly only on Heathrow and Gatwick, its conclusions have led to a much greater understanding of air capacity in the South East, as well as required improvements to maximise that capacity and the needs and wants of the area. Therefore, that model should be applied more widely across the country to help determine demand and allocation at other airports, including Manchester and Stansted, with new supporting infrastructure prioritised accordingly.
- 4.21 More generally, the VISSIM model has been widely used in order to model and analyse traffic flows and is *“A microscopic, time step and behaviour based simulation model developed to analyse the full range of functionally classified roadways and public transportation operations. VISSIM can model integrated roadway networks*

*found in a typical corridor as well as various modes consisting of general purpose traffic, buses, light rail, heavy rail, trucks, pedestrians, and bicyclists.<sup>3</sup>*

*The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?*

- 4.22 We would reiterate the point that NIA must assess future need, with the Commission guiding the market, but they should not prescribe solutions where competition within markets already exists. Instead it should allow investors to invest to meet that demand in a way that best meets the needs of users in terms of cost and quality and without recourse to state support.

*How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?*

- 4.23 MAG broadly supports the engagement tactics outlined in the consultation document. However, on engaging with experts (roundtables and panels) it is important that those within industry are represented alongside economists, engineers and so on. Whilst it is right that the Commission should gather all available views to inform its decisions, those best placed to understand a sector are those who work directly within it, who can provide valuable insight and input to support decision making. We have made a number of approaches to meet with the Commission Chairman, CEO and secretariat but have not yet been afforded the opportunity to engage.
- 4.24 Within the consultation there are stated plans to “*identify and meet with key stakeholders from across infrastructure sectors*”. This engagement is essential and it must include industry stakeholders as part of the mix of experts that can give a fully rounded view. In doing so, this will allow a greater understanding of how industry is able to meet future demand, how competitive forces will play their part and what policy or investment is required from Government to support meeting those needs.
- 4.25 The Commission’s desire to engage with a broad range of local stakeholders is welcome. Airports are legally required to hold consultative committees to engage with their local communities and help address concerns. It may therefore be beneficial for the Commission to make use of these committees when gathering information to help gain a wide range of views. In addition, MAG has a long standing community outreach programme, holding open meetings around our airports, as well as teams to work with local people across a variety of areas, including education and the environment. The Commission should take the opportunity to attend these events and work closely with our experienced teams to help understand aviation infrastructure and its community, as well as economic impacts.

<sup>3</sup> A Comparison of the VISSIM and CORSIM Traffic Simulation Models – Loren Bloomberg & Jim Dale - 2000 - <http://data.ptvamerica.com/docs/2000%20ITE%20VISSIM%20+%20CORSIM%20Safeco.pdf>

**Response to the  
National Infrastructure Commission's Consultation on the  
"National Infrastructure Assessment – Process and Methodology"  
from the Mineral Wool Insulation Manufacturers' Association (MIMA)  
(for deadline of 5 August 2016)**

**1. Introduction:**

The Mineral Wool Insulation Manufacturers' Association (MIMA) is a trade body providing an authoritative source of independent information and advice on glass and stone wool insulation. MIMA actively promotes the benefits of mineral wool insulation and the contribution it makes to the energy efficiency of buildings and the comfort of their occupants.

We represent four of the leading insulation companies in the UK - Isover Saint-Gobain, Knauf Insulation, Rockwool and Superglass.

We welcome the opportunity to feed into the National Infrastructure Commission's (NIC) latest consultation on the plan for developing the UK's National Infrastructure Assessment (NIA). The consultation is very timely in light of the Neighbourhood Planning and Infrastructure Bill which is expected to be introduced into Parliament in the Autumn and will place the NIC on a statutory footing.

The NIC's objective is to set out a picture of the future infrastructure we need, producing an in-depth assessment of the UK's major infrastructure needs on a 30-year time horizon. The consultation document sets out how the assessment will be produced.

**Our response makes clear that we strongly agree that building energy efficiency should be included firmly within the remit of the National Infrastructure Commission as part of a whole energy system approach to providing a cost effective and largely de-carbonised energy system by 2050.**

In practice, this means ensuring energy efficiency is included in the NIC's workstreams related to evidence-gathering set out in the consultation document – specifically:

- The creation of expert panels and the running of roundtables in 2016/17;
- The Call for Evidence planned for Autumn 2016 – including “sector evidence reviews”, “economic and engineering modelling”, and “scenarios”;
- The Vision and Priorities paper (up to 2050) to be published by the NIC in the summer of 2017.

We also summarise answers to questions posed in the consultation document at Annex A.

In brief, MIMA and the broader energy efficiency sector stands ready to assist the NIC in its evidence-gathering efforts for the Vision and Priorities paper in 2017 and for the NIA itself in 2018.

## 2. The current position on energy efficiency:

There is widespread agreement that energy efficiency in buildings has a crucially important role to play in the energy system; in helping to balance energy demand and supply; in supporting energy security objectives and in unleashing significant economic growth.

For example, authoritative research by Frontier Economics in 2015<sup>1</sup> showed that a national **programme of investment in the energy efficiency of the building stock in Britain, over a period of ten years, is capable of delivering major economic and social benefits – in the order of £8.7 billion.** This net benefit is comparable to other major infrastructure road and rail projects, including HS2 (Phase 1). The report concluded that there is a strong case for Government to make home energy efficiency an infrastructure investment priority and to develop an infrastructure programme to deliver it.

Analysis by **Cambridge Econometrics and Verco in 2012<sup>2</sup> demonstrated that for every £1 invested in energy efficiency, £3.20 is returned to economy. In terms of jobs, a report by the UK-GBC in 2014 highlighted that major investment in energy efficiency could almost double the number of people employed in the energy efficiency industry to 260,000.**<sup>3</sup> In summary, that report concluded that the economic case for making the energy efficiency of the UK housing stock a national infrastructure priority is strong.

The reasons investment in energy efficiency of buildings can create jobs and growth is very simple:

- Energy efficiency reduces consumer demand for energy, freeing up energy capacity more cost-effectively than building new power stations, gas and electricity distribution networks and storage.
- The work required to maintain and improve the building stock, including installing energy efficiency measures such as insulation, results in jobs and growth.
- Consumers living in energy efficient homes, and energy efficient businesses, have significantly lower energy bills, allowing them to spend money on other goods and services (particularly in the “able to pay” market).
- Energy efficiency provides a great range of public services, such as helping to protect consumers over the long term from energy price volatility, from fuel poverty and the health impacts associated with that, and it substantially reduces the UK’s carbon emissions.

Despite these significant economic benefits the Treasury has not allocated any public capital funds to support home energy efficiency programmes even though it plans to spend £120 billion of public capital funds on infrastructure projects by 2020. Instead the Government has largely relied upon the Energy Company Obligation, a levy on energy bills, to generate investment in home energy efficiency. Political pressure to reduce energy bills in the short term for consumers has led to a reduction in the levy which has reduced building energy efficiency investment by a third since 2012.

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<sup>1</sup> Frontier Economics, Energy Efficiency: An Infrastructure Priority, 2015. <http://www.frontier-economics.com/documents/2015/09/energy-efficiency-infrastructure-priority.pdf>

<sup>2</sup> Building the Future, the economic and fiscal impacts of making homes more energy efficient, 2014 <http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf>

<sup>3</sup> Up from 135,000 in 2014. UKGBC, A Housing Stock Fit for the Future, 2014. <http://www.ukgbc.org/resources/publication/housing-stock-fit-future-making-home-energy-efficiency-national-infrastructure>

We therefore welcome the NIC's reference to *"the importance of looking at the future of heating and the shift to low carbon solutions in the context of the UK's carbon targets, and the important role that increasing energy efficiency could potentially play."* Too often, capacity is talked about in terms of the energy levels required to 'meet demand', yet householder demand is not for energy but for heat, light and power. If these requirements can be delivered at lower energy input then this potential must be explored.

The inclusion of energy efficiency in the NIA was also recommended by Parliament's Energy and Climate Change (ECC) Committee in 2016 following their inquiry into energy efficiency and demand reduction (Recommendation 7): ***"...the National Infrastructure Commission must consider the infrastructure requirements of meeting the UK's carbon budgets and long-term legally binding carbon reduction targets. Energy efficiency will be a crucial part of the mix. The Government and the National Infrastructure Commission should assess the potential benefits of designating energy efficiency as a national infrastructure priority."***

**The Government responded to the ECC Committee's report on 11 July 2016, stating** *"DECC will continue to work with the Commission as it prepares its National Infrastructure Assessment. As per the Commission's consultation document, this will examine the future of heating and important role that increasing energy efficiency could potentially play."*

Furthermore, in its latest progress report to Parliament, the Committee on Climate Change (CCC) repeatedly cited the Scottish Government's decision to designate energy efficiency as a 'national infrastructure project'. As part of this, an offer of support will be made to owners of all buildings in Scotland – residential and non-residential – to help them achieve a good energy efficiency rating over the next 15-20 years.<sup>4</sup>

Lastly, the NIC will no doubt be aware that a number of major institutions, including the International Energy Agency<sup>5</sup> and the EU Commission are framing energy efficiency as the **"First Fuel"**, and emphasising the importance of viewing building energy efficiency as an infrastructure priority.

### **3. Why a coordinated national infrastructure programme on energy efficiency is needed**

Buildings are one of the largest energy using sectors, and therefore any robust long-term infrastructure plan for the future energy system must include investment in energy efficiency to reduce demand and increase energy security.

Reassuringly, **between 2005 and 2013 UK homes saw a huge 30% drop in (weather adjusted) median gas consumption.** At today's prices this means that approximately £5 billion less per year will be spent on gas alone across the UK's 27 million homes than if consumption had remained at 2005 levels.

**DECC cited drivers for this drop in consumption as; government energy efficiency programmes, efficient boiler regulation and some austerity-driven thermostat adjustment, although the trend started well before the 2008 recession.** This is a great UK success story, meaning we are already far more energy secure than we otherwise might have been.

<sup>4</sup> Committee on Climate Change, Meeting Carbon Budgets – 2016 Progress Report to Parliament, June 2016

<sup>5</sup> IEA, Energy Efficiency Market Report 2014 <http://www.iea.org/publications/freepublications/publication/energy-efficiency-market-report-2014.html>

However, the job of retrofitting the housing stock is only partially completed. As public investment in energy efficiency has dramatically reduced, alongside the fact that the majority of ageing boilers have been replaced and that we are no longer in recession, the downward pressure on national gas and electricity consumption will also have dramatically reduced. Despite the implementation of a string of government programmes over recent decades, the UK's housing stock remains amongst the "leakiest" in Western Europe.<sup>6</sup>

To counter this, all existing UK buildings need to be brought up to a reasonable standard of energy efficiency, at least Band C on an Energy Performance Certificate. There are over 20 million homes in the UK below this standard which leave residents with high energy bills and the risk of ill-health in cold temperatures. This is because only a very small percentage of the country's 8 million solid walls have been insulated, and around 5 million party walls are, as yet, un-insulated. The estimated fuel bill cost to consumers from heat loss through party walls alone is around £465 million a year, (and will be many magnitudes higher from inefficient solid walled properties). Although a greater amount of progress has been made on cavity walls and lofts, there are still millions which have not been treated or could benefit from being topped up. DECC<sup>7</sup> estimated that, as of December 2015, across the UK there are:

- Around 7 million properties that could benefit from loft insulation – mainly topping up existing levels of insulation (29% of homes with lofts).
- Around 4.7 million cavity wall properties that could benefit from some cavity wall insulation (29% of homes with cavity walls).
- Around 7.5 million uninsulated solid walled properties (94% per cent of homes with solid walls).

The CCC recently raised concerns about our lack of progress in this sector. For example, the CCC's 2016 Progress Report found that: "*The total number of energy efficiency measures installed under government schemes in 2015 was down 49% on 2014 and 87% on 2012 across cavity wall, loft and solid wall insulation. This was due to the reduction in installation under the Energy Company Obligation (ECO) during 2015, which was already delivering far less than previous policies in place to 2012. This lack of progress reflects the weakening of energy efficiency policy during this period.*"

So, most of the progress so far has been made through supplier obligations such as ECO which are funded through household energy bills. But these policies have led to an over-reliance on subsidies and have faced significant cuts in recent years. **Attracting private investment into home energy efficiency will require a national infrastructure programme with long-term delivery targets and Government capital investment to provide certainty to homeowners, investors and the supply chain.**

A further very important, but less acknowledged reason for investing in energy efficiency as infrastructure is the significant benefits it can have in "de-risking" other major government strategies and policies, such as:

<sup>6</sup> EBR/ACE, The Cold Man of Europe <http://www.ukace.org/wp-content/uploads/2015/10/ACE-and-EBR-briefing-2015-10-Cold-man-of-Europe-update.pdf>

<sup>7</sup> p9, ECO: Help to Heat – Transitioning to a new Fuel Poverty Focused Obligation Consultation State Impact Assessment [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/534669/ECO\\_Transition\\_Consultation\\_IA.PDF](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/534669/ECO_Transition_Consultation_IA.PDF)



- De-risking smart meter roll out** – While smart meters will offer generators and grid operators a greater understanding of when, where and how much energy is used, and indeed offer consumers some control to manage their consumption, the next logical step is to ‘persuade’ consumers to move away from using energy at peak times. As Paul Lewis, from BBC Moneybox, has put it – that ultimately means *‘paying poor people to not eat dinner at dinner time’*. This principle applies to heating too. While under 10% exclusively heat their homes with electricity, a much larger proportion have to ‘top up’ heat from plug-in electric heaters. If price signals are to be the key point to manage people away from peak load (and it’s difficult to imagine any other signal), then occupants must be able to heat their homes away from peak times but still be confident their home will maintain comfortable temperatures. This can only be done by ensuring the fabric is as energy efficient as possible allowing early morning or early afternoon ‘non-peak’ heating, or improving the building fabric to a level their gas central heating systems can now manage the full heating load.
- De-risking a low carbon heat strategy** – Many solutions have been proposed for ‘de-carbonising’ heat, from electrification of heat and a mass roll-out of heat pumps to wider use of heat networks. If heat pumps are part of the solution, then the home fabric must be efficient for the low-temperature distribution heat pumps to operate efficiently. A similar argument exists for heat networks.
- Avoided grid reinforcements** – When ‘horizon scanning’ for infrastructure needs, it is vital policy makers also consider what ‘smart fabric’ improvements might look like as well as considering the concept of smart fridges and storage. Take the potential for fabric energy efficiency to avoid upstream grid reinforcement costs. Energy efficiency policy to date disincentivises innovation, with policy mechanisms written into primary legislation which is slow to change, even if officials can be persuaded of an innovation’s benefit. Similar challenges exist in persuading DNOs to incentivise efficiency before reinforcement – as set out in the NIC Smart Power report. It would be an exciting proposition if a contract were let that stated; ‘these homes, attached to this sub-station use x base load and y peak load of electricity and z gas load. We are inviting bids that will help occupants in those homes to select packages to reduce all of those loads to a level where we don’t need to reinforce that substation, and those homes also make measurable improvements in terms of other metrics, including fuel bill reductions and comfort. Bidders must package together all the benefits and demonstrate how to measure them and price them. If that price is within reason we should push to scale up through a variety of policy mechanisms, whether regulation or incentives. We may not yet be ready to answer such a question, but there is an opportunity now. Answering it through the NIA and implementing a strategy on the back of it would give industry a ‘landing place’ for such innovations.

**Considering the many benefits, and significant challenges if we are to realise those benefits, we strongly agree that building energy efficiency should be included firmly within the remit of the National Infrastructure Commission as part of a whole energy system approach to providing a cost effective and largely de-carbonised energy system by 2050.**

**4. Gathering data and evidence on the energy system and the role of energy efficiency for the Vision and Priorities paper and the NIA**

We note the NIC plans to create a governance structure, including expert panels and roundtables. We ask that energy efficiency experts be represented in these structures, energy efficiency being a core part of the energy system.

Similarly, we would be pleased (along with colleagues in the sector) to assist with the energy efficiency dimensions of the sector evidence reviews planned and modelling work to be carried out. For example, we can collectively provide feedback on questions for the evidence reviews, and advise on organisations who may be able to carry out research or share existing findings.

As the NIA's focus is on "long term needs", we suggest a key piece of analysis should be to investigate in detail how high levels of energy efficiency in buildings affect energy demand profiles over time, and as a result, how much supply-side capacity could be freed up (as described above).

Specifically, it should be possible to estimate the savings on future energy supply infrastructure costs by raising the energy performance of buildings across the country. This could be modeled with a sensitivity to different possible mixes of low carbon heating solutions chosen. How peaks in daily demand could be smoothed out by the interaction between energy efficiency and smart meters is also an important area to explore further.

Analysis by the Sustainable Energy Association in 2014 already found that the delivery of energy saving measures costs less on average per unit of power than large-scale power generation.<sup>8</sup>

**Through cost-effective investment in all forms of energy efficiency, the UK could be saving 196TWh in 2020, equivalent to 22 power stations.<sup>9</sup>**

A second theme for evidence gathering should relate to types of interventions and investments required to realise the energy efficiency levels needed. Clearly there will be many inter-related factors to consider, such as the condition of the building stock, population projections, climate profiles, energy price profiles, and what level of roll-out existing policies on energy efficiency can realistically deliver. The National Grid's energy scenarios,<sup>10</sup> the analysis for the fifth carbon budget,<sup>11</sup> and DECC's energy pathways 2050 calculator<sup>12</sup> should provide a useful starting point.

We support and agree with many of the following questions the NIC has already highlighted in the consultation document (and the Smart Power report) but these questions must specifically reference building/housing energy efficiency. For example:

- "What will energy demand look like in 30 years time?". What is the impact of optimal levels of energy efficiency?
- "To be able to predict future infrastructure needs, the NIA needs to appraise the quality and condition of the UK's existing infrastructure assets. To do this, relevant information on infrastructure will be brought together to map the baseline stock." This includes the current level of energy efficiency.

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<sup>8</sup> Sustainable Energy Association, Clean energy measures in buildings are cheaper <http://www.sustainableenergyassociation.com/resources/infographic-clean-energy-measures-buildings-cheaper/>

<sup>9</sup> DECC, Energy Efficiency Strategy 2012 [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/65602/6927-energy-efficiency-strategy--the-energy-efficiency.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/65602/6927-energy-efficiency-strategy--the-energy-efficiency.pdf)

<sup>10</sup> National Grid, Future Energy Scenarios (FES) 2016 <http://fes.nationalgrid.com>

<sup>11</sup> <https://www.theccc.org.uk/wp-content/uploads/2015/11/Committee-on-Climate-Change-Fifth-Carbon-Budget-Report.pdf>

<sup>12</sup> <http://2050-calculator-tool.decc.gov.uk/#/home>

- “The need for electricity at peak times of the day could double, whilst the total amount of energy we use will only slightly increase”.
- “The NIA recommendations will not only consider what new physical infrastructure is needed, but also how to be more efficient through managing demand or increasing the capacity of existing assets to provide infrastructure services.”
- “We will consider the demand and supply of “infrastructure services””
- “Demand flexibility is needed”
- “We will consider how to displace the need for new generating capacity”
- “We will take a whole system approach”
- “Recommendations must be consistent with the UK’s carbon and environmental commitments”

As the NIC notes, the thread running through these questions is that physical assets create infrastructure services. In our sector, energy efficient buildings are the assets, and heat and comfort (plus economic growth, energy security etc.) are the services. By improving and maintaining the asset, we deliver the services more efficiently. In doing so, pressure on the supply-side is reduced.

At a practical level, you may be aware that a new industry **Energy Efficiency Infrastructure Group** (EEIG) has been created with senior representatives from organisations working in the energy efficiency sector. There will be a rolling chair and MIMA, will provide the secretariat. This Group is available to support and coordinate action should the NIC wish this. Please contact [name redacted] at [email address redacted] if you would like to discuss working with the EEIG.

## 5. Conclusion

**By 2050 the UK will have to reduce greenhouse gas emissions by at least 80%. In light of the Paris Agreement it is highly likely that the UK will have to effectively produce net zero carbon emissions within 35 years. These targets cannot be met cost effectively unless there is a huge advance in energy efficiency in our existing buildings – including our homes.**

**Energy demand reduction must be delivered as part of a joined up, whole energy system infrastructure approach. This not only makes sense from an energy system perspective, it also makes sense from an economic perspective, with the Government’s own cost-benefit analysis showing that an energy efficiency programme can deliver comparable economic benefits to other infrastructure programmes. But an energy efficiency infrastructure programme would also play a critical role in helping deliver a zero carbon energy system as well as tackling fuel poverty and reducing NHS costs related to cold homes. As part of an infrastructure programme, capital investment could be released to help bring all UK buildings up to at least EPC C.**

**Energy efficiency must therefore be included within the remit of the NIC. It is also vital that the NIC’s evidence gathering process and modeling work investigates further the critical role that an energy efficiency infrastructure programme can play in delivering a secure, cost effective and low carbon energy system.**

**6. For further information, please contact:**

[name redacted]

[job title redacted]

Mineral Wool Insulation Manufacturers Association (MIMA)

Email: [email address redacted]

Tel: [phone number redacted]

**5 August 2016**

## Annex A

### Summary of answers to specific consultation questions

**Question 1** - What issues do you think are particularly important to consider as the Commission works to this objective?

It is important to consider the role of building energy efficiency in balancing future energy demand and supply, reducing the cost of supply-side capacity and an assessment of the interventions needed to deliver a programme of improvements to the existing building stock to realise these benefits.

**Question 3** - Do you agree that the NIA should cover these sectors in the way in which they are each described?

Yes. We welcome the focus on the need for the energy system to help deliver our environmental and carbon reduction objectives, and the important role energy efficiency will play.

**Question 4** - Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

Yes, see Question 1.

**Question 6** - Do you agree that the NIA should focus on these cross-cutting issues?

Yes. We also think there needs to be a focus on understanding the extent to which existing policies can deliver on the “need” identified by the assessment, and if not to consider the policy and/or legislative interventions required. One specific thing to be mindful of in the energy efficiency sector is that a focus on driving the delivery of measures in terms of quantity needs to go hand-in-hand with quality installations and consumer protection. This is why a longer term, coordinated approach though infrastructure planning is needed. Something energy efficiency programmes have lacked to date.

**Question 8** - Do you agree with this methodological approach to determine the needs and priorities?

Yes. A combination of evidence reviews, qualitative scenarios and quantitative modelling is a sensible approach.

**Question 12** - In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

We reiterate the importance of including energy efficiency experts and evidence (specifically of buildings and our housing) in the development on the NIC’s Vision and Priorities paper for 2017, and in the NIA itself in 2018.

## National Infrastructure Commission

### The National Infrastructure Assessment - A Consultation

#### Mutual Energy Ltd response

August 2016

#### INTRODUCTION

Mutual Energy Ltd welcomes the opportunity to respond to this consultation on assessment of the UK's national infrastructure.

In this note we introduce the infrastructure we own and offer remarks in response to some of the consultation questions.

**Mutual Energy Ltd** was formed to acquire and hold important energy infrastructure assets for the benefit of the energy consumers of Northern Ireland, funded wholly by long-term bond finance. Group assets include the Moyle Interconnector (Moyle), the Scotland to Northern Ireland Gas Pipeline, the Belfast Gas Transmission Pipeline and the Gas to the West project which is under development.

The **Moyle Interconnector** links the electricity grids of Northern Ireland and Scotland through submarine cables running between converter stations at Ballycronan More in Islandmagee, County Antrim and Auchencrosh, Ayrshire. The high voltage direct current link has a capacity of 500 MW, making it a significant part of the electricity transmission system to both Northern Ireland and Scotland. Flows on the interconnector are subject to market conditions in each hour of the day, with users generally shipping from low to high priced markets.

**Premier Transmission Limited** (PTL) is the owner and operator of the Scotland to Northern Ireland natural gas transmission pipeline (SNIP). The 24-inch diameter pipeline is 135 kilometres long and runs from Twynholm in Scotland to Ballylumford in Northern Ireland. It transports gas to Ballylumford Power Station which generates over half of Northern Ireland's electricity needs and feeds the Greater Belfast natural gas distribution system via the Belfast Gas Transmission Pipeline. All of the gas used in Northern Ireland, by electricity generation, industry and households, is transported through SNIP.

PTL also operates the **Belfast Gas Transmission** Pipeline on behalf of Belfast Gas Transmission Limited. The Belfast Gas Transmission pipeline system consists of 26km of 600mm 'cross country' pipeline connected to the SNIP pipeline at Ballylumford, above ground installations at Torytown and Knocknagoney, where pressure is reduced before exiting the system and Middle Division, where the North West Pipeline connects. The pipeline incorporates two underwater segments, a 9km, 600mm pipeline across Belfast Lough and a 3km, 200mm pipeline across Larne Lough, both supplying the downstream gas markets.

Mutual Energy Ltd is licensed to build (with SGN), own and operate the high pressure gas pipelines which will extend the natural gas network into the west of Northern Ireland through the '**Gas to the West**' project.

The pipelines operate under an 'open access', non-discriminatory commercial framework.

Mutual Energy is also a 35% shareholder in **Islandmagee Storage Ltd**, which is developing an underground salt cavern natural gas storage facility. This will be a fast-acting store, through which shippers will be able to hedge against price volatility and which will greatly increase security of supply.

Moyle's response to the consultation is therefore from the perspective of an owner and developer of nationally significant infrastructure.

We acknowledge the importance of considering together the range of economic infrastructure in the approach proposed in the consultation paper and we stand by to assist the commission in any way – including understanding usage of the electricity and gas interconnectors and the their value to the economy.

## **CONSULTATION QUESTIONS**

Q1. The Government has given the National Infrastructure Commission objectives to:

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

What issues do you think are particularly important to consider as the Commission works to this objective?

We broadly agree with the proposed objectives, accompanied by the statement that 'recommendations are consistent with the UK's carbon and environmental commitments'.

Q2. Do you agree that, in undertaking the NIA, the Commission should be:

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

We agree that the list of principles is sound and especially that a whole system approach is important. We have no other principles to add to the list.

Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

On energy, which is our area of business, we agree and we note especially the interaction between energy systems and the need to consider the energy system as a whole.

Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

From our point of view, as owner of energy transmission infrastructure, we note the very long lifetime of such systems. This makes a proper national assessment, as proposed by the commission, of great importance. The long lifetimes also mean that it is important to ensure that assets are used most effectively, as the commission acknowledges, and that stranding is avoided. Models of funding of such long term investments should certainly be considered, since this will have an effect on the overall cost to consumers.

While we understand the commission will focus on UK infrastructure, we note that the UK is increasingly reliant on electricity and natural gas interconnection with other countries and we recommend the commission considers the nature of UK's interconnections in the energy sector with other countries and markets.

Further, there is interconnection between separately regulated parts of the UK and a degree of integration with other markets. For example, energy policy is devolved to Northern Ireland, the electricity network of Northern Ireland is part of a synchronous network including the Republic of Ireland and there is a Single Electricity Market (SEM) in those jurisdictions. The Moyle Interconnector (and the East-West Interconnector) provides means to trade electricity between the SEM and GB (BETTA) markets.

Great Britain also has electricity interconnection to the Republic of Ireland, France and the Netherlands and National Grid is promoting further new interconnectors to, for example, France, Norway and Iceland, partly in order to gain access to low cost renewable electricity in some of those countries.

As the owner of an existing interconnector whose ability to export low cost renewable (wind) electricity from the SEM (NI and ROI) market to consumers in Great Britain is constrained by the onshore transmission system in Scotland, we encourage the commission to consider existing and new infrastructure in an integrated fashion. The need for new interconnection is considered quite separately from the ability to make full use of existing interconnection and an example of silo thinking is that GB transmission system investment decisions focus only on the impact on GB rather than the UK as a whole. Investment in the Scottish transmission system would facilitate greater flows across the Moyle Interconnector to the benefit of both NI and GB but only the GB impact is considered under the current investment decision framework.

We therefore welcome the joined-up approach proposed by the commission.

Northern Ireland has the right geology for a salt cavern gas storage facility, technology that has been proven elsewhere. Northern Ireland consumers of gas, especially generators, would be able to use gas storage to hedge against the seasonal cycles and short term volatility in gas prices, lowering costs. However, to justify investment in such a facility, it must be able to access the larger Great Britain storage market. While Northern Ireland has lower unit capital cost of anywhere in the UK to construct a gas storage facility, Northern Ireland is not on a level playing field with Great Britain in this regard – a storage operator in Northern Ireland cannot readily and cost effectively access the Great Britain market, which is regulated separately from Northern Ireland. Appropriate regulatory arrangements for gas storage at the Northern Ireland - Great Britain border are critical.



Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?

As the owner of gas and electricity transmission assets, we note the key relationship between the two networks and their potential to be influenced by changing patterns in other sectors, for example with widespread electrification of transportation. The changing nature of electricity generation provides an increased focus on storage technologies, including storage of natural gas to supply peak thermal generation needs. Similarly, the market design of the electricity sector affects the behaviour of gas shippers and underlying gas infrastructure needs to be able to respond to changes in the downstream industry.

Q6. Do you agree that the NIA should focus on these cross-cutting issues?

We broadly agree, and we note that funding and financing arrangements can be of great importance. Our infrastructure assets are held in a mutual model, financed by low cost and low risk long term debt, an arrangement which has saved Northern Ireland consumers many millions of pounds since mutualisation.

Q7. Are there any other cross-cutting issues that you think are particularly important?

We suggest that market design is also relevant, since it can greatly affect consumer behaviour. For example, half hourly electricity metering where the cost varies throughout the day, similar to the wholesale electricity market, could very significantly change consumer behaviours, and therefore the pattern of load on the system, potentially resulting in a reduced need for investment in new generation and transmission infrastructure.

Q8. Do you agree with this methodological approach to determine the needs and priorities?

Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?

Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach

Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

We acknowledge the detailed planning undertaken by the commission and offer no additional suggestions at this time.

We hope our comments are of use to the commission and we would be happy to expand on any aspect. Further we shall be available to brief the commission on the infrastructure we own, including physical, financial and market aspects.

No part of this submission is confidential and it may be published in full.



Action for Warm Homes

## **National Energy Action (NEA) response to the National Infrastructure Commission consultation on the National Infrastructure Assessment**

### **Background to NEA**

- 1.1 NEA is a national charity working to increase investment in energy efficiency<sup>1</sup>. NEA has a network of offices throughout England and also has national offices in Cardiff and Belfast which also work to support deprived communities and low income energy consumers in Wales and Northern Ireland respectively. NEA's work to influence and increase strategic action includes research, campaigning and working with partners<sup>2</sup> from industry, local and national government and the third sector to deliver practical solutions to UK households - improving access to energy advice, training, energy efficiency products and other related services.
- 1.2 NEA has helped millions of households throughout the UK gain access to energy advice and energy efficiency grants. Over 440,000 heating and insulation measures have also been installed to over 360,000 homes through NEA's Warm Zones subsidiary community interest company which focuses on delivering energy efficiency solutions to low income households in deprived areas. NEA also provides the secretariat for the All-Party Parliamentary Fuel Poverty & Energy Efficiency Group, which was first established in 1995 as the Parliamentary Warm Homes Group, to raise awareness of the problem of fuel poverty and the policies needed to eradicate it.
- 1.3 NEA is currently is delivering a £26.2 million Health and Innovation Programme (HIP) which will bring affordable warmth to over 6,000 fuel poor and vulnerable households in England, Wales and Scotland. The programme is split into three distinct funds; two programmes are being delivered by NEA – the Technical Innovation Fund and Warm and Healthy Homes Fund<sup>3</sup>; and the third is being delivered by NEA's subsidiary Warm Zones cic. The Technical Innovation Fund specifically aims to facilitate community-level trials of innovative solutions utilising measures not traditionally within the scope of current retrofit or energy efficiency programmes. Grant recipients from this multimillion pound programme are working to install a range of technologies<sup>4</sup> and work with NEA to ensure that robust monitoring and evaluation takes place. NEA is also delivering a programme of community engagement and support in each area.

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<sup>1</sup> Please visit [www.nea.org.uk](http://www.nea.org.uk)

<sup>2</sup> NEA's supporters are made up of energy efficiency installers, manufacturers, utility companies, Escos, gas and electricity network operators as well as other key actors such as local authorities, housing associations, health agencies, community groups and other voluntary sector agencies. All of these groups have a key role to play in deploying EE and can also help to motivate policy makers in different ways.

<sup>3</sup> In Scotland a Healthy Homes Fund is being delivered by Energy Action Scotland (EAS)

<sup>4</sup> To view the Technical Innovation projects visit: <http://www.nea.org.uk/hip/projects/?s=&hipprogramme=technical-innovation&hiparea=&sortBy=>

- 1.4 In March 2016, NEA also agreed a partnership with Smart Energy GB to lead a consortium which also comprises Energy Action Scotland, Charities Aid Foundation and Media Trust to deliver a consumer engagement campaign for the smart meter rollout. The consortium will deliver a new programme entitled 'Smart Energy GB in Communities'. The combined expertise of the consortium will help Smart Energy GB to ensure that everyone in England, Scotland and Wales can realise the benefits of smart meters, including those who are more vulnerable and might face barriers to benefiting from this technology.

## **Background to this response**

- 2.1 In March 2016, NEA and our supporters warmly welcomed the creation of an independent National Infrastructure Commission (NIC). NEA now welcomes the opportunity to respond to the consultation on the methodology and processes that will be used to inform and produce the National Infrastructure Assessment (NIA).
- 2.2 NEA also welcome NIC's stated objectives (to have due regard to sustainable economic growth across all regions of the UK, improving competitiveness and the quality of life for those living in the UK). NEA also warmly welcomes NIC stating they will explore the important role that increasing energy efficiency could potentially play in meeting these objectives. NEA believes that increasing investment in domestic energy efficiency is central to meeting these goals. As a result, NEA's response highlights how a 'step change' in permanent reduction for energy demand across the UK will complement the vision outlined in NIC's Smart Power report and NIC's stated objectives within the consultation.
- 2.3 NEA also illustrates how the NIA will need to operate in order to capture the substantial macro benefits that could be delivered. In particular, NEA highlights how any NIA can explore the value of avoiding the cost associated with the morbidity that cold homes prompts, reduce the cost of investment in new power generation, avoid subsidising existing electricity capacity and reduce the need for (and cost) of network reinforcement<sup>5</sup>. As well as helping to reduce the cost to energy consumers of the transition to a low carbon economy, this approach can also simultaneously improve the quality of life for those living in the UK, particular the most vulnerable.

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<sup>5</sup> The Energy Efficiency Strategy: The Energy Efficiency Opportunity in the UK, DECC, November 2012.

## Responses to the consultation questions

### **Q1. What issues do you think are particularly important to consider as the Commission works to this objective?**

NEA welcome NIC's stated objectives (to have due regard to sustainable economic growth across all regions of the UK, improving competitiveness and the quality of life for those living in the UK). As noted above, NEA also warmly welcomes NIC stating they will explore the important role that increasing energy efficiency could potentially play in meeting these objectives. NEA also believes that existing evidence highlights how increasing investment in domestic energy efficiency is central to meeting these goals, as well as the importance of ensuring all domestic customers have access to meeting their energy needs sufficient for their health and well-being<sup>6</sup> and providing equal life chances<sup>7</sup>. We therefore urge NIC to ensure increasing domestic energy efficiency is fully considered and central to:

- The creation of any expert panels and the running of roundtables in 2016/17;
- Any Calls for Evidence in Autumn 2016 – including "sector evidence reviews", "economic and engineering modelling", and "scenarios"
- The Vision and Priorities paper (up to 2050) to be published in summer 2017

In support of these key asks, NEA notes that the Climate Change Committee (CCC) recently highlighted that the Scottish Government has announced that Scotland's Energy Efficiency Programme will be a "National Infrastructure Priority"<sup>8</sup>. This move has been emulated by the Welsh Government and the 'Infrastructure and Wales Investment Plan'<sup>9</sup> which also aims to drive improvements in the energy performance of buildings and tackle fuel poverty<sup>10</sup>. By investigating these approaches NIC can ensure this approach is reflected across the whole of the UK. In turn, by taking the steps outlined in the bullet points above this could lead to additional capital investment to help complement current national energy initiatives, helping accelerate and adequately resource the UK Government's fuel poverty commitments in England<sup>11</sup> over the next 14 years as well as supporting the other UK nations to meet their own statutory fuel poverty targets<sup>12</sup>. These benefits can also be secured in the UK, alongside stimulating low skilled labour and GDP growth, better air quality, reduced energy imports and carbon reduction etc. These important national macro benefits are explored further below.

NEA would therefore urge NIC (through the NIA or call for evidence) to review the independent analysis of the macro benefits of enhancing domestic energy efficiency within the UK context. Building the Future: *The economic and fiscal impacts of making homes energy efficient* produced by Cambridge Econometrics and Verco, for example noted that an ambitious energy efficiency programme can return £3 to the economy per £1 invested by central government; help create a 26% reduction in imports of natural gas in 2030; domestic consumers could save over £8 billion per annum in total energy bill savings; increase relative GDP by 0.6% by 2030; increase employment by up to 108,000 net jobs and help reduce carbon dioxide emissions by 23.6MtCO<sub>2</sub> per annum by 2030.

<sup>6</sup> An adequate standard of warmth is usually defined as 21°C for the main living area, and 18°C for other occupied rooms.

<sup>7</sup> Existing evidence highlights infants living in fuel-poor households have a 30% greater risk of admission to hospital or primary care facilities. More than 1 in 4 adolescents living in cold housing are at risk of multiple mental health problems. Children living in cold housing are more than twice as likely to suffer from breathing problems, including asthma and bronchitis. Children living in damp and mouldy homes are also almost three times as likely to suffer from coughing, wheezing and respiratory illness. Fuel poverty also impacts on educational attainment, either through increased school absence through illness or children unable to find a quiet, warm place to study in the home.

<sup>8</sup> See CCC, Meeting Carbon Budgets – 2016 Progress Report to Parliament, June 2016. For more information regarding Scotland's Energy Efficiency Programme visit: <http://news.scotland.gov.uk/News/Integrated-approach-to-energy-efficiency-2195.aspx>.

<sup>9</sup> For more information visit: <http://gov.wales/funding/wiipindex/?lang=en>.

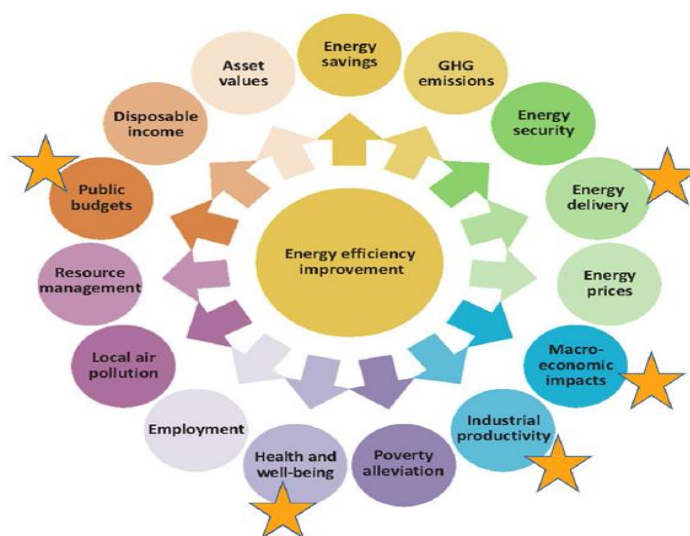
<sup>10</sup> Ibid, CCC, Meeting Carbon Budgets – 2016 Progress Report to Parliament, June 2016.

<sup>11</sup> The Fuel Poverty (England) Regulations 2014 are now law.

<sup>12</sup> The 2010 Fuel Poverty Strategy sets out a target to eradicate fuel poverty in Wales by 2018. The Housing (Scotland) Act 2001 requires the Scottish Government to eradicate fuel poverty in Scotland, as far as is practicable, by November 2016.

As noted in NEA’s initial response to NIC’s call for evidence on infrastructure priorities earlier this year, these benefits have also been illustrated in an international context. The International Energy Agency (IEA)’s report ‘Capturing the multiple benefits of energy efficiency’ which demonstrated the potential for energy efficiency to deliver new jobs and economic growth, reduce pressure on health services, improve energy security and reduce carbon emissions (at the same time as providing a long-term, sustainable solution to unaffordable fuel bills for all consumers). The report also found that large scale energy efficiency programmes can lead to increases in GDP of up to 1.1% per year; can create significant employment (8–27 job years per €1million invested) and can have a benefit to cost ratio of 4:1.

**Table from the International Energy Agency (IEA)’s report ‘Capturing the multiple benefits of energy efficiency’<sup>13</sup>**



NEA is confident that achieving these macro outcomes is a realistic prospect and the UK has historically been highly effective in reducing energy use and galvanising economic activity through this activity. Across the UK, this has helped cut energy use by c. 12% since 2000 saving domestic consumers billions of pounds every year. However, in recent years this progress has slowed dramatically with the introduction in the last Parliament of the Green Deal and the Energy Company Obligation (ECO)<sup>14</sup>. In particular the CCC has recently highlighted progress to improving the energy efficiency of buildings has stalled since 2012 and annual rates of cavity wall and loft insulation in 2013-2015 were 60% down and 90% down respectively on annual rates in 2008-2012. As a result, NEA would urge the NIC to investigate the quantum of the shortfall between the level of ambition presented by statutory targets (carbon budgets, fuel poverty targets and minimum energy performance standards in the private rented sector) with current delivery rates and what can be achieved via exiting policy mechanisms.

In this context, NEA estimates that the UK Government could miss the fuel poverty target in England by 80 years and 1.8 million fuel poor households may still be living in homes below EPC band C by 2030. In addition, some fuel poor households could be waiting over 230 years to receive some insulation measures<sup>15</sup>.

<sup>13</sup> Capturing the multiple benefits of energy efficiency, International Energy Agency, 2014.

<sup>14</sup>CCC, Meeting Carbon Budgets – 2016 Progress Report to Parliament, June 2016

<sup>15</sup> NEA is happy to share our methodology for calculating these figures with the Committee however these figures are based on reported delivery rates using the Government’s own ECO statistics.

In addition, in November 2015 the Comprehensive Spending Review (CSR) stated that there will be deep cuts to the only GB-wide energy efficiency programme from 2017. The overall spending envelope for the Energy Company Obligation (ECO) will be cut to c. £640m per annum which follows a similar previous reduction in 2014 when the budget was reduced by a third; from the original notional spend of c. £1.3bn per annum. Prior to the announcement regarding these likely reductions, NEA had highlighted in both written and oral evidence to the Energy and Climate Change Select Committee that the UK Government's stated objective to ensure that as many fuel poor homes as is reasonably practicable have a minimum energy efficiency rating of Band C by 2030 was at risk of not being met.

Once again, according to the CCC<sup>16</sup> and think tanks such as Policy Exchange<sup>17</sup> current resources are less than half that required to meet the aforementioned fuel poverty targets. It was therefore anticipated that the Government would ring-fence current levels of ECO resources on fuel poverty alleviation. The impact of this latest reduction in overall resources therefore cannot be understated. Whilst the new programme is likely to be more focused on vulnerable fuel poor households living in the least energy efficient homes, it is now likely that fewer households will be helped with energy efficiency measures through levy funded supplier obligations since 2005<sup>18</sup>. Without an intervention, it will also be the first Parliamentary term in the last 30 years that there will be no public funding in England for home energy efficiency in England<sup>19</sup>.

In addition, from April 2016, domestic landlords in England and Wales are not be able to unreasonably refuse requests from their tenants for consent to energy efficiency improvements, where financial support is available from national or local schemes. However, as noted above, financial resources dedicated to energy efficiency improvements have been dramatically reduced or have ceased altogether. The Green Deal Home Improvement Fund (GDHIF) scheme was not a targeted fuel poverty policy but did provide a financial incentive for energy efficiency improvement in the private rented sector, this scheme is now closed. In addition, the Landlords Energy Saving Allowance (LESA), has also now ended. Amid this context, from April 2018, all private rented properties (domestic and non-domestic) should also be brought up to a minimum energy efficiency standard rating of EPC rating "E". Whilst this requirement should demand private landlords invest their own capital in their own properties, there is now a critical concern that this will not occur and compliance with these future regulations will fail entirely or fall on the tenant instead of the landlord who will not currently be supported by any form of public investment.

NEA would also urge NIC to have due regard to the role of other non-departmental public bodies (NDPB) that may already be working to secure these outcomes and can help inform NIC or the NIA to undertake the creation of any expert panels, help host roundtables, develop the ToRs for Calls for Evidence and disseminate and provide feedback on the preliminary findings of the vision and priorities paper. In this context, NEA particularly urges NIC to engage with CCC and Committee on Fuel Poverty<sup>20</sup>.

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<sup>16</sup> Addressing fuel poverty and meeting carbon budgets go hand in hand (CCC), 7 October 2014.

<sup>17</sup> Warmer Homes - Improving fuel poverty and energy efficiency policy in the UK, 2015, Policy Exchange.

<sup>18</sup> The Energy Efficiency Commitment (EEC), replaced the Energy Efficiency Standards of Performance (EESoP) in 2002, it became the main programme to increase energy efficiency in GB across all households. EEC was replaced by a new obligation on energy suppliers to reduce CO2 emissions in the domestic sector, the Carbon Emissions Reduction Target (CERT) in 2005.

<sup>19</sup> The 2010 Comprehensive Spending Review announced the phasing out of Warm Front in England by 2013. This effectively ends over 30 years of public funding for energy efficiency grants for low-income households in England.

<sup>20</sup> For further info visit: <https://www.gov.uk/government/organisations/committee-on-fuel-poverty>

## **Q2. Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

The stated principles are sound, however, 'taking a whole system approach' requires explicitly considering counterfactual costs of inaction and this should be stipulated and examined more clearly. In particular, NEA highlights that cold homes cost health services £3.6 million per day and in the past four years alone, over £5 billion of tax payers' money may have been wasted treating the direct impacts of morbidity associated with cold homes<sup>21</sup>. At present, the large amount owed by many of householders to their energy providers also curtails economic activity within poorer communities. Both of these impacts should be accounted for within the NIA as they enhance any cost benefit ratios. In response to question 9, NEA also highlights how domestic energy efficiency and permanent demand reduction contributes to peak reduction and this can mitigate or defer the costs of network reinforcement. This evidence should be very valuable to the NIC and should be explored further in the context of developing a comprehensive NIA.

As noted above, NEA would also urge the NIC to investigate the quantum of the shortfall between the level of ambition presented by current statutory targets which require capital investment in infrastructure (carbon budgets, fuel poverty targets and minimum energy performance standards in the private rented sector) with current delivery rates and what can be achieved via exiting policy mechanisms (further details are also provided above).

Finally, NEA highlights that NIC has a responsibility to balance the interests of taxpayers but equally ensure there is an equitable distribution of benefits to different types of end user of different forms of infrastructure investment that may be prioritised within the NIA. At present, HM Treasury receives very significant sums through carbon taxes and VAT on domestic energy bills. Over the duration of this UK Parliament alone domestic energy consumers will contribute well over £14 billion to the Treasury<sup>22</sup> and £30 billion over 10 years<sup>23</sup>. Just before the last General Election the Treasury raised an additional £500 million pounds creating higher energy bills<sup>24</sup> and dramatically impacting low income consumers' ability to heat and power their homes and their life chances<sup>25</sup>. NEA notes that thirteen other EU governments<sup>26</sup> channel many of these resources back to consumers, future-proofing their economies and helping improving national competitiveness by reducing energy demand. Currently no public money is spent on improving domestic energy efficiency levels in England.

## **Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

As noted through-out this response, NEA warmly welcomes the NIA stating they will explore the important role that increasing energy efficiency could potentially play. We underline the importance of explicitly considering energy demand as a priority as this can dramatically alter the need for investment in new power generation, subsidising existing electricity capacity or carrying out network reinforcement costs and offer more cost effective solutions to meeting future energy needs for the nation with lower emissions.

## **Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

<sup>21</sup> NEA has extrapolated an Age UK estimate that cold homes cost the NHS in England £1.36 billion per year in hospital and primary care (2012). See: <http://www.ageuk.org.uk/latest-news/archive/cold-homes-cost-nhs-1-point-36-billion/>.

<sup>22</sup> We estimate that £11.82bn will be collected in England, £1.33bn in Scotland, £690m in Wales and £190m in Northern Ireland).

<sup>23</sup> This analysis of the revenues the Treasury receives from domestic consumers is based on Government sources to estimate how much expected revenue they will receive from a) the European Union Emission Trading Scheme (EU ETS), b) the Carbon Price Floor (CPF) and c) VAT on an average electricity bill. We have then combined this with expected VAT revenues from domestic gas bills. These estimates are all based on the Government's own assumptions regarding energy consumption and this includes an unfounded assumption that EU products policy will increase the domestic energy efficiency of electric appliances substantially. However, what the analysis does show, regardless of the impact of various assumptions, is that both carbon revenue and VAT receipts help the Treasury yield large amount of money, which is collected regressively and without an intervention will further strain the finances of particularly low income households.

<sup>24</sup> This figure is the estimated income from the Carbon Price Floor 2015-16 compared to 2014-15. Source: Carbon Price Floor, 14 May 2014, House of Commons Library, p 10.

<sup>25</sup> Ibid; see footnote 7.

<sup>26</sup> According to a recent report: The economic case for recycling carbon tax revenues into energy efficiency, Prashant Vaze and Louise Sunderland, February 2014: 13 countries in the EU have pledged to return part of the proceeds from the EU-ETS auctions to climate and energy efficiency programmes.



As above, NEA welcome the NIA commitment to explore the important role that increasing energy efficiency can potentially play as an important form of infrastructure in the domestic sector. As part of this process, NEA's response to question 9 highlights how domestic energy efficiency and permanent demand reduction contributes to peak reduction and this can mitigate or defer the costs of network reinforcement. This will complement the vision for greater demand flexibility outlined in NIC's Smart Power report and should be explored further in the context of developing a comprehensive NIA which reflects the true investment requirements across the energy sector.

In addition, NIC's Smart Power report notes the importance of smart meters and their roll-out in Great Britain. NEA have completed a number of research projects into smart meters, including *Smart for All (Phases 1 and 2)*<sup>27</sup>, which looked at consumer vulnerability during the experience of smart meter installation, and *Developing An Extra Help Scheme for Vulnerable Smart Meter Customers*<sup>28</sup>, which interviewed stakeholders to assess potential models for delivering additional assistance during the roll-out. As noted in the introduction, more recently, NEA has become a consortium partner for the Smart Energy GB in Communities programme. This programme forms part of Smart Energy GB's consumer engagement campaign and will be dedicated to ensuring that no one is left behind in the roll-out of smart meters. Through this programme NEA will be providing a range of advice and support to help engage a network of partners (trusted intermediaries) and ensure a wide outreach to support consumers throughout the smart meter roll out and their smart meter journey.

NEA also emphasises a careful and phased introduction of time-of-use pricing is critical to ensure tariffs do not impact unfairly on vulnerable consumers. Any requirement for consumers to adopt time-of-use pricing could penalise low income households that have inelastic energy usage and may need to maintain high demand at peak periods. To understand the impact of demand side response we highlight the need for trials. Here, NEA draws the NIC's attention to two relevant projects. In 2011, NEA worked with CE Electric UK and its partners, British Gas, Durham University and EA Technology. The project, dubbed "The Customer-Led Network Revolution" (CLNR), was funded as part of the first competition for the Low Carbon Network Fund (LCNF). The first element of the project focused around understanding current, emerging and possible future customer (load and generation) characteristics. Constructing a detailed understanding of customer consumption and generation profiles across a representative cross section of customer and demographic groups. The next phase focused on assessing to what extent customers are flexible in their load and generation, and what is the cost of this flexibility. This included testing different customer perceptions, such as static and dynamic time of use tariffs and direct control tariffs, for customers with different Low Carbon Technologies<sup>29</sup>.

The second project is energywise<sup>30</sup>. Energywise is the first project to investigate how distribution network operators (DNOs), in collaboration with a Supplier, charity groups and local community actors, can engage with vulnerable customers in order to facilitate energy efficiency and provide networks services, such as Demand Side Response (DSR). The project, which also received funding under Ofgem's 2013 LCNF competition, is led by UK Power Networks with NEA as a consortium partner. University College London is the lead academic research institution for the study and British Gas is the energy supplier providing the smart metering technology.

Working with over 300 social housing tenants in the London Borough of Tower Hamlets, and targeting those tenants who are in or near fuel poverty, the project explores opportunities for

<sup>27</sup> NEA for DECC and Consumer Focus (2012). Smart for All: Understanding Consumer Vulnerability During the Experience of Smart Meter Installation; NEA for DECC (2013). Smart for All: Consumer Experiences of Smart Meters. Report from Phase 2 of Research. Both reports available at: <http://www.nea.org.uk/policy-and-research/publications>.

<sup>28</sup> NEA for Citizens Advice (2014). Developing an Extra Help Scheme for Vulnerable Smart Meters Customers. Available at: <http://www.nea.org.uk/policy-and-research/publications/2014/extra-help-scheme>.

<sup>29</sup> For all final reports and further information on the CLNR project visit the project website at <http://www.networkrevolution.co.uk/>.

<sup>30</sup> For further information visit <http://innovation.ukpowernetworks.co.uk/innovation/en/energywise/>.

this customer group to participate in energy efficiency and demand side response campaigns. This involves, in the first instance, the provision of a smart meter, energy saving devices (eco kettle, LED lights, standby shutdown) and energy efficiency advice, and secondly, using a time-of-use tariff. Results and learnings from the energy efficiency trial will become available by the end of 2016 and will provide important insights for the smart meter roll-out. Specifically, opportunities for vulnerable customers to benefit from smart metering solutions to better manage their energy and save money on their bills. The study will also help electricity network companies understand how demand side response and energy efficiency among this customer group may help manage peak demand to defer or avoid network reinforcement.

***Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important? Q6. Do you agree that the NIA should focus on these cross-cutting issues? & Q7 Are there any other cross-cutting issues that you think are particularly important?***

NEA believes the cross-cutting themes identified within the consultation are worthy of consideration. In addition, NEA suggests that NIC should also investigate the industry capacity and cross-cutting skills that may be required in order to deliver our future infrastructure needs in aggregate. This will identify any 'pinch point' professions or skills that may be in high demand. NEA would also highlight the need to investigate the 'diversity' in the types of organisations that can help deliver infrastructure solutions. For example, a national infrastructure energy efficiency programme could be delivered by a range of organisations (utility companies, local authorities, housing associations, gas and electricity network operators, health agencies, community groups and other voluntary sector agencies etc). All of these groups could be used to support the successful delivery of an energy efficiency infrastructure programme. In contrast, other infrastructure projects may be heavily reliant on one type of profession or skill type and just applicable to a small number of locations across the UK.

***Q8. Do you agree with this methodological approach to determine the needs and priorities?***

Yes. Existing data on energy efficiency delivery is readily available via the National Energy Efficiency Database (NEED) and in the respective national housing condition surveys. This will allow NIC to be able to determine an accurate infrastructure baseline. In terms of other analysis, the benefits, costs and scale of an energy efficiency infrastructure programme can be modelled effectively (see response to question 9 below). NEA has also attached an annex which summarises current fuel poverty levels in England based on the government's own analysis<sup>31</sup>. Finally in terms of conclusions, these can also be tested in public and with key stakeholders across industry, academics, local and central government and non-governmental organisations. Where this may require any support to perform this task, NEA would be happy to help NIC engage these key stakeholders.

***Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?***

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<sup>31</sup> These statistics are taken from the Annual Fuel Poverty Statistics Report, 2016, Department of Energy and Climate Change (DECC), June 2016.

Fuel poverty is the consequence of a combination of factors including the cost of fuel, the level of household income, the physical quality and characteristics of the dwelling and the degree of vulnerability of the occupants of a dwelling. This combination of factors means that fuel poverty can affect households regardless of their geographical location or whether they are urban or rural dwellers. Since 2011, following Professor Hills' recommendations, the Low Income High Cost (LIHC) indicator definition of fuel poverty is now used in England. This states that an individual is considered fuel poor where they have required fuel costs that are above average (the national median level) and were they to spend that amount; they would be left with a residual income below the official poverty line. The low income high cost measure consists of two parts, the number of households that have both low incomes and high fuel costs and the depth of fuel poverty amongst these households.

Prior to the introduction of the Low Income High Costs indicator in England, fuel poverty was measured under the 10% indicator across the whole of the UK. The 10% indicator continues to be used in Scotland, Wales and Northern Ireland. Under this indicator, a household is considered to be fuel poor if they were required to spend more than 10% of their income on fuel to maintain an adequate standard of warmth. An adequate standard of warmth is usually defined as 21°C for the main living area, and 18°C for other occupied rooms. In July 2013, DECC produced a report entitled "Fuel Poverty: a Framework for Future Action – Analytical Annex". This document sets out the details of the analysis that is undertaken to support the development of the strategic framework for fuel poverty. Some of the approaches used may help the development of the upcoming NIA.

The report notes that predicting the changes in energy prices is notoriously complex and NEA is reliant on DECC's most recent projected changes in the price of gas, electricity and 'non-metered' fuels. Projections of metered fuels (gas and electricity) are taken from DECC's publication: 'Estimated impacts of energy and climate change policies on energy prices and bills', while changes in all other fuel prices are taken from DECC's published fossil fuel price series. The total percentage changes in all energy prices between 2010 – 2022 and 2010 – 2027 are outlined in the aforementioned publications. Prices are projected to increase steadily in the medium term – driven primarily by a combination of fossil fuel prices, transmission and distribution costs but also due to the costs associated with Government policies. The price of other fuels (i.e. coal, heating oil & LPG) is assumed to track fossil fuel prices. The application of observed price increases from 2009 to 2011 is consistent with the official DECC Fuel Poverty Methodology, in which differences in regional and payment type costs (e.g. direct debit vs. pre-payment meters) are recognised. When projecting from 2011 to 2027, year-on-year percentage increases in the price of each fuel are only available at the national average level. DECC therefore implicitly assume that while prices increase overall, regional differences in prices and the relative costs of each payment method (e.g. direct debit, standard credit or pre-payment meter) remain fixed at the level set out in the base data.

Projections of income are estimated by applying percentage changes in disposable income to the level of income in the base year, subtracting housing costs (to convert it to an 'After Housing Cost' value) and then equivalising to take account of the difference in household sizes. Housing costs are netted from projections of real disposable income. Housing costs are rent and mortgage payments, which are stated in the base dataset and are assumed to remain constant in real terms over time (thus they are linked to the Consumer Price Index (CPI)). Projecting disposable income involves combining information on the different types of household income, such as earnings, benefits and savings, and applying the relevant rates of change to them. These rates of changes are applied to the different components of income (from the EHS 2010 base data set) and then converted to real values (i.e. net of inflation).

In terms of modelling policy impacts on fuel poverty, there are two parts to the projection model that DECC developed. The first part is a 'micro-simulation' model, which is used to allocate measures to households (based on the policy assumptions highlighted above). The

second part of the model is excel-based. This model calculates each household's energy consumption in the year under consideration (based on their initial energy consumption, reported in EHS 2010 and the 'energy savings factor' – that is, the change in energy requirement that results from the measures that are delivered) and combines this with the projected inputs of energy prices and income to calculate fuel poverty.

The micro-simulation model (which is run in SAP) is used to allocate energy efficiency and heating measures, bill rebates and renewable technologies to households in the English Housing Survey (EHS) dataset. The policy inputs specify the number and type of measures that are installed through each policy as well as the types of households that can receive measures. There are also physical constraints to the up-take of measures – e.g., cavity wall insulation can only be installed in a dwelling with an unfilled cavity. Each household that is allocated a measure realises an associated reduction in their kilowatt hour (kWh) energy consumption. The amount of energy saved depends on the type of measure installed and the property type in which it is installed. The property characteristics which determine the energy saving are: build type (e.g. end terrace, flat, etc.), depth of roof insulation, dwelling age, boiler age, water heating source, main heating fuel and main water heating fuel. These energy saving factors are provided by the Building Research Establishment (BRE) and are based on the BREDEM model. There are different energy saving factors for different fuel types and fuel use. The fuels included are gas, electric, oil, solid fuel, biomass and the uses are heating, water, cooking and lighting. The savings are broken down in this way because some measures only impact on certain energy types, some increase one element of a household's energy bill and reduce another and others necessitate a complete change of fuel. For example:

- Where a gas centrally-heated home is allocated cavity wall insulation, it will see a reduction in kWh gas consumption for gas space heating but no reduction in the energy required for water, cooking and lighting;
- The installation of a biomass boiler means household gas consumption for heating is reduced to zero, but consumption for heating from biomass increases.

The impact of policies also leads to an estimated change in a household's SAP value. The impact policies have on SAP is also provided by BRE and is, again, based on the BREDEM model. For each projection scenario, the micro-simulation model is run 100 times. A representative iteration is then chosen by looking at the iteration that gives an 'average' saving impact or distribution. This representative run is then used as the input for the excel-based model. The original energy consumption for each household (by fuel type and use) from the EHS 2010 is then augmented using the energy saving factors (based on the outputs from the micro-simulation model) to create a new energy consumption value (also by fuel type and use). Current prices are applied to the new consumption to create a new energy bill.

The energy bill and income for each household is then up-rated to the target year (i.e. the year that we are projecting to) using the methodology described above. Finally, household incomes are adjusted to reflect any additional income from feed in tariffs and/or RHI tariff payments, and the final energy bill is calculated by reflecting the impact of Warm Home Discount rebates. A new energy threshold and median income can then be calculated so that it is possible to calculate the level of fuel poverty in the target year. Household SAP ratings after policies have been introduced can then also be used to estimate what the average SAP of those people in fuel poverty are or how many people in fuel poverty have a SAP score of below a certain threshold.

The Government also determines cost-effectiveness using Marginal Abatement Cost Curves (MACC) and this ranks interventions based on their cost-effectiveness for abating greenhouse gas emissions. The MACC allows decision makers to assess how much progress is already being made and subsequently consider what it would cost (or save) to make more (or less)

progress from that point. The same approach to constructing MACCs for climate change or overall energy efficiency policy can also be applied to fuel poverty and DECC has established FP-MACCs to assess, at different points in time, what the most cost-effective interventions are and how much progress these interventions could potentially make towards fuel poverty objectives<sup>32</sup>.

In addition, the Centre for Sustainable Energy (CSE) has developed an analytical model - DIMPSA ('Distributional Impacts Model for Policy Scenario Analysis') – which has been used under license by the Department of Energy and Climate Change for the Government's own assessments of the distributional impacts of policies. DIMPSA enables the assessment of the impact of both the costs and the benefits of policies for domestic energy consumers. Underlying this model is a comprehensive dataset based on the socio-demographically representative sample of UK households surveyed in the ONS Living Costs and Food Survey (LCF). Data from six LCF surveys has been combined (financial years 2004/5 to 2009), generating a sample size of over 36,000 cases. CSE have also helped the Climate Change Committee model the implications of the proposed fuel poverty targets poverty to 2030 of meeting the fourth carbon budget using the National Household Model. Building on this work and in light of the Government's Fuel Poverty Strategy consultation, the CCC also commissioned CSE to undertake some additional modelling and analysis using the NHM to explore the costs and benefits of meeting the fuel poverty targets<sup>33</sup>.

Finally, in 2015, NEA and Agility ECO produced a report investigating the possibility to divert budgets currently allocated to load-related network upgrades into local schemes that improve energy efficiency. In the report this concept is explained fully and is referred to as Alternative Investment Strategy (AIS). Specifically, the report looks to analyse the "Size of the Prize" on Northern Power Grid's network, the economic feasibility of investment in local energy efficiency and how this compares to conventional network reinforcement and practical feasibility<sup>34</sup>. The table below highlights the cost effectiveness of a variety of AIS investment types. These have been calculated in terms of cost per household, for each kW of demand reduction at peak time<sup>35</sup>.

**NEA table highlighting impact of domestic efficiency measures on peak demand which can be used to mitigate or defer the need for conventional network reinforcement**

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<sup>32</sup> It is important to state that all the FP-MACC analysis focuses on the construction of technical MACCs. This means that our estimates of the potential for interventions are made on the basis of technical feasibility and do not account for the willingness of households to receive interventions or the delivery mechanism for that intervention. This means that all interventions are considered independently of any current policy approach to delivery. This ensures that the assessment of cost-effectiveness is not in any way biased by the strengths or weaknesses of current delivery approaches for certain interventions.

<sup>33</sup> Meeting the proposed fuel poverty targets, Modelling the implications of the proposed fuel poverty targets using the National Household Model, Report for the Committee on Climate Change, November 2014.

<sup>34</sup> To read the report visit: <http://www.northernpowergrid.com/downloads/1704>.

<sup>35</sup> Our analysis only covers domestic AIS, and there may be non-domestic AIS which could be suitable.

Category	Energy Efficiency Measure	Cost per household (£)	Peak reduction per household (kW)	Cost Effectiveness (£/kW)	Confidence Level (%)	Adjusted Cost Effectiveness (£/kW)	Approx Annual Saving for resident (£)
Heating Electrically Heated Homes	Electricity to gas conversion (old storage to gas or biomass)	£3,500	2	£1,750	95	£1,838	£445
	Upgrading electric heating (old storage to new generation storage)	£3,250	1.3	£2,500	90	£2,750	£120
	Electric heating to community heating (in block)	£10,000	1.3	£7,692	90	£8,462	£400
	MicroCHP (Baxi EcoGen)	£6,000	1	£6,000	95	£6,300	N/K
	MicroCHP (BLUEGen)	£18,000	2	£9,000	95	£9,450	£2,000
Heating (gas heated homes)	Fit timer (if storage tank)	£60	1	£60	50	£90	£0
Lighting	Replace indicative 3 X 60w incandescent with 3 X 15w compact fluorescent	£12	0.135	£89	95	£93	£20
	Replace indicative 3 X 60w incandescent with 10w LED	£27	0.15	£180	95	£189	£22
	Replace indicative 3 X 50w GU10 to 6w LED direct lamp replacement	£18	0.132	£136	95	£143	£20
	Hybrid - 3 X 60w incandescent to CFLs & 5 X 35w GU10 halogen tungsten filament lamps 6w LED	£34	0.28	£121	95	£128	£35
	District wide street lighting upgrade	£355	0.037	£15,000	100	£15,000	N/A
Building Improvements - Electric Heating	Cavity wall insulation	£415	0.4	£1,038	75	£1,297	£145
	Loft insulation (None - 270mm)	£170	0.4	£425	75	£531	£150
	Solid wall insulation	£10,000	0.8	£12,500	75	£15,625	£270
	Community ECO insulation scheme (High Rise)	£10,000	1.15	£8,696	50	£13,043	£400
Appliance	Voltage Power Optimisation (VPO)	£300	0.025	£12,000	95	£12,600	£23
	Inefficient appliance swapage scheme	£165	0.041	£4,024	75	£5,030	£50
Behaviour	Dedicated behaviour change programme and support	£400	0.16	£2,500	45	£3,875	£41
Hybrid (Gas Heated)	External wall insulation with PV and behaviour change programme	£12,000	1	£12,000	75	£15,000	£400

The table includes an adjustment for "confidence level", which reflects the certainty placed in the various energy efficiency measures to achieve the peak load saving, in the context of a diverse population of customers. The number provided is based on industry research<sup>36</sup>, and calculated by considering average engagement levels of households in a population<sup>37</sup>, their receptiveness to a change of behaviour<sup>38</sup>, the ability and desire to use technology to best effect and any rebound effect<sup>39</sup> likely in that population<sup>40</sup>. This research highlights the variables which impact the ability of permanent demand reduction to contribute to peak reduction. This evidence (and the concept of AIS) can be used by NIC to establish a macro view of this opportunity in the context of developing a comprehensive NIA.

In addition, it is possible to identify these opportunities in a given part of a particular distribution area<sup>41</sup>. For example, NIC could:

<sup>36</sup> NEA Report "Technical Feasibility Study for Electricity NW Ltd into Electricity demand Reduction in Heaton Norris and Heaton Mersey areas of Stockport" May 2013.

<sup>37</sup> City-Scale Domestic retrofit Schemes: Learning from the early adopters: <http://www.tandfonline.com/doi/abs/10.1080/09640568.2014.965299#.VNnL1vmsU9Y>.

<sup>38</sup> What Works in Changing Energy Behaviours in the Home? - A Rapid Evidence Assessment - DECC Final Report <https://www.gov.uk/government/publications/what-works-in-changing-energy-using-behaviours-in-the-home-a-rapid-evidence-assessment>

<sup>39</sup> BRE Energy Follow Up Survey 2013 <https://www.gov.uk/government/statistics/energy-follow-up-survey-efus-2011>.

<sup>40</sup> The service level standard that a DNO is required to guarantee leaves little space for speculation on the ability of a solution to a network problem to deliver. Current traditional methods of asset upgrades deliver a certainty nearing 100%, because the extra capacity created is a known factor, and this is an aspect on which AIS will have to compete against. In this report, we accept the judgement of the NEA experts as a valid reference point. Further research, including that already undertaken by other DNOs (for example the SAVE project), will help explore this point.

<sup>41</sup> Strategy decision for the RII0-ED1 electricity distribution price control, Ofgem, 04 March 2013.

- I. Identify ahead of time load related 'reinforcement hotspots' within a geographic territory
- II. Obtain a forecast from the DNO of the business as usual reinforcement costs
- III. NIC could then establish an alternative cost-benefit analysis indicating which 'other actions' could be taken to either defer or mitigate the reinforcement need in an area entirely (through permanent electricity demand reductions, not demand shifting).
- IV. This would require working with supportive agents to simultaneously assess the scale of electricity demand reduction potential within that area of the network and aggregate this potential
- V. It would then be possible to grade the potential aggregation of electrical demand reductions
- VI. NIC could then evaluate if the AIS met the 'Golden Rule' test set out below

In order for these alternative energy efficiency projects to occur, first they must be located in similar locations to those places where the DNO is planning to invest in network reinforcement alongside areas with relatively high population density, high deprivation and high penetration of electrically heated housing. This means the opportunity to invest in these projects will not be evident in every instance and this 'convergence' may only occur in a smaller number of planned reinforcements a DNO's may be planning on their network.

Another critical challenge for these alternative investments (and the key for delivering value to all energy customers, not just the direct beneficiaries of these measures) is that the contribution by the DNO to the cost of these projects would always have to be lower than the cost of the business as usual network reinforcement (the so-called 'Golden Rule' referenced above). Where the 'Golden Rule' criteria is met this would ensure the investment in energy efficiency is more cost effective than reinforcement; benefiting all energy consumers on that network whilst also providing a direct social outcome for the recipients of the energy saving measures. In addition, and noted in our initial response to the call for evidence, the *Low Carbon Network Fund (LCNF)* also provides results and information collected from various projects that have trailed some DNO-led projects aiming at reducing load as an alternative to network reinforcement. These projects (and others) have given network companies a better understanding of the opportunities and challenges of pursuing this model. A brief summary of these projects was provided in our previous response.

***Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?***

As noted throughout this response, NEA would urge the NIA to have due regard to impacts on fuel poverty. Whilst NEA believes it would be practicable for the NIC to conduct their own assessments (using the approaches outlined above), NEA would also urge NIC to work with the expertise of other non-departmental public bodies (NDPB) that may be able to help. As noted above, in this context, NEA particularly urges NIC to engage with CCC and Committee on Fuel Poverty.

***Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?***

As noted throughout this response, NEA would urge the NIA to set out a balanced portfolio which is predicated on a real shift in permanent reduction for total energy demand across the

UK. This will complement the vision outlined in NIC's Smart Power report and NIC's stated objectives within the consultation. NEA also highlights that any portfolio within the NIA must place a high value on avoiding any unnecessary investment in new power generation, avoid overly subsidising existing electricity capacity and reduce the overall need for (and cost) of network reinforcement<sup>42</sup>. As well as helping reduce the cost to energy consumers of the transition to the low carbon economy, this approach can also improve the quality of life for those living in the UK, particular the most vulnerable. NEA would stress that these outcomes will only be fully realised by a blended investment in energy efficiency. As noted above, currently the only form of support for this activity in England is from a levy funded obligation on energy suppliers.

***Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?***

As above, NIC need to have due regard and consult closely with the CCC and Committee on Fuel Poverty and the Department for Business, Energy and Industrial Strategy (BEIS) Methodology Working Group.

***Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?***

NEA would welcome working with the NIC to engage our stakeholders in the development of:

- The creation of any expert panels and the running of roundtables
- Reaching the right audiences for any Calls for Evidence
- Support in reviewing the vision and priorities paper

NEA's supporters are made up of energy efficiency installers, manufacturers, utility companies, local authorities, housing associations, gas and electricity network operators, health agencies, community groups and other voluntary sector agencies and academic institutions. As the principal organisation focused on fuel poverty in England and Wales, NEA can particularly support dissemination through the following:

- Dissemination of project findings to a wide range of government, energy company and not-for-profit stakeholders through a session on the project at the NEA's annual conference which is the biggest national event focused on fuel poverty issues.
- Dissemination to regional practitioners particularly in local authorities through our regional fuel poverty forums, which are held three times a year throughout England and Wales. These are aimed at strategic policy makers and front line service providers.
- Dissemination of findings to national policy makers, analysts and researchers through our broad range of networks and working groups including the All Party Parliamentary Group which NEA facilitates.

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<sup>42</sup> For further info on the scale of this opportunity see the Energy Efficiency Strategy: The Energy Efficiency Opportunity in the UK, DECC, November 2012.



**Annex 1: Fuel poverty statistics: Summary and comparison 2012-14 (England only)**  
(Source: DECC, Fuel Poverty Statistics 2013, 2014 – published in 2015 and 2016 respectively.)

**Table 1 - Fuel poverty headline figures**

Fuel poverty status	Year	Number of households (000's)	Proportion of households fuel poor (%)	Average fuel poverty gap (£): Real Terms	Aggregate fuel poverty gap (£m): Real Terms
Fuel poor	2012	2360	10.8	385	909
	2013	2347	10.4	374 (379)	877 (890)
	2014	2379	10.6	371	882
Not fuel poor	2012	19576	89.2		
	2013	20236	89.6		
	2014	20163	89.4		
<b>All households</b>	<b>2012</b>	21935	100.0		
	<b>2013</b>	22583	100.0		
	<b>2014</b>	22542	100.0		

Note: Data for 2012 and 2013 are taken from data published in 2015. Data for 2014 is taken from the most recent statistics published in June 2016. Figs in parentheses are taken from 2014 trend data published in 2016. Data is otherwise taken from tables as first published.

- Between 2013 and 2014 the proportion of fuel-poor households rose from 10.4% to 10.6%, an increase of 0.2% points.
- The number of fuel-poor households rose from 2,347,000 in 2013 to 2,379,000 in 2014 – a rise in numbers of 32,000 (1.4%) negating the gains made between 2012 and 2013.
- Between 2013 and 2014 the average fuel poverty gap (£) fell from £374 to £371, a decrease of £3. The most recent (2016) trend table (2003-14) shows a fall in the average gap but from £379 to £371 – a fall of £8 rather than £3. The discrepancy is unexplained.

- Between 2013 and 2014 the aggregate fuel poverty gap (£m) rose from £877 million to £882 million, an increase of £5 million. However, the most recent (2016) trend table (2003-14) shows the aggregate gap having fallen rather than increased, from £890 to £882. The discrepancy is unexplained.
- DECC surmise that rising fuel poverty but a falling fuel poverty gap could be attributed to fuel-poor households having seen a lower than average rise in disposable incomes (pushing them into FP). While fuel prices have increased more than energy efficiency gains, the rise was smaller for fuel-poor households (reduced gap).

**Table 2 - Fuel poverty by SAP bands**

SAP	Year	Proportion of households within group (%)		Number of households (000's)		Total number of households (000's)	Proportion of households fuel poor (%)	Aggregate fuel poverty gap (£m): Real Terms	Average fuel poverty gap (£): Real Terms
		Not fuel poor	Fuel poor	Not fuel poor	Fuel poor				
E	2012	80	20	4010	1015	5025	43.0	371	365
	2013	80	20	3505	875	4381	37.3	335	383
	2014	80	20	3078	758	3836	31.9	324	427
F/G	2012	77	23	1140	348	1488	14.7	323	930
	2013	77	23	1040	313	1352	13.3	292	933
	2014	76	24	896	287	1182	12.1	296	1031

**Households in E**

- Between 2013 and 2014 the number households which were fuel poor with an SAP rating of 'E' fell from 875,000 to 758,000, a decrease of 117,000 households. This represents a fall in numbers of 13.4% since 2013, the fall since 2012 is 25.3%.
- A fifth of households that reside in homes rated as E are fuel poor and they make up almost a third (31.9%) of all fuel-poor households in 2014, down from more than two-fifths in 2012.

### **Households in F/G**

- Between 2013 and 2014 the number of households which were fuel poor with an EPC rating of 'F' or 'G' fell from 313,000 to 287,000, a decrease of 26,000 households. This represents a fall in numbers of 8.3% since 2013, the fall since 2012 is 17.5%.
- While the number of fuel-poor households has fallen, the % of all households with rating F/G that are fuel poor has increased from 23% to 24% - this is likely to be due to the lower number of all households with an F/G band rating.
- Where 14.7% of fuel-poor households lived in a home rated F/G in 2012, this has now fallen to 12.1%.
- In 2014, 44% of the fuel poor still reside in a home rated E, F or G.

**Table 3 - Fuel poverty in households without a gas grid connection**

Gas grid connection	Year	Proportion of households within group (%)		Number of households (000's)		Total number of households (000's)	Proportion of households fuel poor (%)
		Not fuel poor	Fuel poor	Not fuel poor	Fuel poor		
No	2012	84	16	2,412	456	2,868	19.3
	2013	85	15	2,565	437	3,002	18.6
	2014	85	15	2,493	441	2,934	18.5

### **Households without a gas connection**

- Between 2013 and 2014 the number of households without a gas grid connection which were in fuel poverty rose slightly from 437,000 to 441,000, an increase of 4,000 households. The proportion of households without a connection that are fuel poor remained static at 15% while the proportion of all fuel-poor households that reside in a dwelling without a gas connection fell very slightly from 18.6% in 2013 to 18.5% in 2014.
- Both the proportion and number of households living in fuel poverty that reside in a home without a gas connection fell between 2012 and 2014.
- It is also noteworthy that the total number of all dwellings in England without a gas connection fell slightly between 2013 and 2014 but is up slightly on 2012.

**Table 4- Fuel poverty by tenure**

Tenure	Year	Proportion of households within group (%)		Number of households (000's)		Total number of households (000's)	Proportion of households fuel poor (%)
		Not fuel poor	Fuel poor	Not fuel poor	Fuel poor		
LA	2012	89	11	1,535	193	1,728	8.2
	2013	88	12	1,472	193	1,665	8.2
	2014	87	13	1,436	213	1,649	8.9
Owner-occupied	2012	92	8	13,128	1,163	14,291	49.3
	2013	92	8	13,219	1,104	14,323	47.0
	2014	93	7	13,256	1,072	14,328	45.1
Private rented	2012	80	20	3,144	785	3,929	33.3
	2013	81	19	3,520	816	4,336	34.8
	2014	80	20	3,437	852	4,289	35.8
Housing association	2012	89	11	1,769	218	1,987	9.3
	2013	90	10	2,025	234	2,259	10.0
	2014	89	11	2,034	242	2,275	10.2
All households	<b>2012</b>	89	11	19,576	2,360	21,935	100.0
	<b>2013</b>	90	10	20,236	2,347	22,583	100.0
	<b>2014</b>	89	11	20,163	2,379	22,542	100.0

- A fuel-poor household is much more likely to reside in the private sector – either renting or as an owner-occupier. Together they made up over four-fifths (80.9%) of all fuel-poor households in 2014.
- While there has been a fall between 2012 and 2014 in the proportion of all fuel-poor households that are owner-occupiers (49.3%) to 45.1%), there has been an increase across all other tenure groups over the same period – most notably in the private rented sector (33.3% to 35.8%).



- While it remains true in 2014, as in 2013 and 2012, that those living in the private rented sector are most likely to be fuel poor (20%) there has been a very small decrease in the proportion of owner-occupiers that are fuel poor in 2014 (7%) compared to 2012 (8%), but a 2% point increase over the same period in the local authority sector (from 11% to 13%).

### **Local authority**

- Between 2013 and 2014 the number of local authority households in fuel poverty rose from 193,000 to 213,000, an increase of 20,000 – an increase in numbers of 10.4%.
- In 2014, 13% of households with local authority tenure were fuel poor – this was 8.9% of all fuel-poor households.

### **Owner-occupied**

- Between 2013 and 2014, the number of owner-occupied households in fuel poverty fell from 1,104,000 to 1,072,000, a decrease of 32,000 – a fall in numbers of 2.9%.
- In 2014, 7% of households with owner-occupier tenure were fuel poor – this was 45.1% of all fuel-poor households.

### **Private rented**

- Between 2013 and 2014, the number of private rented households in fuel poverty rose from 816,000 to 852,000, an increase of 36,000 – an increase in numbers of 4.4%.
- In 2014, 20% of households with private rented tenure were fuel poor – this was 35.8% of all fuel-poor households.

### **Housing association**

- Between 2013 and 2014, the number of housing association households in fuel poverty rose from 234,000 to 242,000, an increase of 8,000 – an increase in numbers of 3.4%.
- In 2014, 11% of households with social rented tenure were fuel poor – this was 10.2% of all fuel-poor households.

**Table 5 - Fuel poverty by gas payment method**

Method of gas payment	Year	Proportion of households within group (%)		Number of households (000's)		Total number of households (000's)	Proportion of households fuel poor (%)
		Not fuel poor	Fuel poor	Not fuel poor	Fuel poor		
Direct debit	2012	93	7	12,542	942	13,484	39.9
	2013	94	6	12,926	849	13,775	36.2
	2014	93	7	13,084	940	14,024	39.5
Standard credit	2012	85	15	2,624	452	3,075	19.1
	2013	84	16	2,685	503	3,187	21.4
	2014	85	15	2,488	448	2,936	18.8
Pre-payment	2012	80	20	2,103	541	2,643	22.9
	2013	79	21	2,274	608	2,882	25.9
	2014	80	20	2,304	588	2,893	24.7
All households	<b>2012</b>	89	11	19,576	2,360	21,935	100.0
	<b>2013</b>	90	10	20,236	2,347	22,583	100.0
	<b>2014</b>	89	11	20,163	2,379	22,542	100.0

- Households that pay for gas using a PPM are the group most at risk of being in fuel poverty – one in five (20%) that paid for their gas in this way in 2014 were fuel poor compared to 15% of those that used standard credit and just 7% of those that used DD.
- More of the fuel poor (39.5%) used DD to pay for their gas in 2014 than any other method; around the same level as in 2012, but up after a slight fall in 2013.
- PPM users made up around a quarter (24.7%) of the fuel poor in 2014, up from 22.9% in 2012, but down slightly from 25.9% in 2013.



### **Direct debit**

- Between 2013 and 2014 the number of fuel-poor households who paid for their gas via direct debit rose from 849,000 to 940,000, an increase of 91,000 – this is a rise in numbers of 10.7%.
- In 2014, 7% of those that paid for their gas by DD were fuel poor – this is 39.5% of all fuel-poor households and a slight increase on 2013.

### **Standard credit**

- Between 2013 and 2014 the number of fuel-poor households who paid for their gas via standard credit fell from 503,000 to 448,000, a decrease of 55,000 – this is a decrease in numbers of 10.9%.
- In 2014, 15% of those that paid for their gas by standard credit were fuel poor – this is 18.8% of all fuel-poor households and a small decrease on 2013.

### **Pre-payment**

- Between 2013 and 2014 the number of fuel-poor households who paid for their gas via PPM fell from 608,000 to 588,000, a decrease of 20,000 – this is a fall in numbers of 3.3%.
- In 2014, 20% of those that paid for their gas by PPM were fuel poor – this is 24.7% of all fuel-poor households and small decrease on 2013.

**Table 6 - Fuel poverty by electricity payment method**

Method of electricity payment	Year	Proportion of households within group (%)		Number of households (000's)		Total number of households (000's)	Proportion of households fuel poor (%)
		Not fuel poor	Fuel poor	Not fuel poor	Fuel poor		
Direct debit	2012	93	7	13,919	1,123	15,042	47.6
	2013	93	7	14,379	1,012	15,391	43.1
	2014	93	7	14,494	1,116	15,610	46.9
Standard credit	2012	85	15	3,039	552	3,591	23.4
	2013	85	15	3,127	564	3,692	24.0
	2014	85	15	2,882	512	3,394	21.5
Pre-payment	2012	79	21	2,617	685	3,302	29.0
	2013	78	22	2,730	771	3,500	32.8
	2014	79	21	2,787	751	3,538	31.6
All households	<b>2012</b>	89	11	19,576	2,360	21,935	100.0
	<b>2013</b>	90	10	20,236	2,347	22,583	100.0
	<b>2014</b>	89	11	20,163	2,379	22,542	100.0

- Households that pay for electricity using a PPM are the group most at risk of being in fuel poverty – around one in five (21%) that paid for their electricity in this way in 2014 were fuel poor compared to 15% of those that used standard credit and just 7% of those that used DD.
- More of the fuel poor (46.9%) used DD to pay for their electricity in 2014 than any other method; around the same level as in 2012, but up after a fall in 2013.
- PPM users made up almost a third (31.6%) of the fuel poor in 2014, up from 29% in 2012, but down slightly from 32.8% in 2013.





### **Direct debit**

- Between 2013 and 2014 the number of fuel-poor households who paid for their electricity via direct debit rose from 1,012,000 to 1,116,000, an increase in numbers of 104,000 (10.2%).
- In 2014, 7% of those that paid for their electricity by DD were fuel poor – this is 46.9% of all fuel-poor households and an increase of 3.8% points on 2013.

### **Standard credit**

- Between 2013 and 2014 the number of fuel-poor households who paid for their electricity via standard credit fell from 564,000 to 512,000, a decrease in numbers of 54,000 (9.6%).
- In 2014, 15% of those that paid for their electricity by standard credit were fuel poor – this is 21.5% of all fuel-poor households, a slight decrease compared to 2013.

### **Pre-payment**

- Between 2013 and 2014 the number of fuel-poor households who paid for their electricity via PPM fell from 771,000 to 751,000, a decrease in numbers of 20,000 (2.6%).
- In 2014, 21% of those that paid for their electricity by PPM were fuel poor – this is 31.6% of all fuel-poor households and while a slight decrease on 2013 it is an increase of 2.6% points on 2012.

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## The National Infrastructure Assessment

### Introduction

The NFU represents 47,000 farm businesses in England and Wales; in addition we have 40,000 Countryside members with an interest in farming and the countryside. The NFU welcomes the opportunity to respond to this consultation as it is an important area of policy impacting directly on our members.

The NFU has been lobbying on these issues for a number of years, and this is reflected in a consultation carried out with our membership in 2011 on the principle of a high speed rail route from London to Birmingham. From this exercise it was clear that farmers and growers are extremely concerned by the impact of infrastructure proposals, the uncertainty it creates as well as the long term damage to business livelihoods. Farmers and growers recognise the importance of investing in the nation's infrastructure to ensure cost effective communication and transfer of goods and services within and beyond our borders. The NFU has long argued that inadequate Government investment in the agricultural infrastructure has undermined our domestic food security and productivity.

In the NFU's 2015 Manifesto we specifically asked for Government departments to act together in recognising the importance of agriculture and food production. This places greater emphasis on 'rural-proofing' of all legislation.

Particular asks in this manifesto relevant to NIA include:

- Increase on-farm water storage and reservoir building with financial support and tax incentives and by reducing red tape for reservoir applications.
- Accelerated rollout of high-speed broadband to all rural areas to provide universal coverage equivalent to urban areas.
- A review of statutory compensation arrangements for major infrastructure projects (e.g. HS2, HS3, A14 widening) with the aim of fairer and swifter compensation for property lost, blight on property value, business viability and the quantity of compensatory habitat created taking land out of agricultural production
- Encourage waste initiatives throughout the supply chain to create efficiencies to the benefit of both the environment and consumers.
- Ensure that planning rules enable farmers and farm enterprises to compete and grow with expanding potential markets and conform with regulatory requirements.
- Provide flexibility for the Environment Agency to switch flood defence funds according to need between capital and maintenance activities.
- Ensure the new watercourse management exemptions and permits that allow riparian farmers to undertake minor works e.g. de-silting and bank repairs, enable groups of land-managers in partnership to undertake activities within catchments.

- Ensure that Defra's reform of the water abstraction licensing regime delivers an adequate supply of water to meet the increasing demand for UK-grown foods such as fruit and vegetables.
- Establish with industry a cross-Government land-based renewable energy strategy utilising anaerobic digestion, biofuels, biomass, by-products, solar and wind.
- Greater consistency in low-carbon energy policy across incentives, planning, grid access and energy storage.

Establish targets for local authorities and the Environment Agency to support and enable farmers' and landowners' efforts to deter, remove and clear fly-tipped waste from private land at no cost.

### **Responses to specific questions from the Consultation Document:**

#### **Remit & Plan**

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

It is necessary to include [rural proofing](#) within the remit of the National Infrastructure Commission (NIC) to foster long-term economic growth and to ensure the economic development of rural areas, both remote and rural fringe. To help close the productivity gap between urban and rural economies.

*Towards a one nation economy: A 10 point-plan for boosting productivity in rural areas* was one step towards this in terms of economic policy, highlighted existing government work and initiatives.

The National Infrastructure Commission has the potential to champion best practice and solutions for example using major infrastructure works to also provide the backhaul needed for broadband and mobile phone infrastructure and help accelerate the roll out of superfast infrastructure. This is essential to ensure wider communities and in particular the agricultural sector can access the infrastructure they need to foster long term and sustainable economic growth and be able to compete in international and national markets. The European Commission have estimated that civil engineering costs can account for up to 80% of broadband infrastructure costs, so this could help achieve and overcome a key barrier to market failure.

The NIC has the opportunity to promote a holistic approach so that the overall impact of a project on long term and sustainable economic growth is captured, rather than parts of the rural economy being temporarily or permanently impacted by major infrastructure projects. The NIC could have the remit to explore how change can be managed to the actual benefit of the wider rural areas.

The Commission could have the objective of assessing how the town planning system can be amended to allow more certainty for homes and rural farm businesses impacted by major projects. For example a farm holding could face losing buildings and other infrastructure either temporarily or permanently through a major infrastructure project, farm diversification projects could similarly be displaced. This risks future farm growth and jobs as well as impacting on the quality of life of those affected. The farmer usually has to apply for full planning permission for a replacement structure, with considerable uncertainty about whether this can be achieved or how this will impact on the business. If this could be achieved under simplified planning rules or as part of a major infrastructure project in advance, this could improve the economic and social outcome for all.

The value of agricultural land has also to be properly considered as part of the planning process for major infrastructure projects at the planning and pre-planning stage. The National Infrastructure Commission have the opportunity to explore the ground rules of how agricultural land is strategically valued, for example as part of the Environmental Impact Assessment process, and how the true value

can be captured earlier on in the planning process. Such an approach could foster a greater understanding of the specific role of agricultural land and buildings, within the context of the farm holding and within the wider farming environment and rural economy. It also allows an assessment of where value could be added by an infrastructure project, and inform the best choice for routing, or siting of wider infrastructure and compensatory habitat. It could also influence future town planning decisions such as whether land should be reallocated for alternative uses, such as for renewable energy use, if it is to be rendered impractical for future farming use.

It is becoming ever more important to treat farmland as part of a farm business producing food and not just as an open space which is automatically available for alternative uses including significant infrastructure projects which are now regularly being brought forward with planning applications submitted. This is particularly the case in respect to land taken for habitat mitigation, rather than site construction. Often land taken for habitat is required in multiples of that taken up by the development itself, which amplifies agricultural land take but in no way guarantees environmental success

In particular the land take associated with infrastructure schemes which is taken for habitat mitigation and not actually the construction of the scheme itself. The areas of land being taken are not replacing like for like but larger areas of land are being taken to create new habitats.

The process of deciding what land should be taken for environmental mitigation needs to be re-considered as land take for habitat mitigation is too great especially now with more and more large infrastructure schemes seeking consent either through a hybrid bill or the development consent process.

Ten years ago there were no significant infrastructure schemes to speak of happening in Great Britain but now the planning inspectorate website has numerous new applications for schemes highlighted and all of these schemes will in one way or another be taking agricultural land out of production.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

Yes - the NFU is particularly interested in Digital/Communications, Energy, Water/Drainage and Flood Defences, as well as their interdependencies. Specific points on particular aspects of infrastructure provision in these sectors are outlined below.

### **Digital & Communications**

**Digital and communications:** *The NIA will cover all areas of infrastructure needed in the deployment of next generation digital communications, looking across the range of data transmission technologies. Digital communications are particularly important given that digital infrastructure has the potential to deliver more efficient use of infrastructure assets across different sectors (such as in energy through the internet of things).*

Farmers are overwhelming within the last 5% of premises without access to the Government superfast broadband programme. Almost all our European farming competitors will 100% superfast and some ultrafast coverage targets in place by 2020 (please see the [European Digital Scorecard](#) for more information).

Other countries are more advanced in their pursuit of technology for farming, and have not constrained themselves by being wedded to the traditional form of broadband rollout used in the UK to date. There is also a wide range of technologies out there and a convergence of technologies, many of which can actually work very well on farm to work across a number of platforms.

Historically the fact the farming industry does not have the digital connectivity it needs is largely due to Government policy to date. With farming incomes falling by nearly 30%, UK wide, this past year (Defra 2016), it is essential that there is positive intervention. We would therefore ask the NIC to prioritise farming connectivity in its forthcoming work stream. Post Brexit farming needs to be able to compete better as an industry and feed our growing population more sustainably.

As previously highlighted the backhaul needed for major infrastructure projects, such as electricity supply and fibre/wireless based broadband services could be made available for wider farming and community benefit when major infrastructure schemes are introduced. There are a number of other financial instruments and delivery models that can be brought forward, to develop new models and techniques for the rural market off the back of wider infrastructure provision, to satisfy new and emerging markets.

In terms of how next generation digital communications are employed it is also essential that the need for infrastructure is explored from the point of view of the business and not just the digital provider. The NIC therefore needs to be able to engage businesses, to understand how digital connectivity could work. Farm business for example need access to data on the move, as well as having systems in place constantly monitoring and regulating equipment. Self-driving tractors exist, but the ability to get detailed data transferred from monitors on those tractors to the farmer is still being developed. More GPS masts are needed, as well as mobile phone masts. A farmer can access detailed information to know about the health of his animals via equipment within a mechanised dairy, but may not be able to pick up this information without access to a mobile signal. [The NFU Spotlight on Farm Broadband and Mobile Networks document](#) provides further relevant background information.

## **Energy and Transport**

**Transport:** *A critical interdependency which the NIA will aim to better understand is the impact of future transport provision on the energy sector; in particular the potential implications of large-scale car, lorry and rail electrification.*

**Energy:** *The NIA will cover the energy system as a whole, including the interaction between electricity, heat and transport. The Commission are particularly aware of the importance of looking at the future of heating and the shift to low carbon solutions in the context of the UK's carbon targets, and the important role that increasing energy efficiency could potentially play.*

With 75 per cent of national land area in the agricultural sector, NFU members have a significant interest in land-based renewable energy production, where they can benefit directly as energy

producers themselves or as hosts for energy plant developed by others. Our own market research, as well as that of other organisations, suggests that more than one-third of farmers and growers have already invested in some form of renewable energy production for self-supply or export to other users. We estimate that farmers own or host around 60% of Britain's solar power capacity, half of AD capacity and the majority of wind power, while playing a significant role in the supply or fuelling of renewable heat. The NFU believes that domestic land-based renewable energy can deliver a substantial fraction of UK clean energy needs by 2020, faster and cheaper than many other low-carbon energy options. We are especially supportive of farmer-owned small and medium scale renewables projects, particularly schemes which deliver multiple benefits from the land or which help farmers to achieve local environmental objectives (e.g. resource protection, biodiversity).

We are pleased to read that this consultation recognises "electrifying transport and heat to meet the UK's carbon targets could more than double demand on the power sector from today's levels, meaning much more capacity would need to be built." The NFU has previously criticised Government expectations of the extent to which new technologies like heat pumps and electric vehicles could be deployed by 2020. Drop-in renewable technologies such as biomass heating boilers and liquid biofuels have made rapid progress initially, for reasons of their convenience and comparative familiarity for users. However, they have not received sustained policy support, even though the alternative electrification of heat and transport poses major challenges to national energy infrastructure.

The NFU welcomes the National Infrastructure Commission's recognition that "new storage technologies in the energy sector – may enable radical improvements in the usage of existing infrastructure." New developments in electricity storage are likely to enable farmers to connect more intermittent renewables like solar PV and wind power to weak electricity networks in remote areas, where on-site generation may have been previously dismissed as impractical. We note that earlier this year the NIC report on "Smart Power" recommended a number of practical measures for a more flexible electricity system, which the Government accepted in its April 2016 response - including grid reinforcement, energy storage, active network management and a market in ancillary services, all measures which are likely to enable farmer investment in renewables and battery storage.

## **Water & Drainage**

***Water and drainage:*** *The NIA will look at both the public water supply and water used across other sectors (such as agriculture, energy and food processing) to make sure that long-term plans are consistent with the future needs of people, businesses and the environment. This is especially important when considering the effect of climate change on the availability of water.*

## **Developing a National Infrastructure assessment for 'water for food production'**

Farmers rely on directly abstracted freshwater for cooling, washing, incorporating into products and growing crops. In agriculture, water scarcity risks vary considerably between farm businesses, depending on:

- How much water the business is able to access (particularly when river flows are low)
- How much water the business will need in future
- What options the business has to meet that need and
- The capacity of the business to adapt to reduced water availability (for example, changing crops or installing water reuse systems).

We hope that the National Infrastructure Commission will acknowledge the needs of 'water for food production' in its analysis and in the development of its future plans, both for individual farm businesses and the agricultural sector as a whole.

## **Agriculture and water demand for irrigated crops**

### **The voice of British farming**

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Water demand to grow our fruit and vegetable crops tends to reach its peak during the summer months and so that demand coincides with times of high temperatures and low river flows. It is widely predicted that pressure for water at these times will become more frequent and more intense.

In England and Wales, farmers and growers use less than 2% of total water abstracted, so the current water allocation for food production is minor compared to the public supply and energy sectors.

Nevertheless, global climate change means that the UK will need to increase its home food and water security to offset potential disruption of food imports from countries that face even more extreme weather events than us.

Currently, less than two-thirds of food demand in the UK is produced locally<sup>1</sup> and there is an increasing focus on the impacts of food imports, not least their impact on water and the environment in the country of origin. The global nature of food supply means that the length and resilience of the supply chain is coming under greater scrutiny, but there remain many gaps in our understanding<sup>2</sup>.

### **Meeting demands of water for food**

The traditional farming response to improving its resilience to water shortage has been for individual farmers to build their own reservoirs.

As a result, farmers have engaged in a vigorous reservoir building programme over the past 25 years.

However, it is now clear that a much bigger and more innovative construction programme for water storage is needed if food production is to become more resilient.

The NFU believes that in future there will be greater need to install collaborative reservoirs that are utilised by groups of farmers rather than individuals. Ultimately, there must be opportunities to promote multi-sector schemes where farmers, water companies, energy companies and others can share the benefits of new and improved facilities.

A particularly important function for the National Infrastructure Commission could be to identify the location and scale of these projects, as well as promoting the schemes.

The NFU believes it is important for the National Infrastructure Commission to look at ways of achieving 'total water management' within a catchment. This must consider how meeting demands for water usage can simultaneously improve flood resilience for rural communities and infrastructure. Reservoirs used to store water when river flows are lower can complement aims to improve resilience to flood risk through the capping or truncation of peak flow events.

### **Defra water resilience roadmap**

We are pleased that Defra has recently published a roadmap in which it sets out how it intends to make the water sector more resilient to the impacts of climate change, and the NFU is delighted to represent the agricultural and horticultural sector on that ongoing work programme.

We recognise some of the barriers to achieving greater water resilience identified by Defra, particularly those relating to affordability and difficulties with planning across multiple companies.

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<sup>1</sup> Defra food statistics pocketbook (2013)

<sup>2</sup> UK Water Partnership 'Water use in our food imports' (2015)

As the Environment Agency has already concluded, there is no strategic sectoral planning for water risks for sectors such as agriculture; perhaps the need to fill that gap is now overdue.

### **Boosting the resilience of farms and other businesses**

We agree with the conclusion reached by Defra in its water resilience roadmap that without a step change in our national approach, the lack of access to adequate water supplies could lead to some businesses being unable to operate while farmers and growers could lose crops or have lower quality crops

### **Land use planning**

Most planning applications relating to 'built' water infrastructure are decided by local planning authorities. We welcome Defra's proposal to develop a national policy statement setting out the need for water supply infrastructure so that it can be classified as 'nationally significant'. This would allow applications to be determined centrally.

### **Multi-sector collaboration**

The NFU is keen for farmers and other businesses to improve their resilience by working with water companies. For example, Water Resources East (WRE) has brought together water companies, farmers, the energy sector and others to find ways to improve water resilience over the long-term.

The NFU believes that it will be important to find ways of allowing public water companies to develop new water resources; and aligned with additional storage capacity it will be important to use surplus capacity in ways that could also benefit farmers and other businesses.

### **Removing regulatory barriers**

The NFU seeks government action to remove regulatory barriers to businesses seeking to increase their resilience to the risks of water shortage. The main barriers faced by farmers when building reservoirs is the planning system which can result in time delays and significant cost in meeting environmental and archaeological assessments.

We are pleased that, as part of the Rural Productivity Plan (launched in 2015), government is committed to review the planning system and other regulatory constraints facing rural businesses, and to re-examine measures that can be taken to address them. This includes an examination of planning barriers to the installation of farm reservoirs.

The Countryside Productivity Scheme also supports investment in reservoirs, irrigation and water management systems to help improve farm resilience and productivity, but the latest version of rural development funding for water resource management is very restrictive for would-be applicants.

It may be that in future farmers rely on a network of water storage ranging from large multi-sector installations that are linked to an expanded number of small, local reservoirs.

It is therefore logical that the National Infrastructure Commission should use its influence to remove the regulatory barriers to small-scale local schemes because it will make the large strategic schemes more efficient and viable.



## **Flood Defences**

**Flood defences:** *The NIA will assess the level of flood risk across the UK and how it might change over the period to 2050. It will consider whether the current strategy is consistent with a value-for-money approach for dealing with the issue of floods in the long-term.*

### **Assessing level of flood risk:**

The costs of the 2013/14 floods on agricultural businesses were estimated at £18.9m, and were £50million during the 2007 floods. Costs for the 2015 winter floods are still rising; however £7million was claimed under the Farming Recovery Fund. Therefore strategies to increase resilience to rural businesses, infrastructure and communities through river and coastal asset construction and maintenance are vital.

Flood risk is determined by the likelihood of water inundation on land, and the associated socio-economic and environment impacts on this area. Long-term trends in total volume, duration and intensity of rainfall events are still debated. The Met Office's State of the UK Climate 2014 report<sup>1</sup> found that 'the annual number of days of rain with greater than or equal to 1mm was well above average for year 2014 across most of the UK'. This is indicative of a change towards greater total precipitation levels, but also that these rainfall events are shorter in duration and more intense. Flood modelling must be brought up to date to take into consideration recent extreme weather events.

The NFU recognises the need for the allocation of funding for the protection of people and property as we are faced with the risk of these more extreme events. However, current outcome measures used to determine how funding is spent does not truly recognise the importance of agriculture and rural communities to the wider economy. To illustrate, the UK farming sector contributes some £102 billion to the economy through its capacity to produce high quality food. The Agri-food sector as a whole employs 13% of the UK's population, and is dependent on food produced nationally

Currently, the narrow application of the Treasury's Green Book rules do not fairly reflect the benefits of defending agricultural land in any assessment to allocate flood defence funding. This is primarily due to the very homogenous valuation of agricultural land, with all land generally assumed to be wheat, the most prevalent crop within the UK.

These valuations only consider the financial impact on that individual business and do not account for the consequential wider economic impacts on the rural economy. These are caused, for example, by disruptions to infrastructure and communications which adjacent urban communities are dependent upon. Protection of agricultural land is also needed to reduce dependency upon food imports and continue to support our agri-food sector.

Only through fuller consideration of the impacts of flooding to agricultural land and rural communities will it be possible for the current strategy and flood and coastal risk management to take a value-for-money approach.

1. The Meteorological Office (2015). State of the UK Climate 2014. Available online:  
[http://www.metoffice.gov.uk/media/pdf/0/a/State\\_of\\_the\\_UK\\_climate\\_2014.pdf](http://www.metoffice.gov.uk/media/pdf/0/a/State_of_the_UK_climate_2014.pdf)

## **Public Sector Cooperation Agreements**

Under section 13 of the Flood and Water Management Act, a risk management authority, such as the Environment Agency, may arrange for a flood risk management function to be exercised on its behalf by another public sector risk management authority. Other public sector risk management authorities that can be involved in these Public Sector Cooperation Agreements include internal drainage boards, district councils, and lead local flood authority.

The NFU welcomes the increased implementation of Public Sector Cooperation Agreements, as they enable other organisations to undertake FCRM work when it is more efficient for them to do so. It is vital that publicity on the use of Public Sector Cooperation Agreements is readily available to land managers and all relevant catchment stakeholders.

### **Long-term strategic planning and funding for Flood and Coastal Risk Management**

We welcome the publishing of annual FCRM capital budgets up to 2021 and maintenance budgets for this parliament. However it is vital that there is greater flexibility to transfer between capital and revenue funding. The Environment Audit Committee's 2016 review into cooperation across government demonstrated that more than 1 in 20 critical flood defence assets do not meet the Environment Agency's minimum condition. This is a clear demonstration of the need to be able to transfer more capital funding for river and coastal asset maintenance activities when appropriate.

The Environment Agency has also published its river and asset maintenance plans for the financial year 2016-17. We welcome this step as a move towards increased transparency in how revenue funding is spent within Flood and Coastal Risk Management. However, it is important to establish capital and maintenance spending commitments over time periods longer than one year. This enables longer term planning on Flood and Coastal Risk Management- particularly where partnership funding is required for a scheme.

### **Conversion of Flood Defence consents to the Environmental Permitting Regulations**

The new flood risk management exemptions and permits under the Environmental Permitting Regulations have provided land managers and local stakeholders with a greater ability to undertake river maintenance. For example they enable a greater number of essential activities such as dredging and desilting, bankside and erosion repairs, vegetation clearance and in-river habitat creation to occur without cost or heavy application burden.

We believe the NIA should consider some aspects of the new rules which need further review:

- The creation of new exclusions, exemptions and permits which groups of farmers can apply for to undertake essential river maintenance work in partnership. Currently only individuals can apply.
- Some of the new-style exemptions have a large number of conditions, such as limits on the geographic location in which they can occur. These conditions should be carefully considered and reviewed where appropriate to enable continued river maintenance.

### **Waste**

**Waste:** *The NIA will review long-term objectives and strategy in both waste reduction and management, ensuring they represent a cost-effective approach as the UK moves towards a more circular economy.*

This assessment needs to be mindful that farmers and agriculture forms a vital part of waste management infrastructure and therefore the circular economy. This can come in the following forms:

- The creation of waste and the requirement to dispose of it safely and responsibility – barriers to this process include lack of facilities to recycle and dispose of agricultural waste locally leading to illegal waste operators targeting the agricultural sector. The rural nature of farming can mean it is often not cost-effective for collection service to operate however alternative options must be created. The breadth of waste produced on farm can also be challenging which includes domestic waste/hazardous waste/flytipped material/medical and chemical waste. This needs to be addressed as part on the infrastructure challenge.

- Utilisation of waste products on-farm through technologies such as anaerobic digestion, biomass boilers, recycling waste to land for agricultural benefit, the use of co-products into animal feed. This forms a significant impact on the circular economy and greater prioritisation needs to be given to these outlets and technologies.
- Reducing food waste – this can often be caused by dysfunctional supply chains. Greater food waste reduction could be achieved by the supply chain becoming more integrated to prevent losses. Improvement in infrastructure could improve this situation, for example improving forecast systems used by retailers and processors as this would provide farmers with the ability to undertake important business decisions such as the area of land to rent and the volume of seed to plant

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

### **Cross-Cutting Issues**

**Geography and local growth:** *The NIA will seek to understand how economic and physical geography relates to infrastructure provision and development and in turn how infrastructure can shape economic geography. It will look at the role of economic devolution in infrastructure development and consider how its recommendations affect the entire country and local areas.*

**Sustainability:** *In developing the NIA the Commission will analyse whether the existing approach to infrastructure is compatible with the UK's carbon and environmental commitments and consider if different or further action is needed.*

**Governance and decision making:** *The NIA will consider the current institutional frameworks for infrastructure investment and planning in both Government and in regulated utilities and will assess if these are fit for purpose to meet the infrastructure needs of the future. It will also consider the planning system and how this interacts with decision making to facilitate delivery.*

*Others include: Funding and financing; Cost, delivery and resilience; Evaluation and appraisal methodology; Performance measures*

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

The NFU does agree that the NIA should focus on these cross –cutting issues but the NFU also thinks that it is vitally important that the NIA should address how compulsory purchase of private land takes place and the compensation paid by developers carrying out significant infrastructure. It is nearly too easy for developers to rely on receiving a compulsory purchase order or a development consent order to compulsory purchase land for a scheme off a private landowner. The landowners rights are being eroded and the impact on a business financially is not being considered. Compulsory purchase law and compensation needs a complete overhaul to bring it up to date. The public interest of a scheme is not being considered carefully enough.

**Methodology****Q8. Do you agree with this methodological approach to determine the needs and priorities?**

The NFU agrees that the NIA will need to look at each sector and engage widely to understand stakeholders views on infrastructure needs and priorities. One of the major infrastructure challenges is the amount of land take required for all infrastructure schemes and the Commission must address this.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

No comment.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

*Proposed infrastructure drivers:*

**Population and demography:** *Where people will live, and how they will travel, will be a key determinant for infrastructure needs.*

**Economic growth and productivity:** *Economic growth can drive infrastructure demand in different ways depending on the composition of the economy, and the type of goods and services that are produced. At the same time, infrastructure may affect economic growth. This is a complex link which the Commission will explore at both a national level and more disaggregated geographical levels, such as regions and cities.*

**Technology:** *Rather than providing predictions around which technologies will become prevalent, the Commission will seek to understand how the most important technologies can affect supply and demand for infrastructure services; and how to ensure decisions are robust to different future scenarios to minimise asset stranding and facilitate smooth transitions to effective technological scenarios.*

**Climate change and environment:** *The Commission will examine climate change mitigation and the associated targets to reduce emissions, and the need to enhance our environment when choosing what and how infrastructure services are delivered.*

Collectively, the UK has a total farming and food sector worth some £108 billion and the contribution of Britain's farms should not be ignored if the nation is to become less dependent on food imports. The farming sector is a major employer and in 2015 the national agricultural workforce stood at 476,000. Agriculture's importance to the UK economy is also emphasized by the fact that the UK has 142,000 businesses that are registered as farm businesses for VAT purposes. Agriculture's performance has seen the industry contribution to the economy (in GVA terms) grow by a staggering 84 per cent between 2007 and 2014. Similarly, agricultural output has increased from £15.9bn to £25.8bn over the same time period.

In addition, given that 70% of the UK land area is managed by farmers the environmental benefits and ecosystem services provided by farming activities are substantial. Although it is more difficult to place a value on these services, landscape character, biodiversity benefits, carbon sequestration and water regulation are all delivered through careful management of agricultural land.

It should be acknowledged that agricultural land also helps protect valuable infrastructure such as: railways, roads, telecommunications, gas, electricity and water supplies.

### **Economic growth and productivity**

### **Climate change and environment**

The NFU is particularly interested in aspects of Technology as well as Climate Change/Environment.

The approach to infrastructure needs to be compatible with the UK's carbon commitments. The NFU is aware about the importance of climate-resilient national infrastructure to the agricultural sector in facilitating production and getting produce to 'market', and in particular the international dimension.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

No NFU comment.**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

## About National Grid

We are one of the world's largest investor-owned utilities focused on transmission and distribution activities in electricity and gas in both the UK and the US. We play a vital role in connecting millions of people to the energy they use, safely, reliably and efficiently. In the UK we are organised into the following operating segments.

**Electricity Transmission.** We own and operate the electricity transmission network in England and Wales, with day-to-day responsibility for balancing supply and demand. We operate but do not own the Scottish networks. Our networks comprise approximately 4,470 miles of overhead line, 932 miles of underground cable and 338 substations.

**Gas Transmission.** We own and operate the gas national transmission system in Great Britain, with day-to-day responsibility for balancing supply and demand. Our network comprises approximately 4,760 miles of high pressure pipe and 24 compressor stations. In 2015/16, the gas throughput across the system was more than 80 billion cubic metres.

**Gas Distribution.** We own and operate four gas distribution networks comprising approximately 81,400 miles of pipeline. We transport gas from the national transmission system to around 10.9 million consumers on behalf of 39 shippers.

**Other Activities.** Our other activities mainly relate to non-regulated businesses and other commercial operations not included within the business segments including: interconnectors; UK-based gas metering activities; UK property management; a UK LNG import terminal; US LNG operations; US unregulated transmission pipelines; and corporate activities.

## Executive Summary

- National Grid welcomes the opportunity to respond to the consultation on the National Infrastructure Assessment. We support the proposals in the consultation document, and wish to make specific recommendations where appropriate.
- We agree that the National Infrastructure Assessment should be a long term cross cutting review that takes a UK-wide perspective. This needs to cover the energy system as a whole, and take account of cross sector interdependencies.
- The National Infrastructure Commission should provide clarity of how nationally significant infrastructure will be delivered, whilst taking into account Governments devolution agenda.
- The Commission should consider how to better align economic regulation and planning policy, where the two have inconsistent drivers, which can impact on infrastructure delivery.
- It is important that the commission supports the market by facilitating a level playing field for all potential investors when considering solutions to infrastructure challenges.

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**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

The challenges arising from climate change and associated carbon reduction and energy targets should be key considerations in the work of the Commission. Economic infrastructure will have to play a crucial role in helping to tackle these challenges, including in meeting statutory targets in the Climate Change Act 2008. These issues cut across the objectives above and should be integral to the preparation of the National Infrastructure Assessment (NIA) and the Commission's recommendations. The Commission should also take account of the affordability of its recommendations and the related cost to consumers.

Long term certainty and stability in energy and planning policy is also critical to attract investment, to ensure the UK remains competitive on the global stage.

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**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

National Grid supports these principles and it is imperative that the NIA assesses the UK's infrastructure system as a whole. As part of this, the NIA should take account of international interdependencies such as integrated energy markets and interconnectors. The NIC must take account of cross sector interdependencies, recognising the impact of regional growth agendas, electrification of transport and housing on energy. The review must look well beyond individual parliamentary cycles to create certainty for infrastructure planning and investment. The NIC also need to clarify how nationally significant infrastructure will be delivered whilst taking into account the Governments devolution agenda.

In addition, there are two other important principles that should be included; specifically:

- **Addressing needs and utilising opportunities:** In undertaking its assessment, the Commission should identify needs as well as opportunities. When carrying out the assessment of infrastructure needs, the NIC should seek synergies between different sectors or different developments in the same geographical area (such as connecting a cluster of carbon-emitting power stations to a carbon capture and storage network).
- **Adopting a long-term perspective:** It is important that the Commission takes a genuinely long-term perspective on infrastructure needs and opportunities. It should look well beyond individual parliamentary cycles and create certainty for infrastructure planning and investment which typically has a long payback period.

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**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

National Grid agree that the NIA should cover the sectors listed in the consultation document and that those should not be considered in isolation from each other. The NIA should assess and address infrastructure needs and opportunities in a holistic, integrated manner.

It is important that the NIA should cover the energy system as a whole and that it should take account of interactions between electricity, heat and transport. The NIA should recognise the vital importance of maintaining and developing energy infrastructure in order to provide reliable, safe and affordable energy supplies and to help address climate change objectives.

Each year, since 2011, we engage with hundreds of stakeholders through workshops, bilateral meetings and webinars to create a range of plausible and credible pathways for the future of energy out to 2050. These future energy scenarios represent transparent and holistic paths through the uncertain energy landscape to help Government, our customers and other stakeholders make informed decisions and you may find these useful. The future energy scenarios can be found on our website <http://fes.nationalgrid.com/>

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**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

We recommend that the Commission takes account of our Future Energy Scenarios (see Question 3).

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**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

As stated earlier, the NIC must consider all interdependencies holistically. Progression towards decarbonising electricity generation, electrification of transport and heating should be areas of focus. Other, more innovative, interdependencies should also be explored. National Grid recently concluded a project with Element Energy, an energy consultancy that specializes in the intelligent analysis of low-carbon energy, to explore the potential for Electric Vehicles (EVs) and heat pumps to provide balancing services in order to balance electricity demand and supply. EVs can contribute to frequency response, (a process where electricity demand can be automatically interrupted to maintain system frequency), as they are typically plugged in for 8 hours a day but need only 3 hours charging. We would be happy to share the findings of this project with the National Infrastructure Commission.



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**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

National Grid agrees that the NIA should consider the cross-cutting issues listed in the consultation document, subject to the following comments:

- The Commission should have regard to existing funding commitments and price control agreements for regulated utilities. It should not seek to reopen such commitments or agreements, as this would introduce additional risks and cost, and therefore is not in the interest of consumers.
- Any financial assumption made by the NIC should only be seen as a guide, and should not be used by economic regulators as a definitive cost to deliver as the developers and economic regulators are best placed to make decisions on costs. We do recommend that the Commission should work with regulators and regulated utility firms to estimate the impact of any recommendations on consumer bills.
- National Grid publishes a number of documents on an annual basis, such as the Network Options Assessment, Future Energy Scenarios and 10 year statements. These aim to provide clarity and transparency on the potential development of the GB Transmission system and describe the options that the Transmission Owners have provided to meet reinforcement requirements of the national electricity transmission system. We recommend that the National Infrastructure Commission have regard to these and do not seek to duplicate existing processes

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**Q7. Are there any other cross-cutting issues that you think are particularly important?**

Another important area for consideration surrounds the interdependencies between economic regulation and planning policy. For regulated businesses, the economic regulator has a remit to ensure the best value for consumers, and therefore scrutinises costs associated with infrastructure development. This can misalign with planning policy, where environmental, amenity (such as visual, noise and traffic impact) and public outcomes are the focus.

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**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

National Grid agrees that the Commission should consider a range of scenarios to help understand the UK's infrastructure requirements and how these may evolve over time. Please refer to Question 9 for examples from the energy sector.

We welcome the Commission's intention to draw on information available from expert bodies and to engage widely to understand stakeholders' views on infrastructure needs, opportunities and priorities.

National Grid agrees that the Commission should develop an understanding of the existing infrastructure pipeline. This should include planned infrastructure projects and existing funding commitments and regulatory agreements. We also agree that modelling can assist in analysing complex systems and providing context, but that needs to be in conjunction with expert analysis and consultation.

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**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

National Grid uses various models and processes, in consultation with a wide range of stakeholders, which the Commission may find helpful, including:

- Future Energy Scenarios <http://fes.nationalgrid.com/>
- Network Options Assessment (<http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/Network-Options-Assessment/>) and Electricity Ten Year Statement electricity: <http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/Electricity-Ten-Year-Statement/>;
- Gas Ten Year Statement <http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/Gas-Ten-Year-Statement/>.

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**Q10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?**

National Grid agrees with the NIC's proposed drivers of population and demography; economic growth and productivity; technology; and climate change and environment.

When considering climate change and environment, it is important to recognise both the physical effects of climate change impact on infrastructure, and its resilience, as well as how infrastructure can help to minimise climate change impacts.

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**Q11. The NIA will aim to set out a portfolio of interventions that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

The energy demands of the UK in the future are best met with a diverse energy mix, including nuclear, gas, wind and solar, as well as a range of technologies such as interconnection, storage and demand side response. Any methodology to determine a portfolio of interventions must consider the impact on security of supply, cost to the consumer and climate change.

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**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

It is important that the NIC supports the market by facilitating a level playing field for all potential investors when considering solutions to infrastructure challenges. We believe that greater diversity of investors and market participants will increase the speed of innovation and subsequently reduce costs for consumers.

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**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

National Grid welcomes the Commission's commitment to an open, transparent and consultative process and to capture the expertise and opinions of a wide range of stakeholders, and support the proposed engagement tools. It is important that the Commission engages with all parts of society, and does not solely focus on large companies and institutions. The NIC should recognise the impact that infrastructure development has on local communities and should explore how best to engage and ultimately gain public acceptance to infrastructure projects.

We note that the Commission proposes to undertake formal public consultation on its Vision and Priorities document in 2017, but there is no proposal to consult on the final assessment and recommendations. We recommend that stakeholders are invited to comment on the full assessment and recommendations before these are finalised.

4 August 2016

NIA Evidence  
National Infrastructure Commission  
1 Horse Guards Road  
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SW1A 2HQ

## Consulation on the National Infrastructure Assessment Response from the National Housing Federation

Dear Sir/Madam,

The National Housing Federation is the voice of affordable housing and represents over 1,000 housing associations across England. Our members provide two and a half million homes for more than five million people, and last year alone they built 50,000 homes – over one in three of all new homes built.

We are grateful for the opportunity to respond to the consultation on the National Infrastructure Assessment (NIA). The Federation has been calling for a long term strategic view on infrastructure, and we welcomed the renewed focus on infrastructure planning and delivery at a national level that the National Infrastructure Commission (NIC) will bring.

### **Infrastructure and housing**

The Federation welcomes the explicit connection between the supply of new homes, and the delivery of infrastructure to support them. The lack of infrastructure provision is often one of the biggest barriers to housing development, and one where receipts from the Community Infrastructure Levy (CIL) cannot bridge the gap. Upfront delivery of infrastructure is therefore vital to unlock sites for housing – particularly large scale strategic sites, new settlements and urban extensions. Focusing on these large sites and recommending alternative methods of funding would leave funds collected through CIL free to provide localised infrastructure such as schools, health centres and open space which are also vital for supporting the sustainable growth of areas and their communities.

As the consultation alludes, population and demography, and economic growth and productivity are key drivers of infrastructure. At a local level, a lot of work will already have been done to determine where population and economic growth will be directed through the preparation of local plans. Local authorities who have adopted a CIL charging schedule will also have a clear picture of the infrastructure that is required to support that growth through the preparation of infrastructure lists.

Therefore, when preparing the NIA, it will be vital to maintain a regular dialogue with local and combined authorities as they will have an in depth perspective of the needs of their areas, and where infrastructure will help to enable development. A joined up approach between the national and local levels will be the most practical way of planning for infrastructure, and would ensure that a recommendation at a national level does not compromise or adversely affect the local and regional tiers.

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Trading as National Housing Federation  
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Registered in England No 302132

### **Brownfield land**

When putting forward recommendations relating to the funding of infrastructure, the Federation would support consideration of the collection of funds that could be used by local authorities or developers to remediate contaminated brownfield land. This would be particularly valuable in high growth areas where there is an abundance of brownfield land that could be used to accommodate sustainable housing development. Remediation of such land is often costly and this is a key reason for it not coming forward. Providing more upfront funding for this purpose will bring more brownfield land forward for development in accordance with the government's brownfield-first policy. It could also have the benefit of giving developers the ability to deliver policy compliant schemes, as contributions would be less likely to be reduced through viability exercises.

### **Reviewing progress**

Reviewing the outcomes of the recommendations should be a key part of the NIA, and the commitment to producing a new NIA each Parliament provides the opportunity for such a review. A key element of this could be engaging with local authorities to get an understanding of how the recommendations or the delivery of infrastructure has assisted at a local level to deliver the policies and objectives of the local plan. Where no progress has been made on strategic housing sites for example, recommendations could be amended following consultation with the relevant authorities which might provide a more favourable platform for development to take place.

We trust this submission is helpful. If you have any queries or need further information, please don't hesitate to contact us.

Yours sincerely

**[signature redacted]**

[name redacted]  
[job title redacted]



## **National Infrastructure Assessment Process and Methodology Consultation**

As the organisation responsible for managing the UK's airspace ensuring the safe and efficient passage of over 2.4m aircraft every year, NATS welcomes the opportunity to respond to this consultation on the process and methodology for the UK's national infrastructure assessment.

We welcome the decision by Government to create a Commission to assess the UK's long term economic infrastructure; there is a need for long term strategic decision making to ensure the UK has the infrastructure it requires. Airspace, our invisible infrastructure must be included in the Commission's remit.

### **Our airspace & required modernisation**

Airspace is critical to ensuring the UK economy has safe and efficient connectivity with markets around the world. However, with Government forecasts predicting growth of 40% in air traffic by 2030 our airspace is in urgent need of modernisation.

Our current airspace structures have remained little changed since they were first designed over 50 years old, and while safe, simply cannot harness the capability of today's aircraft fleet or provide the capacity required to meet forecast demand without delays and increased emissions.

Modernisation means moving from traditional ground-based beacons to modern satellite navigation, the capability for which already exists on many modern aircraft. The UK is at the forefront of aerospace technological development, and airlines have invested heavily in new aircraft but now we need to modernise our airspace infrastructure to match.

It requires long term strategic decision-making and Government support and commitment to ensure it can continue to benefit the UK. We believe that it is essential that the National Infrastructure Commission includes airspace, and its future development, in its assessment for Government.

### **Delay to airspace modernisation**

The CAA's Future Airspace Strategy, supported by the Government and the aviation industry, was created as the vehicle to deliver modernisation, it *'sets the direction for how the planning, management and regulation of UK airspace should develop to maintain and improve the UK's high levels of safety while addressing the many different requirements on the airspace system'*.

However, plans to modernise our airspace have been delayed due in large part to the negative reaction from some local communities who have been sensitised to aircraft noise by airspace trials and the on-going debate about the future of airport capacity in the south east. The views of these very vocal groups have dominated the public debate and led to the Government reducing support for airspace modernisation. It has since decided to undertake a review of its airspace and noise policy. As a result proposals to modernise airspace have been delayed.

### **Modernisation is imperative to economic growth**

It is important to maintaining our international connectivity, without modernisation the UK economy will suffer, regardless of a new runway. Our analysis shows that without modernisation delays could soar by 2030 to 50 times what they are today, with nearly a quarter of all flights delayed by more than 30 minutes and nearly 65,000 flights cancelled every year. The cost to airlines as a result would be over £1bn, and the impact on the wider economy would be even greater.

Furthermore, Modernised airspace can help minimise noise and reduce CO<sub>2</sub> emissions. More direct routes can be flown, routes can be designed to avoid noise sensitive areas as aircraft are not constrained by ground-based aids and we can design respite routes to ensure a more equitable spread of aircraft noise. It will also mean greater use of Continuous Descent and



Climb operations which see aircraft spend less time at low levels and will also reduce CO<sub>2</sub> emissions. And it will reduce the need for conventional orbital holding, instead aircraft can be sequenced for landing higher, reducing CO<sub>2</sub>.

**Industry is committed to a collaborative approach**

The UK aviation industry is committed to delivering a sustainable future, and Sustainable Aviation's work, of which NATS is a founding member, is critical to this. We are focused on finding collaborative ways of improving our environmental performance and creating a balanced debate to ensure sustainable growth of our industry. During the last 10 years this commitment has delivered a reduction of over 20 million tonnes of CO<sub>2</sub> by UK aviation. Over the same period, we have reduced the impact of aircraft noise with a reduction in noise contour areas around major UK airports, used by the Government to assess community annoyance, has been reduced by 14%.

However we recognise that as with many large infrastructure projects, there will be winners and losers with some people being overflown more, others less. We know that engaging with communities in the airspace change process is essential.

We believe that some of the political difficulty associated with airspace modernisation can be addressed by moving it into long term strategic decision-making and away from the pressures of short term political need. The National Infrastructure Commission provides a once in a generation opportunity to achieve this and highly recommend the inclusion of airspace in the Commission's assessment of the UK's economic infrastructure.



[name redacted]  
The Quadrant  
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5 August 2016

### **National Infrastructure Commission - Consultation**

Network Rail Infrastructure Ltd welcomes the opportunity to contribute to the National Infrastructure Commission consultation on the methodology and process of National Infrastructure Assessments (NIA). Network Rail is the owner and operator of the rail network in Great Britain, responsible for its safe operation, maintenance and enhancement.

The key points of Network Rail's response are:

- Network Rail is supportive of the aims of the Commission and welcomes the opportunity for our organisations to work together to provide robust infrastructure planning for the next thirty years
- Network Rail shares the aim of the Commission to effectively target investment in infrastructure to promote economic growth
- Network Rail has a statutory duty to plan for the future of the railway and does so in collaboration with the rail industry through an established Long Term Planning Process (LTPP). The LTPP plans for the next thirty years, aligned with the Commission's own proposed planning horizon
- Network Rail supports the Commission having a key role in complementing and informing the work of individual actors by focusing on cross-cutting issues and developing shared assumptions and scenarios which can be used across infrastructure sectors
- Network Rail's plans until 2019 have been agreed and funded by Governments and planning for future enhancements beyond this is already well underway. Our plans to 2019 for England and Wales have recently been reconfirmed with Government through the detailed review conducted by Sir Peter Hendy at the end of 2015. These plans are documented in Network Rail's Enhancements Delivery Plan and will be an important building block for the Commission's work.

**Q1 The Government has given the National Infrastructure Commission objectives to:**

- **Foster long-term and sustainable economic growth across all regions of the UK**
- **Improve the UK's international competitiveness**
- **Improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

Network Rail recognises the objectives of the NIA as complementary to its own vision to deliver a railway which will support a thriving, sustainable economy and improved quality of life.

The provision of rail and other new infrastructure delivers wider economic benefits and can be a stimulant for economic growth. In the North of England the rail industry is planning and delivering rail upgrades which will cut journey times between major regional cities, contributing to the Government's objective of transforming Northern growth and rebalancing the country's economy. It is important that the Commission's long term vision considers the potential for rail to stimulate and enable new growth, as well as the need to accommodate the growth of existing demand. Network Rail would also welcome the Commission's consideration of how the potential to stimulate wider economic growth can be taken into account in the appraisal of transport and other infrastructure schemes.

Network Rail is supportive of the Commission giving consideration to how its objectives could be met by the more efficient use of existing assets, as well as through the provision of new infrastructure. This is a key theme of Network Rail's Digital Railway programme which is designed to accelerate the digital enablement of the railway and allow more trains to run on the existing infrastructure. The potential of new technology to enable infrastructure to contribute to economic growth and improve quality of life should be an important consideration for the Commission.

It is important that the Commission's work complements and informs the detailed planning carried out by the individual actors within each sector and adds value rather than complexity to these processes. Network Rail currently leads long term planning on behalf of the rail industry, bringing together industry parties, funders and stakeholders to develop and present choices to funders about the mix of outputs deliverable at different levels of cost.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

Network Rail fully supports the Commission's proposal to conduct NIAs in an open, transparent and consultative manner.

We welcome the Commission operating in a collaborative manner, recognising the specific expertise within each sector and using the detailed long term planning which is already done within the rail industry as a building block for its own work. By taking a comprehensive, whole system approach to infrastructure provision the Commission can complement and inform the work of individual actors.

It is important to Network Rail that the Commission's role in the established processes for planning, funding, developing and delivering projects is clearly defined. Network Rail has a committed portfolio of rail enhancement projects for the period to 2019 set out in its Enhancements Delivery Plan and the NIA should avoid re-opening these committed schemes.



As noted in Network Rail's response to the previous consultation on the structure and governance of the Commission, it is recognised that regulators and public bodies, as well as government departments, will sometimes be best placed to provide information and analysis of value to the Commission. Given the financial constraints of our organisation, requests for information or analysis would need to take existing obligations, as well as the resource required to fulfil a request, into account. This may necessitate a mechanism through which the Commission could fund analysis if it is of significant cost.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

Network Rail welcomes the Commission's proposed broad perspective to consider all economic infrastructure in the UK and to assess the requirements of the infrastructure system as a whole. In considering interdependencies and interactions between sectors the Commission's work can complement and inform the detailed planning of individual actors within each sector and help them to plan on a consistent basis towards a coherent vision of a future infrastructure system.

Network Rail fully supports the multi-modal approach the Commission proposes to take in its consideration of the transport sector. The rail network has crucial interdependencies particularly with road and air transport. We would welcome the Commission taking a network-wide, multi-modal perspective in its consideration of the transport sector, supporting the work of sub-national transport bodies. Assumptions about the future price of rail relative to other modes of transport significantly influence Network Rail's forecasts for future rail demand. By taking a multi-modal perspective on the transport sector the Commission can ensure that a consistent view of demand is taken in the planning of different transport modes.

Rail also has a key interdependency with the energy sector and Network Rail would welcome the Commission's consideration of this. Key interdependencies between rail and other infrastructure sectors are described fully in the response to question 5 below.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

In its consideration of infrastructure provision for the transport sector, Network Rail would support the NIA focusing on:

- The sustainability of the existing infrastructure system and the investment that might be required to allow existing infrastructure to continue to operate efficiently at an affordable cost. This is particularly relevant in the context of climate change and an increase in the frequency of extreme weather events to which the railways are often vulnerable.
- The potentially transformational impact on the transport sector which could result from the development and deployment of new technology. Through the Digital Railway programme Network Rail is developing plans for the use of new technology on the railway to accommodate more trains, and to increase the reliability and flexibility of the railway for passengers. This could have a significant impact on how we plan for the sustainability and growth of the railway. The accelerated introduction of technology will help to free up more capacity from the existing railway infrastructure, tackling the capacity challenge and reducing the need for Government funded infrastructure enhancement schemes.
- The need to accommodate growth in demand for infrastructure and the potential to stimulate the economy through the provision of transport infrastructure. Rail has seen significant growth over recent decades and the railways are now busier than at any time since the 1920s. Alongside the introduction of new technology, targeted investment is needed for the railways to accommodate this continuing passenger and freight growth, and to create new journey opportunities which stimulate economic growth.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

Network Rail is supportive of the NIA's cross-sector perspective on infrastructure provision. This can add significant value to the planning work carried out within each sector.

Network Rail welcomes the Commission's identification of the link between the transport and the energy sectors as a critical interdependency. We are currently delivering a significant programme of rail electrification across the country and it is crucial that the UK's energy infrastructure is able to support the increasing use of electric trains which are faster, more reliable and more environmentally friendly than diesel powered trains.

Rail also has an interdependency with the digital and communications sector. As described, Network Rail has begun planning for the Digital Railway which will utilise high specification digital signalling and train control to make more efficient use of infrastructure assets. The Commission could also explore how better connectivity on the move might influence the decisions that passengers make about the journeys that they take and their productivity while travelling. This will influence the future demand for transport infrastructure.

There is an important interdependency between the transport sector and climate resilience, including flood defences. The resilience of the railways is a key concern for Network Rail. We have published weather resilience and climate change adaptation plans for each of our routes and are developing a Network Study on the resilience of the railway network. The Commission could usefully incorporate this work into a national, multi-sector view of the resilience of the UK's key strategic infrastructure.

Rail freight is usually only one link in a multi-modal supply chain incorporating roads, rail, ports infrastructure and strategic freight terminals. This creates interdependencies not just with other transport modes but with the planning system through which new strategic infrastructure is approved. The planning system also interacts with rail through housing provision which needs to be planned in coordination with infrastructure across multiple sectors. Network Rail would welcome the Commission's consideration of these interactions.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

Network Rail agrees with the cross-cutting issues which the Commission is proposing to focus on through its National Infrastructure Assessments. All of these are likely to be relevant to the rail sector. It is through focusing on these cross-cutting issues and helping the different sectors to plan on a consistent basis, rather than by adding complexity or oversight to the detailed planning work already carried out by the rail industry, that the Commission has the best opportunity to add value to the planning of infrastructure in the UK.

Economic devolution of infrastructure funding and development is particularly critical within the rail industry. Network Rail works in partnership with organisations including Transport for the North and Midlands Connect in order to consider the role of infrastructure in supporting connectivity and economic growth.

Network Rail's devolution of accountability to its route based organisations and their empowerment to work with local and regional funders, as well as national funders, reinforces the importance of supporting different models of funding and financing for large scale infrastructure projects. The Commission could consider the potential and appropriateness of a range of funding models to support projects, in particular the potential for commercial funding. The impact on the cost, delivery and resilience of a project should also be considered. Wider socio-economic benefits and system effects should be accounted for in relation to funding models, and the proposal for the NIA to examine

existing appraisal methodologies and frameworks should provide an opportunity for consideration of this.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

Network Rail considers that the Commission has identified a comprehensive set of cross-cutting issues which are relevant to the rail industry.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

The Commission has set out an ambitious methodology to determine the infrastructure needs and priorities of the UK over the next thirty years. It is important that there is clarity of the respective roles of Network Rail, the Commission, Government departments and devolved funders so that there is no uncertainty or complexity added to the process for the development and delivery of projects. It will also be essential to have clarity about the fiscal remit of the Commission and in particular whether the projects being developed by Network Rail will be considered within it. In the future, Network Rail expects enhancement projects to be funded progressively rather than in multi-year funding settlements as has previously been the case. This should be taken into account if rail enhancement schemes are to be funded within the Commission's fiscal remit.

In developing the NIA it will be essential that the Commission engages with the detailed planning work within each infrastructure sector. Network Rail's planning work is delivered through the Long Term Planning Process (LTPP) which has been designed to consider the role of the railway in supporting the UK economy over the next 30 years. The LTPP comprises of a set of activities and documents that:

- Address the demands that are likely to be placed on Britain's rail network over the next 30 years
- Capture stakeholder aspirations to develop new train services in the light of continuing rail investments
- Present investment choices for funders to accommodate demand and future aspirations

The LTPP takes a network wide perspective and involves the whole rail industry in identifying priorities for future rail infrastructure investment.

Following the Bowe review into the planning of Network Rail's Enhancements Programme 2014-2019, Network Rail has made improvements to the way in which the delivery of enhancement projects is jointly governed and managed with the Department for Transport. This process has been set out in a Memorandum of Understanding agreed between Network Rail and the Department for Transport. Additional governance has been put in place to assist the timely and efficient delivery of works. Network Rail now develops a pipeline of projects which are put through a series of joint decision points so that funding is committed progressively and the value for money of the outputs being delivered is tested at key points in development. This process is intended to apply to all DfT funded railway enhancements projects delivered by Network Rail.

The Commission should avoid duplicating these detailed planning and development processes and focus on areas where it can add value to the LTPP and to equivalent processes in other sectors. This can be achieved by focusing on the cross-cutting issues identified in the consultation and by developing consistent planning assumptions and scenarios which can be used across the various sectors. Such assumptions could cover strategic priorities, levels of funding available, appraisal assumptions and future housing provision, and would ensure that different infrastructure sectors are planning for a consistent set of outcomes.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

As the consultation document describes, scenarios are a useful approach to address uncertainty in planning for the future. They are employed in the LTPP to take account of different policy and economic developments which could influence the future demand for rail travel. The LTPP scenarios are defined by the performance of the economy, measured against the strength of other national economies, and by social and environmental planning, measuring the extent to which Great Britain is willing to intervene to address the negative impacts associated with modern society and globalisation, and the extent to which technology enable interventions.

There are four long term economic outcomes considered, overlaid with different social and environmental planning environments:

- Prospering in global stability. The British economy is strong, prospering through its integration with other national economies by exporting high value products and importing low value products. Britain takes an active role in solving social and environmental problems, partly to maintain a stable service industry for its high value activities and a stable supply chain for the imports it requires, and partly because its technological advancement and high national wealth allows this to be done without worsening individuals' standard of living.
- Prospering in isolation. The British economy is strong, prospering by concentrating on domestic production in isolation from global market pressures. Britain takes little interest in solving social and environmental problems. This is partly because it has neither a dependency on stable foreign import markets, nor a stake in global technological innovation, and partly because the mixture in value of domestic economic activities undertaken to maintain self-sufficiency prevents redistribution of domestic resources without worsening individuals' standard of living.
- Struggling in global turmoil. The British economy is performing poorly, struggling to compete in high value export markets as the global supply chain and credit markets are volatile and other countries improve their employee skill levels and resource base. Britain takes an active role in addressing social and environmental problems, partly in an attempt to stabilise global import and credit markets, and partly because global technological innovation allows it to do so without worsening individuals' standard of living.
- Struggling in isolation. The British economy is performing poorly in the absence of both an export market for its high value products and a source of inexpensive imported materials and technological innovation to support domestic production. Britain takes little interest in solving social and environmental problems as it has neither the wealth nor the technology to achieve this without worsening individuals' standard of living.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?**

The Commission has identified the most significant infrastructure drivers. All of these drivers are relevant to rail and the wider transport sector. The link between infrastructure and economic growth and agglomeration has particular relevance for the transport sector.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

Network Rail would welcome further clarity on the scope of the portfolio of investments recommended in the NIA and the fiscal remit which will accommodate it. It is unclear whether this is expected to include all infrastructure schemes in the UK, or if it is limited to large schemes of particular strategic

importance, or to all schemes which contribute to key strategic outcomes defined by the NIA. The scope of this portfolio will be crucial in determining the interaction between the NIA and sector-specific planning processes.

The NIA can best determine an appropriate portfolio of investments that meets the demands of the UK in the future by building on the detailed planning work which is carried out within each sector. The Commission can add value to these processes by ensuring that the portfolios of investments recommended for each sector are consistent in the outcomes which they deliver. For example, the investments proposed by the energy sector must be sufficient to deliver any additional capacity required for electrification schemes being delivered by the transport sector. Similarly, the Commission can consider the transport system as a whole and ensure that investments made across the different modes support a coherent set of outcomes.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

Network Rail would welcome the Commission's consideration of the future distribution of new housing and how the infrastructure sectors can best plan to accommodate this. Without considering and making assumptions about future housing development it will be difficult for the Commission to plan future infrastructure needs effectively or develop business cases for proposed interventions.

The Commission should also consider how decision making processes around infrastructure investment can be sufficiently flexible to account for different scenarios as they develop. Decision making would benefit from being spread over time to avoid over-committing investment to a scenario which does not materialise as expected.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

Network Rail would welcome the Commission's engagement with the LTPP, which incorporates expertise from all parts of the rail industry to plan for future capacity and capability challenges on the railway. The Commission's proposed call for evidence during the autumn of 2016 will allow Network Rail to provide further detail about existing forecasts, studies and plans across the rail industry, and Network Rail would welcome ongoing dialogue with the commission as well as the opportunity to contribute to the expert panels and workshops detailed in the consultation document.

**National Infrastructure Commission Response by [name redacted] of North Star Solar**

North Star Solar is a new entrant into the market seeking to provide battery and solar solutions to the entire network ranging from National Grid Balancing Services, to DNO constraint management, Industrial and Commercial applications all the way through to domestic installations of battery and solar solutions.

[name redacted] [personal information redacted].

Q1. The Government has given the National Infrastructure Commission objectives to:

foster long-term and sustainable economic growth across all regions of the UK

improve the UK's international competitiveness

improve the quality of life for those living in the UK

What issues do you think are particularly important to consider as the Commission works to this objective?

**The most important aspect of the NIA work is to ensure that they take a whole system approach to these complex matters as one cannot divorce CO2 management, energy supply, transportation, fuel poverty or health. In terms of priorities it is essential that the UK remains competitive in terms of managing these issues in order that it can continue to create wealth and jobs. How those wealth and jobs are shared across the country then becomes a secondary but very important issue for social cohesion.**

Q2. Do you agree that, in undertaking the NIA, the Commission should be:

Open, transparent and consultative

Independent, objective and rigorous

Forward looking, challenging established thinking

Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Are there any principles that should inform the way the Commission produces the NIA that is missing?

**I would stress the need to take a whole system approach, this is essential.**

Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

**Yes.**

Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

**Perhaps not surprisingly coming from the Energy area I think that there is the need for considerable focus on this area. In particular the market is undergoing significant changes that need to be addressed in a holistic fashion:**

- **Affordability – the cost of energy and the impact of fuel poverty. The government approach needs to ensure that we achieve a competitive cost of energy for homes and businesses.**
- **Security of supply – with political issues relating to gas and the supply from Russia we need to be aware of how and where our energy comes from. With the Brexit now happening we need to understand the role of interconnectors with Europe and how the marginal KW will flow in a European energy market.**
- **CO2 reduction – we need a path to sustainable low carbon energy supply that keeps the lights on but which is affordable to businesses and consumers.**
- **Technology – the roll out of smart meter and the mass deployment of batteries is a game changer of the energy markets across the world. With prices for batteries and solar due to fall significantly it will disrupt the market creating both opportunities and threats to UK plc.**

**Without considering these issues as a whole the UK risks locking itself in to expensive high carbon solutions which are not optimal. Examples of this are readily available eg 2 GW of Diesel back up contracted by National Grid or the**

**proposed Hinckley Nuclear deal which is priced at 2x the current cost of energy and is likely to rise to 3x with escalation.**

**The Government need to reconsider the costs of intermittent generation such as solar and wind as battery costs fall into the future. There are suggestions that batteries are likely to fall by 20% a year for the next 4 years due to global scaling of production to satisfy demand.**

**Modelling of battery deployment suggests between 12- 30 GW of batteries could be deployed by 2030 saving the UK plc over £2bn a year in energy costs and leading to significant CO2 savings.**

**Other issues that need to be considered are that with more embedded generation of solar and batteries, who pays for the National Grid Transmission Networks and how are these costs recovered from consumers and businesses? Is there a higher fixed connection charge and if so what is the impact on fuel poverty?**

Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?

**The interconnection of insulation in housing, the cost of energy and the impacts on fuel poverty and health are important to consider. Consider a simple example of an elder patient who cannot leave hospital after an operation because their house is cold. This incurs significant costs on the NHS in terms of bed blocking.**

**A solution to problems like these is using existing government legislation which allows energy savings to repay the costs of energy saving measures. This; A) relieves the NHS of costs; B) helps provide a warm home; C) is at no cost to tax payers; D) helps carbon emissions.**

Q6. Do you agree that the NIA should focus on these cross-cutting issues?

**Yes.**

Q7. Are there any other cross-cutting issues that you think are particularly important?

**Health, housing and fuel poverty.**

**Transport development and housing developments. I was [job title redacted] of the Toronto Board of Trade and as such played a role in working with local and national governments to set out a transportation plan that created economic growth**



**funded by increased rates from property developments. In essence we securitized part of the future benefits accruing from putting in transportation investment.**

Q8. Do you agree with this methodological approach to determine the needs and priorities?

**Yes.**

Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

**Sadly there are not many models that come to mind from an energy perspective on total holistic planning. There is clearly a significant opportunity and risk to the UK Plc in getting this right. It is possible that we can create an export market for smart grids, battery and solar deployment that could be exported elsewhere as other countries go through this transition. What is fairly certain is that solar and battery deployment along with smart grids will become a global market place.**

**Significant work has been conducted on how to position the National Grid in light of new technologies versus a decades-old infrastructure. Getting this model right will lead to significant value creation, not only savings for the Grid and for end-users, but it will also create a specialised services industry which can export these skills to other Grids worldwide. As a services industry based economy, the benefits for UKplc will be significant. If however, recommendations are not implemented the Grid as we know it today will become far more expensive to run and maintain.**

Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?

**Please see above comments.**

Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

**In energy terms the NIA should consider how to adopt a low carbon pathway that seeks to have the least regret and that allows for new technology to develop. This means not locking into long term large deals but understanding what the future needs are likely to be (flexibility versus base load, electrification of cars, gas to electricity heating etc). The key questions are not whether battery and solar will**

**be adopted at scale but how fast will prices fall and therefore how fast will it happen.**

**In energy terms the NIA should consider how to adopt a low carbon pathway that seeks to have the least regret and allows for new technologies to develop. This means creating a framework which is flexible and allow adjustments along the way to take into account of likely technological changes eg falling prices of batteries etc. It does however rejecting certain technologies that are never likely to reach sustained scale and therefore compete on price with on-shore wind, solar or batteries.**

**The most appropriate methodology is determining which forms of investment can, or will be funded from independent institutional capital. Getting these investors comfortable with the technology risk, interface risks and deployment risks is paramount to expanding long-term infrastructure spending, rather than relying solely on public financing. The appetite for this debt from the private sector is very deep.**

**Over and above this, understanding what the future requirements are likely to be; flexibility versus base load, electrification of cars, gas to electricity heating etc. Key is flexibility and understanding and knowing what can or cannot be financed helps create flexibility.**

Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

**Yes – in part answered above, the NIA need to address the ability to attract private financing in particular from large institutional and pension fund investors. With long term interest rates close to zero or negative the ability to attract long term funding to stimulate the economy today and create productivity benefits for the future is essential.**

**For example a few large pension funds have indicated that they would not support building more CCGT in the UK on the back of the capacity mechanism as they regard this technology as potentially becoming a stranded asset as solar and battery deployment is accelerating. They have sufficient high carbon assets in their portfolios which risk becoming stranded already. Looking at the work that the Bank of England is doing on sustainable investment is another key input for the NIC.**

Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions

**Creating workshops/groups which provide the Commission with independent advice including pension funds, and experts from other markets eg Australia, USA**



National Infrastructure Commission  
1 Horse Guards Road,  
London,  
SW1A 2HQ

5<sup>th</sup> August 2016

### **Consultation on National Infrastructure Assessment**

Northern Gas Networks is the gas distributor for the north of England, northern Cumbria and most of Yorkshire. We transport gas to 2.7 million homes and businesses. Our distribution network includes 23 offtakes from the national transmission system, 179 above 7 bar pressure reduction installations, 2,588 district governor and large industrial / commercial installations and 37,000 kms of underground pipelines.

Gas is the principal source of non-transport energy consumption in the UK accounting for 54% of total direct final energy consumption excluding petroleum. Our network is therefore a critical piece of national infrastructure and at times of peak energy demand transports 5 times more energy than the electricity network in our region.

Gas is a comparatively inexpensive source of energy for domestic heating with electricity systems costing over 3 times as much as gas.

Our response to the detailed questions in the consultation are attached. If you wish to discuss any aspect of our response please do not hesitate to contact me.

Yours sincerely,

**[name redacted]**

**[job title redacted]**

*[phone number redacted]*

*[e-mail address redacted]*

**Q1. What issues do you think are particularly important to consider as the Commission works to;**

- **Foster Long term and sustainable economic growth across all regions of the UK**
- **Improve the UK's international competitiveness**
- **Improve the quality of life for those living in the UK**

In relation to the energy sector there are three areas we think should be focused on:

## **1 Improving Energy Efficiency**

This offers significant opportunities to make the UK more efficient, alleviate fuel poverty and reduce our carbon emissions. We support many of the comments being made by NEA in their response to this consultation regarding the reduction of financial resources being deployed in this area. We therefore support and encourage NIC to ensure increasing domestic energy efficiency is fully considered and central to:

- The creation of any expert panels and the running of roundtables in 2016/17;
- Any Calls for Evidence in Autumn 2016 – including “sector evidence reviews”, “economic and engineering modelling”, and “scenarios”
- The Vision and Priorities paper (up to 2050) to be published in summer 2017

## **2 Making best use of existing Infrastructure**

Decarbonising heating remains a potentially challenging aspect of UK emissions reductions given the relatively low cost of gas heating, the extensive nature of the existing infrastructure and supply chain, and high degree of customer satisfaction with the current technology.

There is increasing understanding that utilising the existing gas infrastructure offers the lowest cost pathway to a decarbonised heat and transportation system. To facilitate this it is important that the UK invests in green gas technologies including methane generated from renewable sources, such as anaerobic digestion and bio-substitute natural gas (BioSNG) and hydrogen. NGN and the other gas distribution companies are already stimulating investment in these areas through a number of innovation projects and the NIC should consider how these can be further encouraged and developed at a national scale.

The H21 Leeds City Gate project is a study with the aim of determining the feasibility from both a technical and economic viewpoint of converting the existing natural gas network in Leeds to 100% hydrogen which could potentially lead to a significant decarbonisation of heat in the UK. NGN believes it is vital that this solution is considered as part of a holistic future UK energy mix.

### **3. Encouraging Multi Vector Solutions**

It is vital to fully assess the ability of various heat sources to meet current and future needs in acknowledgement of the fact that no single heat source or technology has all the answers and the long term solution probably rests in a variety of complementary technologies. Encouraging greater cooperation across different sectors should be facilitated.

NGN's experiences working in partnership cross utility may also provide some insight into further opportunities geographically. Currently NGN works with Northern Powergrid, Northumbrian Water and Yorkshire Water on social, innovation and sustainability programmes.

**Q2. Do you agree that in undertaking the NIA the commission should be:**

- ***Open and transparent***
- ***Independent, objective and rigorous***
- ***Forward looking challenging established thinking***
- ***Comprehensive taking a whole system approach, understanding and studying interdependencies and feedbacks?***

The above forms a good list of guiding principles on which to operate, and will ensure progress and activities are met and supported within a spirit of cooperation and ensure enduring ownership.

Perhaps additional areas that could be considered;

- Inclusive aspects that are associated with diversity either personally or geographically may be implied, but are not clear, this can become important when engaging stakeholders from rural communities are those representing vulnerable groups.
- Solutions should be owned and be acceptable, issues such as shale gas, can be emotive and divisive, as such the commission needs to be aware of this and work to establish ownership for solutions in order that they can become sustainable in the longer term.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

NGN is a gas distributor, as such of particular relevance are energy aspects, however, as stated this is not independent of other areas, such as transport and other influencing factors that bring changed/new needs for an energy infrastructure. The concept looking at energy systems as a whole are welcomed, particularly aspects related to quality of life, where currently obligations can be misaligned causing confusion and a lack of integration to bring maximum benefit, similarly the links associated with heat should be considered

more closely to avoid unnecessary activities around infrastructure upgrade that could be avoided, through using “right solutions”. Reference to low carbon solutions should be supported further by reference to alternative fuels, such as hydrogen or opportunities through shale gas.

***Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?***

Infrastructure is critical to the effective functioning of society, at both a commercial and domestic level. The UK gas infrastructure is amongst the most comprehensive and advanced the world. It is well maintained, extremely reliable and has received, and continues to receive, significant financial investment from the private sector.

Where customers have ineffective or no infrastructure, they are significantly disadvantaged. Considering this from an energy perspective, those living in rural communities with no access to the gas network are more disadvantaged, and worthy of additional consideration.

Extending and improving infrastructures can bring significant benefits often to those that are vulnerable and hard to reach. Whilst commercial aspects need to be considered, from an energy perspective, alternative solutions such as hydrogen and shale, may bring opportunities to these communities as well as massively reducing carbon outputs.

As well as examining a range of alternative gas sources (such as hydrogen), NGN is also conducting a study into the opportunities that exist to positively impact customers in disadvantaged rural communities by minimally extending our existing network (up to 50 metres). This is another exercise that could be worth examining on a national level.

***Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important***

As we outlined in our response to Q1 long term solutions to the decarbonisation heat are likely to rest on a mix of different technology solutions.

Interdependencies exist and it is right that they are recognised. Often, influencing factors for a particular sector can provide visibility of future needs, if these are identified, in good time efficiencies can be gained from partnership working. For example new developments, commercial or domestic, if identified early, can be considered more effectively from an asset/infrastructure upgrade/install, and can additionally benefit from better planning and operational delivery i.e. installation of Networks in advance of road infrastructure schemes.

These can also operate on a socio economic level - early identification of opportunities can result in timely interventions and better long term outputs.

Of particular note regarding energy, water/drainage and waste schemes can provide early visibility of diversions and should be considered, additionally transport and communications can provide early opportunities to avoid more expensive schemes through opportunities for partnerships through early construction stages.

***Q6. Do you agree that the NIA should focus on these cross-cutting issues?***

Yes. This list is comprehensive and provides a good focus for the work of the NIC.

***Q7 Are there any other cross-cutting issues that you think are particularly important?***

How assets are being managed and maintained is another cross-cutting issue that is of particular importance as this directly impacts the life cycle and performance of the assets.

***Q8. Do you agree with this methodological approach to determine the needs and priorities?***

Yes. Particularly welcomed as included within this response by NGN is the consideration of impact on customers of options. This will ensure early engagement and identification of support and concerns. These can, in turn, be considered. The proposal to work with experts in the field is also a worthy intention, although this may provide challenges due to differing priorities and will need a level of impartiality that may prove difficult on sensitive and emotive infrastructure proposals

***Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?***

NGN has been at the forefront of the development of a collective measurement of the health and risk associated with gas distribution assets. Subsequently the impact the proposals/investments in business plans make upon the health and risk of the assets over the regulatory period.

A risk assessment and reporting solution has been developed to ensure health management is appropriate to the needs of the Gas Distribution Network. This process identifies the potential impact arising from the unavailability or failure of a network's assets through the assessment of the consequence and risk associated with such failures. Risk values are represented in monetary terms as a "common currency" for comparison between different failure types and Asset Groups. This defined common currency for the statement of asset risk is subsequently referred to as Monetised Risk. The effect of example intervention plans and the associated risk impact is also calculated. This enables the comparison of current and future with- and without intervention scenarios using both



a relative asset Health value and an absolute Monetised Risk value for each planned intervention.

This model may provide an example of best practice.

***Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?***

Given that fuel poverty is now a significant part of Government agenda and despite plans to reduce, continues to cause more challenge and will be influenced by fuel prices, a longer-living population and low carbon agendas, perhaps this should have more prominence.

Options would undoubtedly benefit from third sector input and also from changing technologies through alternative gas sources, such as hydrogen and shale, along with electricity storage, these areas will bring significant changes to our current infrastructures, both current, planned and yet to be considered.

***Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?***

Avoidance of network infrastructure upgrades through more efficient and diverse energy mixes, a recognition of the benefits of a more integrated and harmonised policy for conservation of energy, effective use of new technologies as they become available, partnership working to avoid disruption and maximise likely outcomes of key projects.

***Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?***

Reference to existing groups and having due regard and close relationships with the CCC and Committee on Fuel Poverty and the Department for Business, Energy and Industrial Strategy (BEIS) Methodology Working Group, and use of current delivery vehicles through industry groups, GDNs, DNOs

Emerging studies and reports that look at the future role of gas should be given due consideration, eg. The Green Gas Book (2016, sponsored by the ENA), KPMG's 2050 Energy Scenarios (July 2016) and Managing Heat Decarbonisation by Dr Keith MacLean, Dr Robert Sansom, Tom Watson, Dr Rob Gross from Imperial College London's Centre for Energy Policy and Technology (April 2016).

***Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?***

Proposals as outlined form a sensible solution for engagement, review and dissemination, ideas around best practice, both internationally and nationally are referenced and should be explored, as should high impact and successful programmes as delivered by industry with the sectors covered.

Effective governance and engagement along with thorough and robust plans for communication should be considered at the early stages. Learning should be sought from other successful and unsuccessful engagement programmes.

Early establishment of influencing groups should be put in place in order to help shape future working, NGN would be delighted to help, should the opportunity arise.

5 August 2016

NIA Evidence  
National Infrastructure Commission  
1 Horse Guards Road  
London  
SW1A 2HQ

Dear Sir or Madam

**Northumbrian Water response to National Infrastructure Commission (NIC) consultation on the National Infrastructure Assessment (NIA) Process and Methodology**

We are aware that Water UK, who represent all major water and sewerage service providers in the UK have responded on behalf of the industry setting out the industry's response to the consultation. Northumbrian Water Group (NWG) are very pleased to also have the opportunity to respond to this consultation.

We would like to start by saying that we are delighted that the NIC has been established and believe the process and methodology outlined in the NIA consultation document demonstrates a real desire to consider the infrastructure of the UK on a strategic, cross sector, collaborative and long term basis.

Regarding water resources and supply, a well established process of water resource management planning exists in the UK which assesses the ability to meet future demand by looking forward 25 years, taking account of factors including population, economy and climate change. This is certainly a model of good practise but the industry is constantly looking to improve and become more resilient and we are pleased that the NIC is proposing to challenge established thinking and the NIC is able to provide a crucial role in ensuring a clear direction on resource management based on national priorities. From an NWG perspective, we have robust and resilient water resources both in the north through the strategic investment in dams and impounding reservoirs at Kielder in Northumberland over three decades ago and more recently at Abberton in Essex, where our new facility was opened in 2015.

More broadly catchment based solutions are increasingly a focus of our industry whether in regard to protecting our water abstraction sources or in considering the environmental impact of our consented waste water discharges.

Regarding waste water, we have a real focus on our networks where issues include complex urban drainage, with not all drainage related assets owned or managed by water companies. There is a huge amount of effort and planning going into the 21<sup>st</sup> Century Drainage Programme, including mapping out the complex arrangements of ownership, and accountability. The drive behind this programme is to provide the evidence base to ensure that future decision making, investment and operation is collaborative and coordinated, leading to an effective and resilient network throughout the UK. Water Companies are also working closely with Defra on understanding urban drainage systems. The Water UK response adds more detail about this excellent programme and this work will benefit from the NIC's challenge and will also inform the NIA through the call for evidence in 2017.



From a waste water treatment perspective, our business has transformed in recent years. We treat waste to an exceptionally high standard and return effluent to the environment. One hundred percent of the resulting sludge from the process (or *fuel* as we like to think of it) is collected via a lean logistics operation, fed into our Advanced Anaerobic Digestion Plants and used to generate electricity through combined heat and power (CHP) processes or injected as biomethane via the water industry's largest gas to grid plant.

An area of critical importance is taking a strategic approach to new development and strategic planning, particularly from a waste water planning perspective. We have excellent strategic relationships with all of the relevant local authorities and play a key part in strategic drainage planning at an early stage. However, a more holistic, coordinated and focussed approach to new development and in particular the management of surface water through Sustainable Drainage Systems (SUDS) would benefit society as a whole leading to lower costs, increased capacity and resilience, and the enhanced degree of biodiversity that well planned schemes of this type can bring. Changes to legislation which currently allow an automatic right to connect to a public sewerage system may facilitate the necessary change in thinking.

As well as new developments, working collaboratively to retrofit SUDS to existing developments will be key to ensuring network resilience. At NWG we believe we are leading in this area with some excellent examples, including an innovative scheme at Brunton Park where partners include NWG, the Environment Agency and Newcastle City Council (the Lead Local Flood Authority).

It is important to appreciate inter-sector interdependencies and the importance of resilience across sectors. For example, a power supply that fails can cause a direct loss of power to customers but of course can have far wider impacts including a water supply interruption or an environmental discharge. Strategies for this *collective resilience* could be many and varied; from more resilient power networks to better battery technology. Equally, the reliance on good 4G and 5G data networks is critical if we are to maximise the benefit of technological improvements that allow us to efficiently deliver the unrivalled customer service that is our aim at NWG. From the opposite perspective our investment in the Tyneside Interceptor scheme has helped clean up the River Tyne and facilitated a revitalised Newcastle and Gateshead Quayside, a picture of which is featured in your consultation document.

We welcome the NIC's commitment to consider infrastructure in a collaborative and holistic manner. Water is such a critical part of our lives in so many ways and we are passionate about its long term sustainability. Equally, sound environmental decisions require other sectors to work closely with us to ensure that the outcomes we all desire are achieved.

Sometimes physically seeing examples and discussing them with those involved can be helpful and we would be delighted to facilitate a visit to see some of our leading infrastructure examples such as our Brunton Park SUDS and flood alleviation scheme, Kielder Reservoir, our AAD and Gas to Grid plants, and our Tyneside Interceptor scheme. Please advise if such a visit would be of interest.

We trust this response proves helpful and we would be very pleased to provide any information that the NIC may find useful, and commit to work with you to ensure that your perspective on the water sector is transparent, well informed and evidence based.

We look forward to hearing from you soon.

Yours sincerely



[signature redacted]

[name redacted]

[job title redacted]

## **National Infrastructure Assessment: Process and Methodology consultation**

The Nuclear Industry Association (NIA) welcomes this opportunity to respond to the NIC's consultation on its plan for producing a National Infrastructure Assessment.

NIA is the trade association and information and representative body for the civil nuclear industry in the UK. It represents over 260 companies operating in all aspects of the nuclear fuel cycle, including the current and prospective operators of the nuclear power stations, the international designers and vendors of nuclear power stations, and those engaged in decommissioning, waste management and nuclear liabilities management. Members also include nuclear equipment suppliers, engineering and construction firms, nuclear research organisations, and legal, financial and consultancy companies.

As major investors the nuclear new build developers are better placed than the NIA to comment on the detailed proposals and will be making their own submissions. We would however like to make some broader points.

### **Overview**

The NIA strongly supports the creation of an independent National Infrastructure Commission to consider the UK's long term infrastructure needs. Large scale projects are often affected by the political life cycle and the independent NIC should help overcome this issue and provide greater certainty for both the public and investors.

In this context the NIA also supports the proposal to undertake a National Infrastructure Assessment once a Parliament to analyse the UK's long term infrastructure needs, outline a strategic vision and set out recommendations. We believe this process will enable the NIC to make an effective contribution to ensuring the UK's infrastructure needs are met.

### **Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

### **What issues do you think are particularly important to consider as the Commission works to this objective?**

Given the provision of affordable and reliable energy is fundamental to maintaining all three of these objectives the energy sector, and specifically the electricity sector, should be a key sector for the Commission's focus. As the Commission notes electrifying transport and heat to meet the UK's carbon targets could more than double demand on the power sector from today's levels.

Even without this the UK needs huge investment in new generating capacity. Since 2010 30% of our capacity has closed, and by the end of 2030 a further 35% of that 2010 capacity will shut down. Our current fleet of nuclear stations currently generates about 20% of the UK's electricity, but even with life extension all but one of these stations are set to close in the next decade and a half. It is vital that a start is made on building new low carbon

technology to replace this – new nuclear, renewables and potentially Carbon Capture and Storage.

Three developers EDF Energy, Horizon Nuclear Power and NuGen – have plans for 16 GW of new nuclear build in the period to around 2030. This will not only help secure our energy policy and climate objectives but bring enormous benefits to the UK economy in terms of jobs, skills and our global industrial competitiveness.

However these are long term capital intensive projects entailing a combined investment of around £60bn. Financing on this scale will only be forthcoming if investors are confident in the stability of UK energy policy over a long time scale, and the new National Infrastructure Commission can make a major contribution to securing this.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

We agree these are the right principles for the NIC to undertake the NIA.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

The NIA broadly supports the proposed approach to these sectors. With regard to transport we agree that it is important to better understand the impact of future transport provision on the energy sector, in particular electrification. On energy we agree on the importance of the shift to low carbon solutions in the context of the UK's carbon targets.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

We very much support the approach of pulling together infrastructure needs across sectors. As mentioned above developments in transport infrastructure could have a major impact on electricity requirements.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

We agree this is a sensible list of cross-cutting issues for the NIC to focus on.

- Q8. Do you agree with this methodological approach to determine the needs and priorities?**
- Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**
- Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

The NIA supports the proposed methodological approach to determining the needs and priorities, and agrees the NIC has identified the key infrastructure drivers. With regard to climate change and the environment driver, as noted above the need to replace electricity infrastructure will be important.

- Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**
- Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

The NIA generally supports the Commission's proposed approach.

- Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

The NIA believes that the extensive range of engagement tools outlined by the Commission should provide the necessary evidence base to underpin the Commission's work.

**NIA**



Making a positive difference  
for energy consumers

NIA Evidence  
National Infrastructure  
Commission  
1 Horse Guards Road  
London  
SW1A 2HQ

Date: 5 August 2016

Dear colleagues,

**Ofgem's response to the National Infrastructure Commission's consultation on 'The National Infrastructure Assessment: Process and Methodology'**

We appreciate the opportunity to respond to your consultation of 26 May 2016 on the National Infrastructure Assessment (NIA). We also found it helpful to discuss some of the issues raised in the consultation with your team before preparing this written response.

Ofgem is the Office of Gas and Electricity Markets, the independent economic regulator of Great Britain's (GB's) electricity and gas markets. Our aim is to make a positive difference for energy consumers. We work effectively with, but independently from, Government, the energy industry and other stakeholders. We do so within a legal framework determined by the UK parliament and the European Union.

As you know, we have worked with the National Infrastructure Commission (NIC) to date in order to inform the 'Smart Power' report, published in March 2016. We look forward to working with the NIC further as you confirm your approach to the NIA, and as you produce the first iteration in 2017 and 2018, in particular on energy-related issues and content. The paragraphs below set out some high-level views on the NIA consultation, and reference some areas of Ofgem's work that we think will be particularly relevant and important to take account of. We would be happy to follow up on this response with a more detailed discussion of these issues.

Broadly we think the proposed approach to the NIA set out in the consultation seems sensible and well-considered. This seems to cover the areas that we would expect a NIA to consider. We think the relevant sectors and cross-cutting issues have been identified. In particular, the energy sector faces a number of challenges as we move towards a sustainable and low-carbon economy. The need for further infrastructure investment (alongside options to make better use of our existing assets) is well-documented.

The consultation notes that working with sectoral experts will be important as you work to produce the NIA. To this end we would be happy to discuss how Ofgem's specific experience in regulating the energy sector could be relevant. Ofgem's work in the following areas may be of interest:

- Our experience in considering long-term infrastructure planning and regulatory issues as part of our Integrated Transmission Planning and Regulation (ITPR) project.



- Our work, following ITPR, to provide more coherent long-term network planning in the electricity transmission sector by enhancing the role of the System Operator (SO). The SO is now responsible for an annual GB Network Options Assessment, as well as existing input into European planning processes for long-term infrastructure priorities under the European Energy Infrastructure Package.
- Our consideration of the drivers of energy system and market change that have the most material impacts on consumers, and implications for regulation, through our work on horizon-scanning.
- Our consideration of how to facilitate the transition to a smart and flexible system. This includes the examination of roles and responsibilities in network and system operation (including more active management of networks), and facilitating efficient levels of electricity storage and other forms of flexibility.
- Our work to extend competition in delivering electricity network investments – offshore, onshore and interconnectors – and balancing centrally-identified delivery with the benefits of market-led approaches.
- Our experience in complex and long-term system modelling, for example as part of our assessment of new interconnector investments.
- Our ongoing work to reduce and remove barriers to infrastructure delivery, such as those relating to financing and the supply chain.
- Our experience in enabling network companies to propose innovative solutions to the challenges that they face through discrete innovation funding mechanisms.

It will be important for you to engage across the energy industry, including with customer and stakeholder groups. We work closely with other GB economic regulators and are a member of the UK Regulators Network (UKRN). We have contributed to UKRN's ongoing work around cross-sector resilience; identification of infrastructure needs; and sharing of best practice with regard to infrastructure delivery. We think this work will be of relevance for the NIC when undertaking the NIA.

We are happy to meet with you to discuss our response in more detail. Please contact [name redacted] ([\[email address redacted\]](#)) in the first instance.

Regards,

**[name redacted]**  
**[job title redacted]**

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## **National Infrastructure Commission**

### **The National Infrastructure Assessment - Process and Methodology'**

#### **Consultation response from Ofwat**

#### **Introduction**

Ofwat is the economic regulator for the water and wastewater services in England and Wales. We are a non-ministerial government department and oversee licensed private companies delivering water, sanitation and drainage services. We ensure that companies deliver services efficiently and with regard to the resilience of systems and services, and ensure that they put customers at the heart of their work.

As a regulator, an important part of what we do is to set limits on the prices of monopoly services. We also use markets to help allocate resources efficiently and to enable and encourage service providers to find new and better ways of doing things. Together, markets and regulation enable us to ensure delivery of better outcomes for customers and society.

We welcome this opportunity to comment on the National Infrastructure Assessment Process and Methodology, and we look forward to continuing a productive and collaborative working relationship with the commission.

The main points we would make are:

1. We are pleased that the proposed process and methodology intend to work in combination with existing planning/financing processes for water and wastewater services.

We believe our role as an independent economic regulator remains vital to the provision of affordable, resilient and sustainable infrastructure in relation to water and wastewater services. Paragraph 68 makes reference to 'changes to regulatory or market structure' as options for cost-effective infrastructure. Given the timescales for our Water 2020 programme, market development and the planning to inform the next Periodic Review for water and wastewater services we would ask that the commission clarifies its support for these process early to avoid uncertainty. We have committed to providing the methodology statement for our next price review for

consultation by July 2017, and so anything that would affect this would need to be clear well in advance of the date or risk injecting uncertainty into the price review process.

2. We note that the NIC's approach attempts to take a broad view of the demand for infrastructure services. In driving a customer-centric view of water services, we have sought to ensure that companies focus on their customers and do so in a way that is not narrowly restricted to the customer as consumer of water services, but also as a citizen who cares for the environment and the longer term. However we do link this back to the fact that under present system, it is the present customer that pays the bill. We believe that our approach could have wider relevance for the NIC as it develops its approach, and we would be happy to discuss.

We think it is vital that the work of the commission builds on this customer focus, and the legitimacy it brings. There is a risk that infrastructure providers and their investors could interpret the NIC analysis as being a top-down approach, rather than one which builds on the vital role of customer engagement and involvement in decision making. It is therefore important that the NIC focuses on strategic direction to national infrastructure planning rather than local service provider plans.

3. Similarly, we think the approach should consider risks and who bears them as well as costs in a narrow sense. A particular scheme may be low cost, but that maybe because customers are bearing a lot of risk. This may mean that the commission cannot do its cost benefit analysis without taking a view on risk allocation and, to an extent, on financing arrangements. At the very least it will need to make clear its assumptions. We do have experience, especially in relation to the recent Thames Tideway Tunnel project, of different approaches to risk allocation and their impact on financing costs. Using an innovative approach to allocation of risk between investors, companies and government, Tideway secured one of the lowest ever financing costs for an infrastructure project. We would be happy to discuss this further.
4. The process and methodology makes no direct reference to Wales and the devolved aspects of water and wastewater services. We regulate England and Wales and water policy is largely devolved. It will be important that the distinction between the approaches in both countries is recognised in the work of the commission that addresses the water sector. This will be particularly important if options to transfer

water resources across the political boundary were to be considered.

5. We are very pleased that the process and methodology recognises that infrastructure assets also include natural assets such as rivers and flood plains (para 39). For water and wastewater services the role of green/soft infrastructure is becoming increasingly important and relevant to ensure infrastructure solutions are resilient and sustainable to a wider range of possible futures, as well as to ensure cost-effectiveness over the long term.
6. Similarly, although we are very pleased to see the process and methodology recognising the challenge of climate change mitigation, it is not clear that it equally recognises the role and challenges related to future infrastructure for adaptation. In this regard we would encourage the commission to consider 'adaptive management' approaches to infrastructure planning (such as the Environment Agency's Thames Barrier 2100 project) to provide the framework for flexible/adaptive infrastructure delivery.
7. We believe that one of the biggest opportunities for the commission to provide additional benefits will be its multi-sector approach. This is likely to be particularly important with respect to delivering both value for money and resilience. We are aware that strong interdependencies exist across sectors related to water, wastewater and drainage services, particularly with energy and food. We are equally clear, however, that sector-based planning approaches for infrastructure may mean that some significant opportunities may not have been realised. The commission may be aware, for example, that in the recent guidance issued to water companies on their water resources management planning process, (in England co-authored by us, DEFRA and the Environment Agency and in Wales co-authored by us, Welsh Government and NRW) we have set a clear expectation that companies will look beyond their own boundaries and indeed beyond the traditional public water supply in finding the best value water resources.

Our replies to the individual questions below focus on those with most importance to our ongoing work. We would welcome the opportunity to discuss with you, and with the commission, how the responses we have made can be taken forward.

## Responses to questions

Q1: The Government has given the National Infrastructure Commission objectives to:

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

What issues do you think are particularly important to consider as the Commission works to this objective?

We would urge that the commission gives particular consideration to both customer value and resilience. In assuming customers will pay (either through water bills or taxation), it is important that future infrastructure requirements provide a valued benefit which is affordable.

We very firmly believe that the engagement of customers in the most recent water periodic review (PR14) was a significant step forward in terms of getting the best result for customers, and driving real innovation in the water sector. This view is supported by independent consumer bodies such as the Consumer Council for Water. We took this approach deliberately to get away from a tendency in the sector to work to the regulator, not to the customer. This also helped the sector to focus on the long term needs of customers, including resilience, rather than being led by top-down plans. In turn, by focusing on what customers want and are willing to pay for, the industry is able to increase its legitimacy.

Choices about resilience will impact not just customers but also the UK's international competitiveness. Confidence in the provision of water and wastewater utilities has the potential to impact inward investment. A range of potential shocks could impact continuity of water and wastewater services. Our recent work (Towards resilience: how we will embed resilience in our work [Dec 2015 [here](#)]) has shown that cost effective resilience planning is complex, involving a wide range of interdependences within the sector and across sectors.

Customer legitimacy of the sector, and our independent regulation, also help underpin investment in the sector, and we would note that this is particularly important in uncertain times.

Q2: Do you agree that, in undertaking the NIA, the Commission should be:

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

We support these principles. We would suggest that the commission might also reflect other priorities such as reducing the regulatory burden.

Q3: Do you agree that the NIA should cover these sectors in the way in which they are each described?

Yes, we support the NIA covering these sectors, although it might help to describe the water sector together as 'water, wastewater and drainage'. Currently wastewater appears as an add-on, but wastewater services are relied on equally to water services by customers in the sector and, especially in the face of climate change and increasing development, face considerable challenges.

Q4: Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

Under water, wastewater and drainage we would suggest an explicit reference to natural infrastructure would be useful given the scale of opportunities presented by green/soft infrastructure options, distributed infrastructure and demand-side solutions in combination with more traditional water company-owned fixed assets.

Q5: The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?

Water services as well as wastewater and drainage services have a range of links with other sectors. The highest profile links for water are generally with energy and agriculture (food). However, a wider range of opportunities and interdependencies exist beyond these such as the role of networks for customer infrastructure, smart metering interoperability, demand management and flood risk management.

The role of markets is likely to be particularly important with regard to an integrated infrastructure approach. Our recent work as part of our 'Water 2020' programme provides a useful example (Water 2020: our regulatory approach for water and wastewater service in England and Wales [May 2016] [here](#)). For both water resources and bio-resources, markets are being introduced for elements of the value chain where there is scope for new players and different approaches to drive down costs, encourage innovation and make better use of scarce resources and existing assets. The process of introducing these markets will shine a light on the current regulated cost base. The wholesale network infrastructure controls continue for the bulk of the pipe and treatment work assets, but the markets at either end of the value chain will help to ensure that the regulated monopoly investment is targeted better. For major investments in the regulated monopoly network (with whole-life totex value above £100m), we have said that companies have to consider explicitly how these schemes are best delivered by market testing the approach to delivery, operation and financing. We also require information on company's plans and the evidence underlying them be published, which should provide useful information for the National Infrastructure Assessment.

Q6: Do you agree that the NIA should focus on these cross-cutting issues?

We very much support the cross-cutting issues highlighted in the consultation. We would, however, like to see the approach taking more of an outcomes, rather than output approach. The shift in recent years from an outputs to an outcomes focused approach for the water sector has enabled the sector to deliver enhanced services to customers and value for money through the freedom to innovate. This approach has been particularly effective for infrastructure investment with a shift away from

traditional, often less resilient solutions, to a far wider range of interventions types providing higher value to customers and society.

Q7: Are there any other cross-cutting issues that you think are particularly important?

Climate change adaptation and mitigation are cross-cutting issues which are likely to enhance important interdependencies between sectors. The energy/water nexus is a useful example, not just with regards energy/water generation but also the carbon footprint of water use and opportunities for combined demand management approaches.

Q8: Do you agree with this methodological approach to determine the needs and priorities?

The remit and ambition of the NIA are considerable and we would again encourage that the commission seek to work with and utilise existing approaches as much as possible. Although pleased to see that the approach will include the commission developing its own simple models we would ask that transparency will be important, some aspects of infrastructure planning can be simplified but others aspects cannot if suboptimal planning is to be avoided.

We would particularly ask the commission to look at the markets and incentive framework approach being operated in water. We believe this approach is already leading to more resilient, sustainable and cost effective infrastructure development and has still further potential.

We agree with the assessment and role of scenarios. We face a range of plausible futures and scenarios can be a useful and effective tool to help with an adaptive management approach. Related to this the water sector is increasingly using Robust Decision Making approaches for future water resource planning due to the complex nature of long-term investments under deep uncertainty. We would suggest the NIA should include the use of these emerging, more sophisticated, decision support systems.

Q9: Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?



Due to the long-term nature of water resource management the sector has taken a long-term approach to planning. The baseline planning period for the statutory process of Water Resource Management Plans is 25 years, the current WaterUK national water resource assessment is for 50 years and the Environment Agency/Ofwat Case for Change assessment (2011) looked out 50, 80 and 100 years in terms of pressures and gaps between supply and demand.

For wastewater the planning approach has previously been less structured or long-term. However, the new 21st Century Drainage project represents an important step change, the project will undertake a long-term strategic review of wastewater infrastructure planning which should add greatly to the evidence base.

The Environment Agency approach on 'Long term investment scenarios for flood risk management' also provide a very useful model for infrastructure investment.

Q10: Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?

Yes, we agree these are the most important infrastructure drivers.

Q11: The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

With regard to water, wastewater and drainage we believe the most appropriate and effective approach is for the NIA to set-out a series of scenarios with clear milestones for decisions and delivery – an adaptive management strategy. We do not see that the NIA will have sufficient information to make site specific infrastructure recommendations outside of the formal planning processes and particularly the Statutory planning process for water resources. Such an approach would able the NIA to set-out its expectations for infrastructure to meet demands as a set of outcomes which can be monitored and reported against.

Q12: In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

The fiscal remit makes clear reference to the affordability on public finances. The methodology is less clear on value for money and affordability for customers. It is customers who will pay, and we would therefore suggest that the methodology recognises and clarifies how customer's interests (affordability/wiliness to pay) will be included within the approach. Similarly, it was not clear how the methodology will assess the objective 'improve international competitiveness'.

It would be interesting to understand the NIA's approach to both these areas. The approach taken in the water sector to building customer views, including on affordability, into decision-making has evolved a great deal in recent years and continues to do so as we approach our next price review. We would be happy to discuss these approaches with the commission.

Q13: How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

We have highlighted above how existing approaches in the water sector to engage with customers can be used. In addition a wide network of stakeholders/communities, which represent the wider society are also in place and can be utilised to enable the Commission to engage as needed.

# Response to consultation into the process and methodology of the National Infrastructure Assessment (NIA)

## Summary

The UK government has issued a [consultation](#) into the process and methodology of the National Infrastructure Assessment (NIA).

The Open Data Institute (ODI)'s mission is to connect, enable and inspire people around the world to innovate with data. Last year the UK government asked the ODI to [bring in the voice of data businesses and innovators](#) and promote data innovation across government.

The Open Data Institute's response is based on our focus on data, our belief in the strategic importance and value of data infrastructure. It was developed with input from our global [network](#).

## Response

Q1. The Government has given the National Infrastructure Commission objectives to:

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

What issues do you think are particularly important to consider as the Commission works to this objective?

We believe that data, and other forms of digital infrastructure, are vital to a 21st century economy; are improving people's lives in ways that are not fully captured in current statistics; and will be a major source of economic growth in the future.

Parts of this data infrastructure are [critical national infrastructure](#), even if they are not currently treated that way. If they disappeared tomorrow, if they were maliciously attacked or if their quality and usefulness was gradually eroded over time, it would cause significant economic harm.

Data such as statistics, maps and real-time sensor readings help us to make decisions, build services and gain insight. Data connects and is useful across multiple sectors improving the lives of citizens and helping businesses both be more efficient and create new products. Open weather data, for example, will be used by everyone from farmers to the transport industry to individual citizens. Mapping data is published by the public sector and then built on by organisations as diverse as Google, construction companies, and the home insurance industry to help people find their way around cities, to decide where to build homes or the premium for flooding insurance. Health data is generated in and used by health care activities; when aggregated it can be used to plan service provision and research new cures. Research and statistics are used in every sector: where they are absent or of poor quality, this hampers knowledge and innovation.

Data infrastructure includes these datasets, the technology and processes that makes them useable, policies and regulation such as those for data sharing and protection, and the organisations and people that build and maintain data. The organisations that maintain the UK's data infrastructure includes well-known public institutions such as local authorities, the NHS, the Met Office, the Land Registry, Ordnance Survey and the Office of National Statistics as well as organisations such as [Thomson Reuters](#), [Google](#), [Dun & Bradstreet](#), [Ipsos Mori](#), [OpenCorporates](#), [OpenStreetMap](#), [TransportAPI](#), [EveryPolitician](#), [Democracy Club](#), [OrclD](#) and many more.

Data cares less about the physical location of its users than many other forms of national infrastructure. Investment in data infrastructure will support regions across the UK by opening up opportunities for better services, better insights, more resilient cities and economic growth across the country.

If the UK drives the opening up and standardisation of data infrastructure globally then UK businesses will have a competitive advantage internationally. A leading example is TfL, which was one of the first city mass transit services to open up data about its transport services. TfL's open data enabled the creation of businesses such as CityMapper that first made it easier for people to move around London, then added support for cities across the world, while growing and creating jobs in the UK.

To put it another way, by opening up its data infrastructure TfL increased the impact of its investment in transport infrastructure and generated export opportunities for the UK's digital businesses. This decision had a relatively low cost and created benefits much faster than more traditional forms of physical infrastructure. The decision to open up TfL's data was taken in 2009; significant services benefits were already being received by consumers in [2013](#) when TfL reported a [return on investment of 58:1](#). Much of this value does not return to TfL: it returns to the Treasury due to other economic activity. Similar activity is happening across the country to get more value from physical infrastructure in other sectors such as [water](#), [road](#) and [cycling](#) infrastructure.

As well as increasing impact, better data infrastructure will help build other forms of national infrastructure more efficiently and effectively. Creating an environment where organisations share their data about the location of underground services - such as telecoms, gas and

electricity - can speed up construction activities and reduce the impact on citizens. Open demographic, geospatial and environmental data can help planners identify more accurately where infrastructure is and will be needed. Building in a robust data infrastructure to support physical infrastructure by collecting and sharing sensor data will help maintain that physical infrastructure.

Q2. Do you agree that, in undertaking the NIA, the Commission should be:

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

The NIA should be **informed by data** and either link to existing datasets or publish new open data that is used to inform its decisions. It should be **fair and ethical**, ensuring that all stakeholders receive an equal opportunity to input and taking account of the benefits and impact on everyone in society. It should **work collaboratively** with UK and international organisations and individuals outside the public sector that can help inform its decisions.

Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

We would recommend that the NIA include data infrastructure as a distinct sector. Data infrastructure has different characteristics to physical infrastructure. Data infrastructure is virtual. Organisations that hold, use and share data need to create and maintain public trust in how they are using data. Data creates network effects when it as open as possible using open standards in an open culture. Data infrastructure respects boundaries - whether local or international - less than other types of infrastructure. Data infrastructure should be expected to evolve: it cannot be built with the expectation that it remains static, it requires more [agile](#) approaches to development to enable it to adapt to needs and capabilities that change over time.

It does not seem likely that the NIA would be able to create a vision to 2050 for data infrastructure but it may be possible for the NIA to recommend sets of principles for strengthening [the UK's data infrastructure](#) and [making use of personal data](#) as well as a model to fund those that contribute to our public, open data infrastructure. The understanding of data and digital has changed dramatically even over the last 3 years.

The principles and funding model should encourage strategic decision making based on social benefits, environmental impacts and economic growth rather than the short term focus risked by exercises such as the [current consultation on privatising the Registry](#).

Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

No answer.

Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?

Each of the sectors - transport, digital and communications, energy, water and drainage, flood defences and waste - is connected by and can help build better and more open data infrastructure. Understanding transport usage patterns can help communications service providers plan for service provision. Insight into water usage can help with planning flood defences. More open transport data infrastructure can increase usage of transport services and increase the return on investment in the underlying infrastructure.

By encouraging each of these sectors to design and build data infrastructure that is as open as possible, the NIA can help gradually build the UK's data infrastructure and increase the impact of the physical infrastructure on which it is currently focussed.

Q6. Do you agree that the NIA should focus on these cross-cutting issues?

No answer.

Q7. Are there any other cross-cutting issues that you think are particularly important?

The consultation says that the cross-cutting issues are governance, sustainability, funding and financing, costs, resilience, performance measurement and project appraisal methodology. As well as building open data infrastructure for each of these sectors we would encourage the NIA to consider how to encourage organisations in each of these sectors to be open, collaborative and to work together to solve common problems.

Q8. Do you agree with this methodological approach to determine the needs and priorities?

We would suggest that the NIA's methodology include an assessment of the National Information Infrastructure work produced by the Cabinet Office; an assessment of current

data infrastructure initiatives; and a recommendation on how to develop a framework for data ethics and better sharing and use of personal data across all sectors of the economy.

We recommend bringing together people to discuss and map out future trends for technology, the web and data across the world and how those trends will affect the future competitiveness of the UK.

Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

The ODI, and its member organisations, use a model of [open innovation](#). They are becoming porous – using an open approach as a mechanism to improve their services, take advantage of new ideas and opportunities, and grow and collaborate more with their networks. This model can extend to whole sectors, such as [retail banking](#). This model encourages organisations to work together to solve common problems with everyone sharing in the benefits.

Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?

The consultation says that the key drivers are economic growth and productivity, population and demography, climate change and environment, and technology. We would also regard the open web as a key driver. The open web is not just about technology. Over the last 25 years the web has significantly changed the world by making it easy for people to collaborate and provide services regardless of geography.

The services that have been built and delivered over the web have significantly raised people's expectations. Whilst the web has been described as a technology trend we see its cultural, or social, impact as a significant distinguishing factor from technology such as new storage technologies in the energy sector.

Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

The future of supply chains for data is unclear. The evolution of data to a commodity is still in progress. The investment methodology in data infrastructure will need to be able to adapt as we learn what works and what doesn't. Based on our experience we suggest that securing maximum value from data infrastructure require investment in a number of different areas including:

- government institutions that enforce data protection regulation and the publication of open data from across society
- supply-side institutions that publish and maintain open data
- developing official statistics to make them more accessible and usable

- data awareness, data literacy and data science skills
- demand-side market stimulation to expedite changes in behaviour
- standards development and bodies
- technological innovation such as in data publication, data integrity, security, search, integration and analysis

Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

The methodological approach should consider the opportunities for export growth. Being a world leader in developing data infrastructure that is as open as possible whilst respecting privacy will benefit the UK by developing a robust ecosystem of businesses and workers with the necessary capabilities and skills to either build data infrastructure or deliver services on top of it in other countries.

Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

In addition to the engagement methods described in the consultation we would recommend a panel of experts in digital and data infrastructure.



**[email address redacted]**

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**From:** [name redacted] [email address redacted]  
**Sent:** 12 July 2016 22:38  
**To:** NIA Evidence  
**Subject:** National Infrastructure Assessment Comment

Keep in mind that UK's Infrastructure will be at a higher risk factor once autonomous vehicles are allowed on the roads. Due to the vulnerability that no regulations have been required on autonomous vehicles to prevent them from becoming a weapon of destruction by a bad actor/terrorist group.

Given today's society, we all need to make sure that we incorporate the highest mitigation/prevention framework and unless UK requires that all autonomous vehicles have sensors to detect hazardous/wmd materials (explosives, etc.) and once detected to disable certain autonomous features, then the risk factor increase dramatically and the NIC should account for this. Just think about how easy it would be for someone to take an autonomous taxicab and load it up with explosives and send to a major infrastructure. Currently, several governments agencies have stated that this is a problem and should be addressed as proactive approach instead of a reaction.

I just wanted to pass along a comment as you move forward as this could be a major issue down the road and one that could have a global impact.

[name redacted]

\*\*\*\*\*

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Ordnance Survey

# **THE NATIONAL INFRASTRUCTURE ASSESSMENT: PROCESS AND METHODOLOGY**

**Consultation response by Ordnance Survey**

**AUGUST 2016**

## Responsibility for this document

[name redacted] is responsible for the content of this document.

## Change history

Version	Date	Summary of change
1.0	05 August 2016	First issue
1.1	08 August 2016	Minor amendments

## Approval for issue

[name redacted], [job title redacted]

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# INTRODUCTION

Ordnance Survey (OS) is Britain's mapping agency, responsible for creating and updating the definitive mapping and geographic information database of England, Scotland and Wales. We provide services, both in Great Britain and internationally, to governments and commercial organisations based on our knowledge, skills and understanding of location data and geography. Established in 1791, Ordnance Survey is today a government-owned limited company, the entire issued share capital of which is held by the Secretary of State for the Department for Business, Energy and Industrial Strategy (BEIS), who is represented on the OS board by UK Government Investments (UKGI).

Our core business is focused on the collection, creation, maintenance, management and supply of geographic information to meet the needs of all aspects of national infrastructure. In this regard we are heavily relied upon by all infrastructure, construction and utility organisations, as well as port, airport and railway operators and the public sector in delivering against regulatory and policy objectives.

OS data is available to over 4,000 public sector organisations, free at the point of use under the terms of the Public Sector Mapping Agreement and the One Scotland Mapping Agreement<sup>1</sup>. Additionally, OS expertise has been used to provide analysis and services to assist in the execution of a number of Government policies and delivery functions. Examples of these include:

1. Provision of 'Mapping for Emergencies, a service available to the emergency services whenever there is a threat to life. OS specialists are on call at all times to supply bespoke data, knowledge and advice. This service also includes advice regarding infrastructure response, for example modelling alternative routes for Dawlish (February 2014) and Cumbria (December 2015) following major flood events.
2. Working with HS2 Ltd to provide a service to assure highly-accurate positioning capability to facilitate the construction process. This project is still under discussion, and will be based on developing enhancements to OS's own satellite positioning infrastructure.
3. Collaboration with DfT to define and create a new generation of definitive road, path and right of way data, developed and maintained as a combination of OS surveyed content and information sourced from highway authority custodians. The resultant data, to be released this year, will enable improved routing and asset management.
4. Working with the Department of Health to develop a map-based tool to visualise live data on localities' performance and process measures in relation to winter pressures on NHS and social care services, enabling the identification of areas under most pressure and facilitating planning and response actions.

Supporting the planning, operation and resilience of national infrastructure comprises a central component of our mission and our public task. We support the ambition of the NIC and would welcome the opportunity to engage with you and support you at a strategic level.

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<sup>1</sup> <https://www.ordnancesurvey.co.uk/business-and-government/public-sector/mapping-agreements/index.html>

# CONSULTATION RESPONSES

Q1. The Government has given the National Infrastructure Commission objectives to:

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

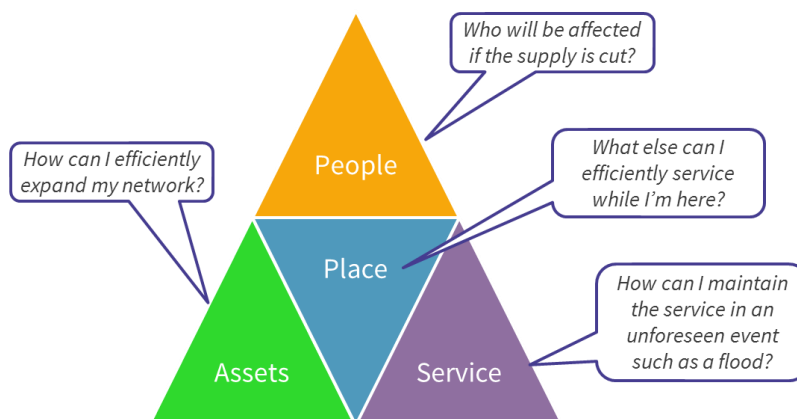
What issues do you think are particularly important to consider as the Commission works to this objective?

We suggest that a strong, maintained data framework is vital for realising the ambitions of the Commission and should be considered within the scope of the National Infrastructure Assessment. Specifically, we recommend adoption of a common location referencing framework for the strategic oversight of national infrastructure. Everything happens somewhere, and infrastructure, or services relating to it, is inherently geographic or location-based. Making use of location as a common reference can link otherwise disparate datasets and enables information about land, properties and infrastructure assets to be identified, analysed and communicated effectively.

All stakeholders in national infrastructure services should be able to have common access to a shared location referencing framework. Rather than each organisation maintaining its own data holding within isolated data stores as present, our vision enables a shared version of a single truth, providing access to the spatial reference network through a central hub or portal which then enables the sharing of information both within and between organisations and sectors.

The benefits of this facility transcend the requirements for reducing the costs associated with infrastructure interactions – they have the capability to improve the optimisation of asset performance, maintenance and resilience throughout network lifecycles. Moreover, for the wider infrastructure community, a shared single version of the truth represents a powerful resource and capability, enabling improved transparency, accountability and governance to the benefit of citizens.

The scope of a location referencing framework has the potential to provide benefits that go beyond network assets. Infrastructure assets represent the physical hardware that enables the supply of services to people. These three components – assets, service and people – are highly interdependent in terms of 'place', as illustrated below.



Your consultation highlights how interactions between infrastructure networks are inherently complex. One advantage of a common location referencing framework is that there is a powerful network effect; the benefits typically rise exponentially in line with the number of contributors with minimal marginal cost. One example of this is the Olympic Mapping Portal, which is briefly described in Annexe A.

Q2. Do you agree that, in undertaking the NIA, the Commission should be:

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

We agree with the Commission's choice of principles.

Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

Yes – we are broadly happy with the scope and description of the sectors as they are described. However, we suggest that the scale of the investment challenge relating to sewage and waste water management merit this being promoted to a sector in its own right.

We would like to note that parts of Britain's data infrastructure, including statistical, cadastral and geographic data, should be considered as components of critical national infrastructure. We recommend the inclusion of a comprehensive and robust data infrastructure in the scope of the Commission's considerations. Issues of data privacy, data exchange and data protection will be significant, and reference to initiatives already being driven through other consortium organisations, such as the Cities Standards Institute<sup>2</sup> PAS183 would be welcome.

Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

We suggest that improving resilience and proactively developing future capacity should be a key focus area for the NIA.

Particular examples of current challenges are:

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<sup>2</sup> <http://www.bsigroup.com/en-GB/smart-cities/The-Cities-Standards-Institution/>: PAS183 – Smart Cities Guide to establishing a decision making framework for sharing data and information services

- **Electricity:** Smart meters and grids hold the promise of being able to help balance load and manage supply from more localised resources, such as small-scale wind and solar generators. The significant challenge in this sector is to manage cost, for example in investing in new overhead or underground lines. This challenge is set against the backdrop of the Climate Change Act, obliging the UK as a whole to reduce its emissions by at least 80% from 1990 levels by 2050.
- **Gas:** We envisage significant future disruption in this sector, especially with regard to district heating schemes which may largely replace traditional networks, and are often built upon partnerships between energy providers, Local Authorities and Infrastructure providers. This partnership model will require much greater levels of data exchange and collaboration against a single, agreed model of 'what is where'.
- **Digital communications:** The UK is one of the leading economies globally for the digital economy, providing a significant contribution to GDP, but it is also one of the worst in terms of infrastructure capacity and reliability. A major challenge is being able to proactively create capacity for planned new developments. Service providers frequently fall short with infrastructure that cannot cope with increased demand; retrospectively upgrading services is costly and also extends the waiting time for connections.

In line with HMG's vision of a Digital Built Britain<sup>3</sup>, consideration should be given to opportunities to create 'Smart Infrastructure Grids' using sensors to support real-time demand and capacity management. We believe that the quality of life and the economic vibrancy of Britain's cities is dependent on an ability to provide consumers with a wide variety of digital services at home or on the move; for example, by predicting peaks in energy or transport demand to match capacity with demand and to inform customers of any disruption.

This requires that citizens have access to the information they need, when they need it. This will require careful integration of different datasets from different data sources to ensure privacy and security, as well as the development of more powerful search tools, to cope with ever-growing volumes of data.

Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?

It is important that NIA should be run in coordination with other emerging government strategies such as Digital Built Britain and the Natural Capital Plan<sup>4</sup>.

We would like to highlight areas where cross-sector interdependencies are particularly acute.

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<sup>3</sup> <http://digital-built-britain.com/>

<sup>4</sup> <https://www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report-government-response>

- **Street works:** ensuring that works are coordinated and executed in an efficient and effective way is a particular challenge for infrastructure owners in the context of incomplete access to cross-sector asset information, which in many cases is inaccurate or out of date. As a result, numerous asset strikes occur every year (60,000 according to one estimate<sup>5</sup>), often with severe consequences. In addition street works are not as efficient as they could be, resulting in longer time for the works with corresponding economic impact. Initiatives such as PAS256<sup>6</sup> attempt to address specific issues, but often in the isolation of the extent of their jurisdiction, which ultimately undermines their impact.
- **Utility connections:** As part of the Distribution Price Control Review (DPCR5), Ofgem has implemented measures to facilitate competition in the provision of utility connections. As a consequence, customers have seen a major shift in this provision from incumbent utilities to Independent Connection Providers (ICPs). To enable further competition, ICPs require efficient exchange and sharing mechanisms for asset and location data. Digital data sharing portals do exist today; however, in many cases they are cumbersome and require an excess of manual intervention. In 2015 Ofgem published results of its findings in relation to issues frustrating competition. Access to information held by utility companies was highlighted as being key to a successful open market, together with the adoption of common processes and practices to facilitate data exchange.

This challenge is particularly relevant in respect of the pressures for increases in the housing supply, and also relates to the problems faced by digital communications providers outlined in our response to question 4.

- **Network planning:** This is a multi-faceted process requiring considerable exchange of information. Infrastructure asset owners are increasingly seeking ways of reducing the costs of on-site visits and in-situ surveys through desktop surveying and remote visualisation, which is heavily reliant on accurately-mapped asset records. However, many asset owners are increasingly finding that their assets are poorly referenced to location, acting as a brake on efficient network planning. This is particularly a problem associated with 5G roll-out where environmental factors have a very significant impact on siting of antenna. The number of sites requires make this an acute issue to resolve.
- **Risk and safety planning and emergency response:** Effective coordination between sectors and between responding agencies becomes an acute priority when public safety is an issue. Two examples illustrate the issue here:
  - a) An incident in Nantyglo in 2014, when a burst water main resulted in 100,000 litres of water entering the gas network<sup>7</sup>
  - b) A fire in a multi-utility tunnel in London in 2014 required the evacuation of 2000 people<sup>8</sup>.

Managing and coordinating response requires significant direction, where an authoritative single view of up-to-date information is vital, not just of assets, but also of addresses (where

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<sup>5</sup> <http://wwtonline.co.uk/features/striking-out-underground-cable-strikes#.V6DAkKKrPNI>

<sup>6</sup> BSI Specification for underground utility detection, verification and location

<sup>7</sup> <http://www.bbc.co.uk/news/uk-wales-south-east-wales-28892392>

<sup>8</sup> <http://www.independent.co.uk/news/uk/home-news/holborn-fire-2000-people-evacuated-from-offices-as-smoke-fills-central-london-streets-10149502.html>



people live and work) and routes for access and evacuation. This requirement is amplified by the interdependencies between classes of infrastructure. For example, a flooded electricity substation may have knock-on impacts to communications services (a cascade of impacts often referred to a 'system-of-systems failure').

- **Transport planning:** This has specific challenges in urban environments. For example, the need to increase 'safe' cycle lanes in London has in fact reduced the capacity of the streets for motorised transport, decreasing resilience and increasing the challenges of an estimated 1 million population growth.

Q6. Do you agree that the NIA should focus on these cross-cutting issues?

Yes, we strongly support a focus on these issues.

Q7. Are there any other cross-cutting issues that you think are particularly important?

Building upon our response to Q1 and Q5, we argue that shared access to asset information is a vital component of good practice in respect of managing cross-sector infrastructure issues, particularly in respect of buried assets. We know from our work with utility companies how important precise asset location is in order to:

- Plan and execute asset upgrade, servicing and maintenance works, including determining access and equipment requirements and arranging road closures
- Undertake risk management, including predicting local hazards and developing response and contingency plans
- Undertake financial analysis, including estimating capital value, estimating costs of replacements and new connections

In addition, the huge growth of 'Big Data' represents a cross-industry opportunity that is increasingly impacting national infrastructure programmes throughout the asset lifecycle. Architecture, engineering and construction projects are increasingly adopting shared data models, encouraged by the recent BIM2 mandate<sup>9</sup>, and asset owners are now recognising the value of digital assets to support more effective asset management. Linking Building Information Modelling (BIM) with geospatial data is enabling and informing more comprehensive predictive, behavioural and responsive analytics, and also influencing how buildings and infrastructure are able to respond to change (both environmental and usage).

We envisage that the proliferation of Big Data will increasingly provide the information to enable strategic investment decisions for those networks and systems (for instance, highways and energy) which cut across society. The criticality of location information is multiplied when several

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<sup>9</sup> <http://bim-level2.org/en/>

organisations need to coordinate effectively to optimise maintenance scheduling and to facilitate cross-sector innovation.

A capability which we believe will benefit all stakeholders is a single view of the truth. A number of initiatives have attempted to create centralised ‘hubs’, but the very fact that there are several such hubs demonstrates their limited success to date, and illustrates the inherent limitations of producing ‘solutions’ within the confines of a particular sector or application. The challenges raised by the need to share data (referenced in Q3) are significant enough to require a government scale response.

Ordnance Survey works closely with infrastructure asset owners across all sectors, spanning utility services, telecoms, rail, ports and airports. Their requirement for asset information – particularly underground assets – encompasses the following generic needs and drivers:

Need	Drivers
Coordinate street works	Avoid clashes Minimise the disruption window Comply with New Roads & Street Works Act
Undertake asset/facilities management	Improve efficiency when fault-finding and/or providing maintenance
Identify above-ground risks (e.g. flooding, subsidence) associated with underground assets	Enable risk analysis, improved insurance, valuation, contingency planning
Know where it is safe to dig	Avoid clashes
Know where it is safe to build	Determine whether development sites are at risk, e.g. of subsidence as a result of historical coal mining

Our recommendation is that a single mandated hub<sup>10</sup> of asset information represents the best means of realising the needs of all those concerned with asset investment, maintenance and optimisation.

The effective sharing of information – that is, sharing which enables organisations to develop plans and make decisions with confidence – relies on clear standards to ensure information interoperability. We recommend that the NIC and the infrastructure community should work together to agree upon a clear set of data standards in respect of asset information.

In global terms, we suggest that you take the following standards into account:

- Data Specification on Utility and Government Services<sup>11</sup> – an existing standard
- BIM 4 Infrastructure<sup>12</sup> – an emerging standard

At a more granular level, standards apply to network asset information in the following ways.

**Location referencing:** Network asset information is by its nature geographic in nature – it contains a description of its location in space. However, location can be described in diverse ways, notably:

<sup>10</sup> Note: a hub does not necessitate organisations to release their data, but rather make their data discoverable and/or sharable, with the appropriate access constraints, through a central service using federated services.

<sup>11</sup> [http://inspire.jrc.ec.europa.eu/documents/Data\\_Specifications/INSPIRE\\_DataSpecification\\_US\\_v3.0.pdf](http://inspire.jrc.ec.europa.eu/documents/Data_Specifications/INSPIRE_DataSpecification_US_v3.0.pdf)

<sup>12</sup> <http://www.bimtaskgroup.org/bim-4-infrastructure-uk/>

- Absolute referencing systems, such as British National Grid or latitude/longitude/elevation standards such as WGS84 or ETRS89, with associated vertical datums.
- Relative referencing systems, including both local grids and measures of chainage, offset and elevation relative to a linear network

Locating underground assets represents a particular challenge. Today, a number of asset owners have a poor understanding of where both their own and other parties' underground assets are, and this adds considerable overheads to any field operation. As a response to this, the standard specification PAS 128<sup>13</sup> has been developed (with Ordnance Survey input) to ensure that the appropriate level of investigation or in situ survey is undertaken before digging.

**Identifiers:** The adoption of unique identifiers for data records is increasingly becoming recognised as a vital component of information exchange. Identifiers which have a geographic linkage are particularly valuable – for instance, linking addresses to location helps ensure that vulnerable customers can be properly protected. In the context of infrastructure assets, we advise that consideration be given not just to the assets themselves but the entities that contain them (such as roads) and which they serve (typically identified by addresses). In particular, we advocate the adoption of:

- The Unique Street Reference Number (USRN), to explicitly relate assets to section of road
- The Unique Property Reference Number (UPRN), relating to all addressable properties within Great Britain
- The TOID, uniquely identifying every surveyed land parcel, including fields, water bodies and open land

These identifiers are never recycled and contain an auditable lifecycle history as the entities they identify change over time. Further information is provided in Annexe B.

Any standard chosen for maintaining and sharing asset information should prescribe requirements for persistent unique identifiers.

**Metadata:** Metadata is information that describes a dataset or a data record. Clear information about asset information provenance, accuracy and the date of last inspection or update is vital to enable users to make informed judgements about how to use it properly.

The UK standard for metadata with respect to information containing a location component is GEMINI<sup>14</sup>, which conforms to the European INSPIRE directive<sup>15</sup>. This will also ensure interoperability with data.gov.uk.

**Online services:** Increasingly, the sharing and syndication of data is enriched by providing online data feeds directly into applications, as opposed to delivering static datasets through download or physical media. This typically requires a layer of online services in the form of Application Programming Interfaces or APIs.

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<sup>13</sup> <http://www.bsigroup.com/en-GB/about-bsi/media-centre/press-releases/2014/June-2014/Underground-utilities-can-now-be-detected-more-easily-with-new-standard-#.VNnO7GMVisY>

<sup>14</sup> <http://www.agi.org.uk/join-us/agi-groups/standards-committee/uk-gemini>

<sup>15</sup> <http://inspire.ec.europa.eu/>

Our recommendation is that feeds of geographic information, such as network asset records, are provided through APIs that confirm to Open Geospatial Consortium (OGC) standards, for instance Web Map Service (WMS) or Web Map Tile Service (WMTS) for graphic maps, and Web Feature Service (WFS) for positioned network assets such as cables and pipelines.

Q8. Do you agree with this methodological approach to determine the needs and priorities?

We agree that adopting a scenario-based methodology is suitable for this purpose.

Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

We have no comment on suitable simulation models.

However, we suggest that referencing data against a consistent geospatial model is tremendously valuable as a means of enabling rich integration, analysis and visualisation of data for better decision making. The British Standards Institute (BSI) highlights that ‘this ability to pinpoint a geographical reference, enable access and link data underpins the compelling case’ for the use of location as a crucial dimension to data<sup>16</sup>.

Scenario-based modelling is also highly dependent upon information which is maintained or modelled over time. Reference data such as topographic mapping can serve as a powerful tool in this regard, not simply as a visual tool but by providing hard statistics and evidence that can inform time-series analysis and the projection of future trends. For example, the figure below illustrates the development of part of Swindon between 2004 and 2011.



We would be pleased to provide advice and support on any aspect of this, including the planning and execution of geographical evidence reviews (consultation document paragraph 67).

Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?

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<sup>16</sup> BSI, Smart Cities Overview, <http://www.bsigroup.com/en-GB/smart-cities/Smart-Cities-Standards-and-Publication/PD-8100-smart-cities-overview/>

Overall, we agree with the infrastructure drivers identified by the Commission.

In addition to what has been highlighted in the Technology driver section, we suggest that the digital economy is examined further. In our response to the House of Commons Business, Innovation and Skills Committee's inquiry on the digital economy in October 2015, we commented that 'the integration of smart technologies and efficient governance models will increase in the near future; not least due to the constant expansion of cities and their demands on resources from a decreasing reserve'<sup>17</sup>. There are crucial challenges that need to be overcome first, including differences in semantics, syntax and the quality of information collected by different organisations. As mentioned already, interoperability – that is, enabling collaboration across functions, disciplines and organisations – is a significant factor when trying to enable technologies to reach their full potential. At Ordnance Survey we believe that location data can serve a common reference framework which not only provides connectivity between assets but can also be used for data analytics and public engagement.

A strong digital economy is also recognised internationally. A recent report the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM)<sup>18</sup> discusses – along with the growth of Smart Cities, connectivity through the Internet of Things and the linking of geospatial information with statistical data – the future role of governments in geospatial data provision and management. The report explores the pressures that are forcing governments into considering their roles as providers of reliable geospatial data. Core data themes are emerging where governments need to provide reliable, authoritative data (paragraph 9.1.2).

We strongly support the Government's Digital Built Britain (DBB) strategy and vision to extend the BIM methodology to function in tandem with the Internet of Things, advanced data analytics and the digital economy to enable the UK as a whole to plan new infrastructure more effectively, build it at lower cost and benefit from operational efficiency gains. As an integrated digital process, BIM is capable of providing coordinated, reliable information about projects and assets (encompassing both buildings and infrastructure) throughout their lifecycle, underpinned by intelligent geospatial referencing to connect information. Above all, it will enable citizens to make better use of the infrastructure already in place. The Government is keen that the UK should lead the move from the use of BIM in individual assets to its incorporation in the design and management of smart cities. We believe this approach will underpin future infrastructure investment programmes and should therefore be considered a key driver within the context of this research.

We also suggest that national security and national self-determination should be recognised as a driver, in the context of a changing global ecosystem.

Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

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<sup>17</sup> <http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/business-innovation-and-skills-committee/the-digital-economy/written/23754.pdf>

<sup>18</sup> Future trends in geospatial information management: the five to ten year vision, Second Edition, [http://ggim.un.org/docs/UN-GGIM-Future-trends\\_Second%20edition.pdf](http://ggim.un.org/docs/UN-GGIM-Future-trends_Second%20edition.pdf)

We return to our central theme of the value of a location referencing framework. A portfolio of infrastructure investments will benefit from such a framework by ensuring that:

- Investments can be planned and monitored effectively through a sound understanding of how they will interact with existing assets in the landscape; for instance by coordinating the digging of underground trenches
- Physical assets can be properly identified, valued and accounted for over their lifecycle, so that balance sheets are accurate and defensible
- Infrastructure continues to serve the needs of consumers, ensuring that services remain available, affordable and resilient where and when they are required
- Successful projects can be analysed to ascertain where similar investments might be made to derive greatest future benefit

Additionally, visualising investments through a mapping interface offers a simple and intuitive method of communication. By way of example, we have developed a simple web tool to view and query the components of the National Infrastructure Plan<sup>19</sup>.

Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

We have no comment against this question.

Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

We welcome the Commission's aim to include a variety of methods to gather the expertise and opinions of a wide range of stakeholders. In addition to the methods mentioned in the consultation document, we would urge the Commission to consider a diversity of channels when trying to engage with different parts of society. Social media, for instance, is a medium that has increased substantially over the last few years and reaches almost all parts of society, and has been widely adopted, for example, by the business community to promote engagement within itself and potential stakeholder groups

The success of large-scale national infrastructure projects depends on a common understanding and shared priorities among all stakeholders. Ensuring that the communication channels used help retain the commitment and involvement of a large number of different parties will be crucial for the winning support for these projects.

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<sup>19</sup> <http://demos.ordnancesurvey.co.uk/public/demos/infrastructure/index.html>

## CONTACT INFORMATION

We would be pleased to support you with any aspect of the National Infrastructure Assessment. Please contact [name redacted], [job title redacted], Ordnance Survey.

Email: [email address redacted]

## ANNEXE A: THE OLYMPIC MAPPING PORTAL

The Olympic Mapping Portal was developed by the London Metropolitan Police for the London 2012 Olympic and Paralympic Games to ensure the safety and security of citizens during the event. The portal provided an efficient and secure way to view and share mapping and associated intelligence throughout the Games.

Prior to London 2012, the Metropolitan Police used different geographic information systems (GIS) to supply mapping and associated data to its stakeholders. Information was maintained in separate databases and the different systems did not link together. To enable a common operational picture for both the police and external users, a system providing a single, definitive source of all Olympic data was needed. The Olympic Mapping Portal was subsequently created using a wide range of Ordnance Survey's mapping data to provide a location and place dimension to the information held. New datasets, such as the Olympic torch route, were also created by Ordnance Survey for use within the portal. The portal ultimately contained a large data catalogue of more than 300 layers of information enabling users to upload and download data in common GIS formats.

The portal was accessed by over 2,000 users and 46 government agencies during the Games and continues to be used. Authorised users across the country are able to view the same map and the same information in 'real time' and this information can be used to deploy police resources effectively, particularly when supporting national events. Additionally, by creating a catalogue of map symbols, users have access to a common set of icons and pictures for geographic features enabling effective data sharing.

The portal led to the adoption and implementation of geospatial data standards, a common set of map symbols and a metadata standard that ensures all new data loaded into the portal is compliant with INSPIRE (Infrastructure for Spatial Information in Europe). Moreover, the centralised view provided by the portal has negated the need for users to distribute copies of data across teams or to hold local copies of data which is now processed and distributed centrally.

Further information is available at <https://www.ordnancesurvey.co.uk/business-and-government/case-studies/metropolitan-police-ensure-safety-london-2012.html>.

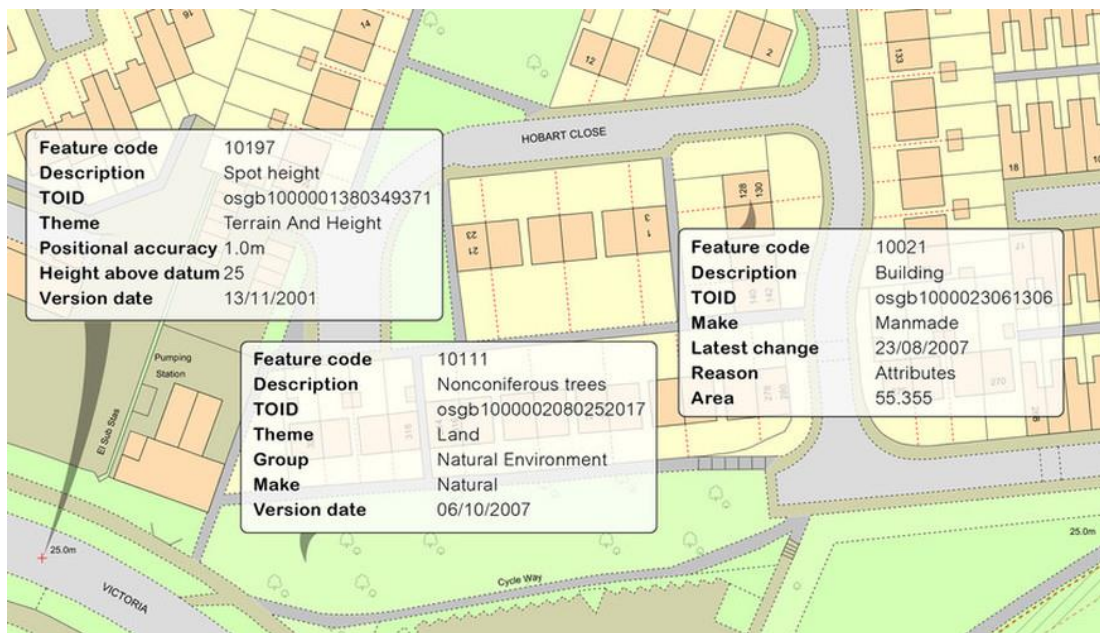


## ANNEXE B: LOCATION REFERENCING DATA

Ordnance Survey information is considered by infrastructure owners to be key to efficient location referencing. This Annexe briefly sets out some core elements of the information which is relied upon by all utility and infrastructure providers, encompassing:

- Topography – mapped real-world objects, enabling assets and events to be analysed in terms of proximity, adjacency and context
- Highways – enabling the referencing of linear assets such as cables, pipes and ducts
- Addresses – representing service end points of linear assets

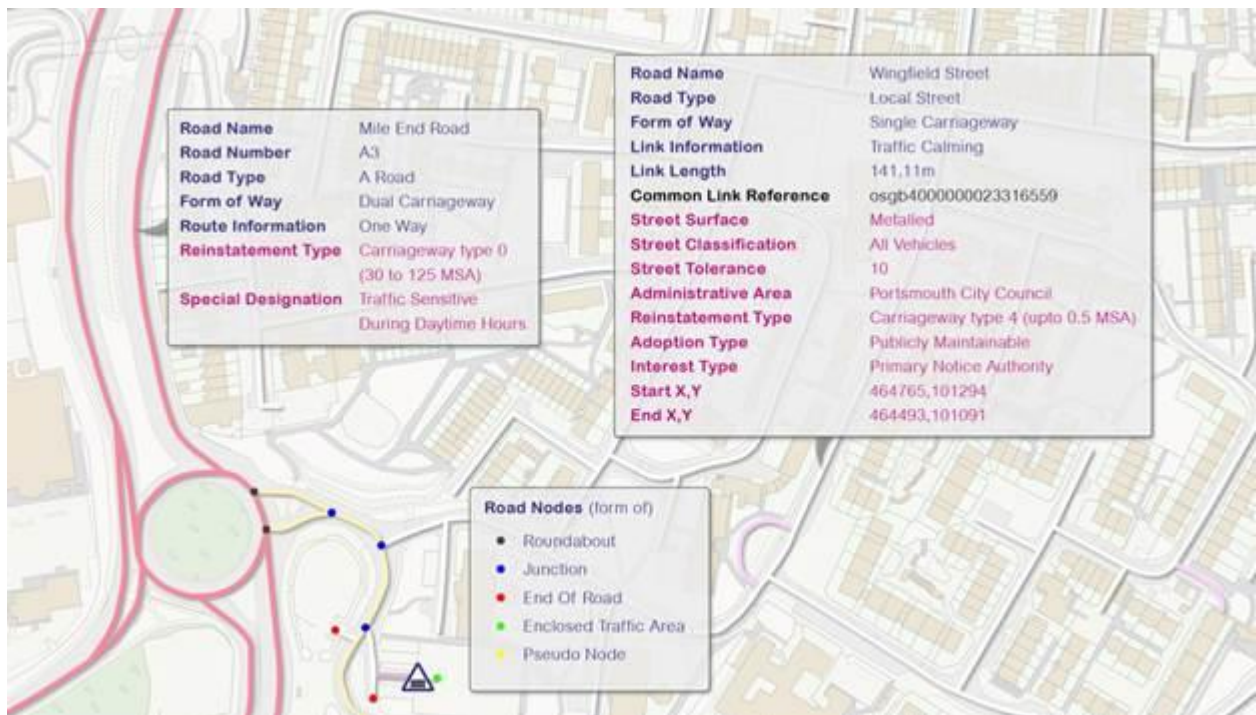
**Topography:** we maintain the highly detailed ‘master map’ of Great Britain which provides the context and underpinning data for infrastructure and asset planning and management. The figure below illustrates some of the data attributes which underlie each surveyed object.



The detailed database that powers this output is continuously maintained, with around 10,000 updates registered every day across Great Britain. It is regarded as a core tool for all aspects of asset management, and moreover provides a referencing framework to share information through the unique identifier – the TOID – which is maintained for each mapped object.

**Highways:** Ordnance Survey is creating a new-generation highways dataset which will consist of the high quality and richly attributed data submitted by local authorities through the National Street Gazetteer (NSG) combined with Ordnance Survey’s widely used authoritative and fully maintained geographic roads data, creating a definitive highways network for England and Wales.

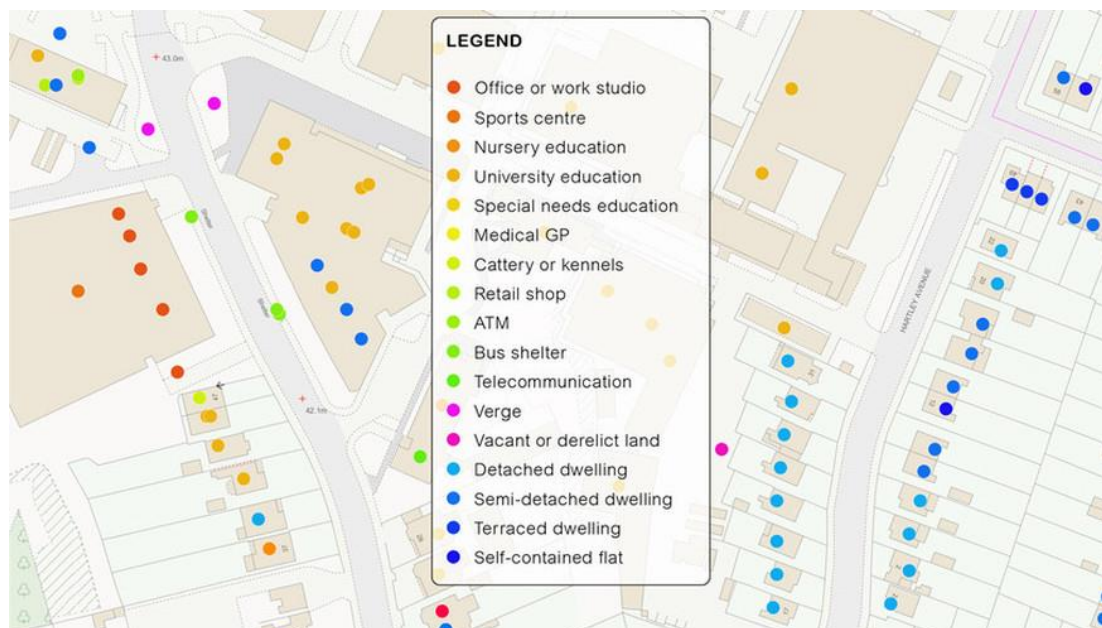
The figure below illustrates the information maintained by road element.



The dataset includes a Unique Street Reference Number (USRN) for each section of road. This identifier is already used as the mandated mechanism to notify the undertaking of street works. The USRN is further used to provide a link between addresses and streets.

**Addressing:** Through a partnership between Ordnance Survey and the Local Government Association, we maintain and provide the definitive national address database. Each address record is identified by a Unique Property Reference Number (UPRN), has a precise geographic location and a set of attributes relating to functional classification, lifecycle status and alternative address variants.

The figure below illustrates how this can be used to map non-residential address functions.



Access to a consistent and maintained address dataset is vital to manage and share information which links both business and personal customers and properties.

Address changes are built in to the data management and publication process, and are of particular relevance to cross-sector investment projects. The figure below illustrates how the UPRN is allocated and managed throughout a property lifecycle.



The TOID, the USRN and UPRN represent important foundations for data sharing and interoperability. As unique and persistent identifiers, they unambiguously reference geographic entities (such as water bodies and pavements) and addressable properties (for instance homes, businesses and civic functions) in an open way.



PENSION INSURANCE  
CORPORATION

## **Pension Insurance Corporation**

*Response to the National Infrastructure Commission's consultation:  
The National Infrastructure Assessment, process and methodology*

5 August 2016

### **Contact:**

[name redacted]

[job title redacted]

Pension Insurance Corporation

[phone number redacted]

[email address redacted]

Pension Insurance Corporation ("PIC") does not regard any of the information in this document as confidential.

### **About PIC**

- 1) PIC is a specialist insurer which providing pension insurance buyouts and buy-ins (bulk annuities) to the trustees and sponsors of UK defined benefit pension funds. At year-end 2015, PIC had £16.6 billion in assets under management and had insured more than 130,000 pension fund members.
- 2) With non-callable pension obligations that stretch out decades into the future, we are the natural home for investments that provide secure long-dated cash-flows, such as infrastructure. As such we are enthusiastic about the establishment of the NIC and this consultation which seek to address a real opportunity to repair the broken pipeline of infrastructure projects.

- 3) From a standing start five years ago we have built an internal team which has developed considerable experience and an exceptional track record in sourcing and investing directly into infrastructure debt. We therefore have relevant experience should help be required to develop in-house expertise at other institutional investors and specifically within pension funds.
- 4) We believe that we are now playing a role of real importance to the UK economy by filling the hole that has been left by the withdrawal of the banks from this space. We have invested more than £5 billion, or about 30% of our portfolio, in infrastructure debt and have plans to increase this as our portfolio develops. Our portfolio has grown by more than £10 billion over the past three years. We operate in a rapidly expanding sector and expect to have considerably more assets to deploy in infrastructure over the coming years.
- 5) Amongst other innovative direct investments we have completed in the past 12 months, we have invested £100 million in debt secured on the Thames Tideway Tunnel; £75 million in debt issued by Virgin Atlantic Airways, secured on its portfolio of landing slots at Heathrow, the first time this type of transaction has been completed; and £70 million in debt ultimately issued by the Church of England Pensions Board.
- 6) Previous investments in this area by us include the first European solar bond, as well as social housing, hospitals, schools and student accommodation. In effect our business moves capital efficiently through the economy, from generally sub-scale defined benefit pension funds and into infrastructure investments which support jobs and growth. Our scale and expertise allow us to do this more effectively than the majority of pension funds.
- 7) Our pension fund clients include the London Stock Exchange, Alliance Boots, Total, EMI, Cadbury, Honda, and the public sector, including DEFRA.
- 8) PIC is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and Prudential Regulation Authority (FRN 454345).

## **Summary**

- 9) PIC welcomes the opportunity to respond to the NIC consultation paper.
- 10) Institutional investors require several factors to be able to invest consistently and significantly in infrastructure debt. These factors are:
  - a. The development of a “whole system approach”

- b. A predictable deal flow. This would help pension funds and other institutional investors justify building up teams and developing expertise. This creates a virtuous circle of knowledge and confidence, helping more deals to close, lowering costs for borrowers and helping to grow the economy
  - c. The better alignment of infrastructure investment requirements with the regulatory systems governing institutional investors, such as Solvency II. It is important to make sure that in areas of focus, such as waste and digital, investment risk is managed more sympathetically, perhaps through the creation of investment grade debt structures
  - d. More stability in regulatory systems / Government support for infrastructure projects
  - e. More stability in the planning process
  - f. The (re-)focussing of (semi) state actors, such as the European Investment Bank, away from opportunities which would naturally attract private sector capital and towards opening up further opportunities by using their balance sheets
- 11) The UK has three main issues in consideration of its infrastructure:
- a. Our infrastructure is perceived as poor when compared internationally
  - b. The process for procuring infrastructure is difficult and uncertain
  - c. These two factors mean that productivity and economic growth are both perhaps below where they should be, adding to the economy's vulnerabilities
- 12) In principle, infrastructure projects are attractive assets for private investors. They typically offer relatively high and stable returns and can provide a welcome hedge against inflation. Their allure has only increased as long-term interest rates plumb new depths. Pension funds and insurers seeking to match long-term liabilities are perfectly placed to take on the illiquidity of these assets as the cash flows generated from them match liabilities and provide a measure of outperformance compared to risk free.
- 13) There is, moreover, no apparent shortage of private capital. Globally, the combined assets of liability-constrained investors such as pension and insurance companies, and asset-based investors such as sovereign wealth funds and family offices, exceed \$50trn. In the UK, the assets of pension funds and other institutional investors exceed 60% of GDP.
- 14) Institutional investors overall, however, still allocate only a small proportion of their assets directly to infrastructure. Furthermore, they favour the secondary market, where capital can be spread across a broad range of assets, and the higher risk planning and construction stages of projects can be avoided.
- 15) There is now a real opportunity to create a virtuous circle, in which the real interest of pension funds and other institutional investors in this sector is encouraged through

confidence building measures, enabling the development of in-house teams and expertise. This will lead to successful investments, creating confidence, allowing the further development of teams and expertise, ensuring further successful investments in this area. The net effect of this virtuous circle would transform the overall infrastructure of the UK, improving productivity and boosting economic growth.

- 16) For now, the feeling among private investors remains that there is a lack of suitable projects. Infrastructure development in the UK has focussed on a small number of large scale (and high risk) “trophy” projects, as opposed to a larger number of smaller deals. There is also a need for more ready-to-finance opportunities where there is no requirement for investors to involve themselves in the earlier, riskier stages of infrastructure development. Both of these situations arise because pension funds do not have the necessary in-house expertise to properly assess the risks. We believe this situation can be radically transformed.
- 17) Balancing this lack of expertise in the short term, and encouraging more private sector involvement in these types of projects, means that the government needs to shoulder more of the early stage risk. Large scale or trophy ventures are typically subject to bidding criteria uncertainties, idiosyncratic contracts, delays in the award of projects and financial approvals, and, reflecting their complexity and technological richness, significant construction risks, as well as the vagaries of the political process. For institutional investors the overwhelming conclusion is that they are not worth the time and effort to understand at this point, let alone invest in.
- 18) The UK has an unprecedented need for infrastructure renewal, a new government that appears to have recognised the weaknesses of the existing system and investors with pools of capital seeking good quality investments. This is a crucial opportunity and it should not be squandered.
- 19) PIC would be delighted to help with any further work on this topic, including participation in the panel of experts and / or involvement with the expert roundtables mentioned on P.30 of the consultation document.

### **PIC’s response to consultation questions**

#### **Consultation Question 1: The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK’s international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

- 20) There are a number of factors to consider as the Commission works to its stated objectives. In our view these can be summarised as:
- a. Predictability of deal flow
  - b. Alignment of investment requirements with regulatory requirements of institutional investors
  - c. Stability of the planning process
  - d. Depth of expertise in institutional investors

**Predictability of deal flow**

- 21) Over the past decade institutional investors have increasingly had to deal with a flow of infrastructure projects that has been subject to bidding criteria uncertainties, idiosyncratic contracts, delays in the award of projects and financial approvals, and, reflecting their complexity and technological richness, significant construction risks. Compounding these obstacles to investment, there have simply not been enough suitable projects for insurance companies and pension funds to invest in.
- 22) An unpredictable flow of potential investments means that institutional investors are less likely to invest in building the necessary expertise to allow them to assess risk accurately. The resulting unfamiliarity with risk leads to a safety-first mentality, lowering interest in this area even where suitable opportunities are available. Amongst other issues, this can mean a less competitive tendering process and greater taxpayer expense.
- 23) It is clear that a lack of follow through on a programme approach to procurement has been frustrating for all parties, including funders. This suggests there is a desire to resolve it and we believe that it is possible to do so.
- 24) These uncertainties are best exemplified by the ongoing debates around Heathrow, HS2 and Hinckley Point. However, the point is systemic and does not relate just to these projects in isolation. From an investor's perspective, this uncertainty increases risk. And this risk, from a project provider's point of view, increases costs.

**Alignment of investment requirements with the regulatory requirements of institutional investors**

- 25) This is an important point in consideration of the NIC's objectives. In particular, the new regulatory system for all European insurers, Solvency II, places strict capital



requirements around investments that are not based on investment grade, secure and predictable long-term cash flows.

- 26) As the NIC progresses in its work and draws up a National Infrastructure Plan it is important to consider the requirements of insurers under Solvency II in determining how the projects are to be funded. This is particularly the case in the stated areas of focus in this consultation document, including waste and digital, which have typically had lower levels of institutional investment because they have carried higher levels of risk.
- 27) Judicious use of the government's guarantee scheme, or leveraging the EIB's balance sheet to lower risk in this area, would help ensure that investment by insurance companies flowed into the sectors of the NIC's focus.

### **Stability of the planning process**

- 28) From an investor's perspective much time and effort, and therefore expense, is required to do due diligence on each and every project. In practice, investors will have to live with the risks inherent in these investments for decades, with limited opportunity to sell. Moreover, they depend on the cash flows to match pension payments, so have to go to considerable trouble to make sure that the deal works. The uncertainties inherent in the planning system can therefore rule out investments in some types of projects at a very early stage.
- 29) A lower level of interest from institutional investors means that the project developers would have to offer a higher yield to make the project more attractive, ultimately costing the taxpayer more.
- 30) However, there are well-managed and well-run processes which can serve as model projects. For example, PIC recently invested £100 million in debt secured on the Thames Tideway Tunnel, the 25 kilometre tunnel underneath the River Thames in London. This was an innovative investment which required much hard work before the deal was signed. The key aspects of the transaction:
- a. The £100m size of the transaction was split across four tranches
  - b. There is a long deferral period (4-5 years), providing certainty of funding cost for the borrower, but reducing cost of carry, with an unusual feature of no funding drawn on day one to help match the cash flow needs of the construction works
  - c. There is a unique inflation linkage, whereby this is the first transaction with inflation linkage with such a long deferral period
  - d. The maturity profile has been sculpted to match PIC's long-dated liabilities, a feature which also benefits the borrower as they require long-dated funding

- 31) We feel that this excellently run project serves as a model of best practice:
- a. It was a well-managed procurement process
    - i. Good co-ordination across different government departments and between government and Thames Water
    - ii. Rigorous evaluation process reduced bidders down to a very small number, with an emphasis on quality rather quantity, helping to guarantee funding
    - iii. Smart use of government financial support, which was complex but did not require overall government guarantee. This was
      1. More efficient for government finances
      2. Enabled investors (prepared to commit to the credit work) to obtain a higher return
    - iv. It was a resource efficient process for investors as the financing competition was based on a firm proposal:
      1. Certainty of financing provided by initial commitments from banks
      2. Institutional debt competition was more efficient as it was not split between different bidding groups
      3. The higher certainty of outcome incentivised institutions to commit resources

**Consultation Question 2: Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

- 32) We believe that these broad principles are the right ones. We feel strongly that based on these principles the NIC will be able to encourage institutional investors to build up centres of knowledge that allow them to play a real part in the renewal of infrastructure in this country, creating virtuous circles of investment and return that benefit society as a whole.
- 33) At the same time, we have comments about their scope, in particular around “a whole system approach”.
- 34) As the NIC will be aware, infrastructure investment can be an important element of macroeconomic stabilisation policy, especially given its 'multiplier effects' on aggregate

demand. As the money allocated for infrastructure investment is disbursed, it cascades through the economy, feeding demand for materials and other manufacturing and service sector inputs, creating new jobs, boosting incomes and, in due course, ‘crowding-in’ other forms of investment, via the ‘accelerator’ effect.

- 35) Yet this economic perspective of infrastructure investment assumes somewhat that the situation of pension funds and insurance companies has been taken into consideration when developing an infrastructure pipeline. In our view, “a whole system approach” would consider the impact of increased levels of available infrastructure investment in helping reduce defined benefit pension fund deficits, as their liabilities can be matched by these bonds which have a higher yield than gilts, as well as helping insurance companies invest in a world of low yields. This lowers risk in the financial system as a whole and encourages institutional investors to move beyond a safety first mindset.
- 36) Those managing infrastructure projects benefit because there is a wider pool of potential UK investors from which to draw, potentially leading to lower borrowing costs and stronger certainty of funding.
- 37) One major issue impeding UK institutional investors from investing in infrastructure is competition from state-subsidised funders. As part of this consultation, thought should be given to the crucial issue of “crowding out”. This is a particular problem where institutions like the European Investment Bank (EIB) invest in listed corporate bonds at the expense of institutional investors.
- 38) In our view the EIB should focus on the highest risk investments, rather than investing in, for example, the corporate bonds of utilities that institutional investors need to match liabilities. Ultimately, if the EIB drives yields down merely to meet arbitrary lending quotas, bringing no benefit to the wider economy it is difficult to see the benefit that they bring. However, when they are able to use their balance sheet to support projects which are outside the risk appetites of private sector lenders, they have a pivotal role to play in making the economics of a particular project work.
- 39) This focus would allow them to play a pivotal role in fostering centres of knowledge and expertise and hence the virtuous circles of infrastructure investment.

**Consultation Question 3: Do you agree that the NIA should cover these sectors [Transport, Digital and Communications, Energy, Water and Drainage, Flood defences, Waste] in the way in which they are each described?**

- 40) First, in our view the NIA should not limit itself to the areas described, but should also cover housing and urban regeneration. It is not immediately obvious to us which government department will be responsible for these key areas.
- 41) However, we also have comments on the sectors that fall within the ambit of the NIA.
- 42) In particular, it is crucial that the areas described, most of which have been difficult areas for investors, are aligned with the requirements of the regulatory frameworks within which institutional investors have to operate, not least Solvency II. Without further insight into specific risk treatment, it is difficult to see how the NIC will stimulate interest from institutional investors because most of the sectors of focus have historically transferred too much risk to the private sector.
- 43) Of the sectors described, only transport and energy are currently aligned to the needs of investors under Solvency II.
- 44) Other sectors, such as waste and digital, have struggled to attract institutional investors because they have much higher levels of risk, because there is a perception that returns are poor, and because there is no track record of successful investments. In attracting investors to these areas, it would be helpful for the NIC to develop a procurement model areas which replicates the best of the models historically used to fund schools and hospitals. This would allow the development of centres of expertise and make the process of investment more efficient for all concerned.

**Consultation Question 6: Do you agree that the NIA should focus on these cross-cutting issues [Funding and finance; Cost delivery and resilience; Governance and decision making]?**

- 45) We agree that the NIA should focus on these cross-cutting issues. In particular, we have comments on “funding and financing”, “cost, delivery and resilience” and “Governance and decision making”.

**Funding and Financing**

- 46) In the UK, which was something of a global pioneer in the area of Public Private Partnerships (PPs), these schemes have been bracketed under the term Private Finance Initiative (PFI). The PFI contributed considerably to infrastructure spending over the 15 years leading up to the financial crisis. More than 700 such partnerships were assembled, with a capital value of more than £50bn. This included almost 100 hospital schemes, more than 100 education projects, and around 40 transportation projects and initiatives in

areas as diverse as defence and culture. Overall, they were associated with some 12% of total annual capital expenditure over the latter part of that period.

- 47) However, the PFI has been a major casualty of changing political priorities, as well as the banks' more conservative attitudes to lending, an attitude that has been further encouraged by the losses some banks have made on these projects. Smaller PFI projects in particular were highly dependent on bank finance. The PFI was dealt a further blow by the collapse of the monoline insurers that had hitherto conducted much of the project risk evaluation spadework and lent their stamp of approval as well as their credit enhancement to the bonds issued to finance larger projects.
- 48) Moreover, the more cost-conscious post-financial crisis period saw a growing focus on whether these initiatives were offering sufficient value for money for taxpayers. The net result is that PFI activities have tapered off decidedly since 2008. The current government has tried to address some of these issues with its PF2 programme, but this effort has yet to reach critical mass.
- 49) We believe that giving new life to PFI should be a central focus of the NIC's efforts to attract institutional investment.
- 50) Under PFI an industry was established around the deal flow, which, whilst having its downsides, was efficient and allowed, in theory, for the taxpayer to obtain better value, because there was lower risk and less uncertainty.
- 51) Today, we seem to have the opposite, where hardly anything is predictable and therefore investors and their advisors can't plan for it. Furthermore, the unpredictability extends beyond the initial planning stages and has become an issue in deciding whether a project can go ahead even quite close to breaking ground, as well as in the financing structure.
- 52) This unpredictability may well be a feature that is hard to remove for the larger end projects, or where they are particularly innovative or complicated. But what we saw under the previous Chancellor was a neglect of the smaller scale infrastructure pipeline, which we believe should be a focus of the new National Infrastructure Plan.
- 53) As regards the largest, most complex, projects, the experience, both in the UK and other advanced economies, is that many of these, such as airports and major railway routes, need a (government) sponsor, even though the bulk of the financing may come ultimately from existing public markets. Government cannot avoid planning, delivering and, to some extent, partially financing projects, at least in their early stages.

- 54) For smaller projects, such as individual hospitals, schools, or renewable energy plants the government is also important, albeit for somewhat different reasons. Historically, equity for a small infrastructure project, such as a PFI deal, came from the sponsor and potentially the constructor, with the debt component supplied largely by the banks. But with the banks now deleveraging, this financing component is in short supply, even though the potential equity providers are still present.
- 55) Hence, to encourage pension funds and insurance companies to invest there is a burgeoning need for Government to involve itself in:
- a. Managing the procurement process so as to ensure that the debt is delivered to (non-bank) investors in a suitable form, and with feasible timelines in respect of pricing and delivery of funds;
  - b. Developing risk transfer systems, such as guarantees and stand-by lines of credit; and
  - c. Incorporating into the overall financing assessment the setting of tariffs and user charges for which it is responsible, whether directly or indirectly.

### **Cost, delivery and resilience**

- 56) “Crowding out” is a key issue, especially by the European Investment Bank. In our view the EIB should focus on the highest risk investments rather than competing for corporate bonds that insurance companies need to match liabilities. We struggle to see the benefit that the EIB is bringing when it invests in these sorts of opportunities.
- 57) The EIB’s focus should be on smaller and more selective (ie higher risk) amounts of expenditure, rather than the massive lending programmes that it has now.
- 58) We welcome its recent announcement of a credit enhancement product and would like to see this extended so that their balance sheet is used to back projects that otherwise would be rated too risky for insurance companies to invest in. This has the potential to “crowd in” institutional investors and allow significantly more funds to be made available for infrastructure investments. One example of where this worked well was Tideway, which benefitted from this selective use of government supplied credit enhancement.
- 59) The government introduced the UK Guarantee Scheme (UKGS) in July 2012 to provide sovereign-backed financial guarantees for money lent to fund future infrastructure projects, in an effort to avoid any project delays resulting from adverse credit conditions following the financial crisis. It has since been extended to 2021, even though credit conditions have eased somewhat.

60) Under the scheme, the Treasury provides assurances to lenders that, if loan recipients are unable to maintain their repayment schedule, or a project fails, the lender will still be reimbursed. In return for the guarantee, the Treasury charges an annual fee to each infrastructure project company, based on the risk associated with the project. The fee income is intended to exceed any losses.

### **Governance and decision making**

- 61) In terms of governance, a stable and accessible long term programme of infrastructure investment will need to be:
- a. Co-ordinated across different departments and levels of government;
  - b. Devoid of policy reversal and prevarication over key decisions;
  - c. Supported by regulatory stability (especially in relatively regulation heavy sectors such as energy and utilities); and
  - d. Cognisant of the ability of construction firms to supply the necessary resources to do the job.

### **Conclusions**

- 62) Institutional investors require several factors to be able to invest consistently and significantly in infrastructure debt. These factors are:
- a. The development of a “whole system approach”
  - b. A predictable deal flow. This would help pension funds and other institutional investors justify building up teams and helping develop expertise. This creates a virtuous circle of knowledge circulating back into the economy helping more deals close successfully as well as ultimately lowering costs for borrowers
  - c. The better alignment of infrastructure investment requirements with the regulatory systems governing institutional investors, such as Solvency II. It is important to make sure that in areas of focus, such as waste and digital, investment risk is managed more sympathetically, perhaps through the creation of investment grade debt structures
  - d. More stability in regulatory systems / Government support for infrastructure projects
  - e. More stability in the planning process
  - f. The (re-)focussing of (semi) state actors, such as the European Investment Bank, away from opportunities which would naturally attract private sector capital and towards opening up further opportunities by using their balance sheets
- 63) There is now a real opportunity to create a virtuous circle, in which the real interest of pension funds and other institutional investors in this investment class is translated into investments creating confidence in the system, teams and expertise are then built up in-

house, ensuring further successful investments in this area. The overall effect of this virtuous circle would transform the overall infrastructure of the UK, improving productivity and boosting economic growth.

64) PIC would be delighted to lend our experience and expertise in helping develop these centres of knowledge.





# **The National Infrastructure Assessment – Process and Methodology: Consultation**

## **A Response by the Pensions Infrastructure Platform (PiP)**

June 2016

## **Contents**

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## Executive Summary

The issue of pension funds' investment in infrastructure cannot be looked at in isolation from the wider economy and, specifically, the role of defined benefit (DB) pension provision. Despite the gradual decline of DB pension provision in recent years, over a third of the UK's workforce is still accruing benefits in a DB scheme, with schemes themselves managing over £900bn of assets. It is therefore crucial that employers sponsoring DB schemes can meet their obligations to scheme members without facing undue impact on their ability to invest elsewhere in the economy.

In order to match their long term pension payment obligations, provide security for scheme members and reduce the risk of volatile cash contributions from scheme sponsors, pension schemes need investments that generate long term, consistent, low-risk, inflation-linked cash flow returns. Core infrastructure assets can be a great source of these long term, low risk cash flows. Unlocking institutional investment into infrastructure on a large scale would also be highly beneficial to the UK economy.

Achieving increased investment into infrastructure depends a great deal on the predictability of the returns that will be generated over the longer term. For core infrastructure, both economic and social, this predictability principally relates to the political, legal and regulatory regimes the assets will be operating under, the level of any subsidies that may or may not be paid and any usage revenues that will be obtainable.

Predictability in all of these areas is needed from start to finish – from the initial stages of project consideration – to make it worthwhile for pension schemes to incur the bidding and project development costs and to arrange long term funding – right through to operation.

Unfortunately a characteristic of infrastructure projects is the length of time they take to agree, plan and then construct. It often takes many years from initiation of a project to its first operation. This means that infrastructure project timescales do not match the timescale of the UK Government electoral cycle and introduces short term political risk into infrastructure decision making. It is critical that decisions on the UK's strategic infrastructure needs are separated from short term, partisan, political interference and that once the country's needs are established, there is confidence that implementation decisions will be taken within a clearly defined period – not subject to open ended prevarication.

We believe that the definition of clear long term goals which form the basis for a coherent long term plan is the best way to provide confidence to pension scheme investors, developers and operators.

Any reduction in long term predictability, whether real or perceived, increases the overall project risk for an investor, pushes up the level of returns required to reward the taking of that risk and therefore makes projects more expensive.

The National Infrastructure Assessment therefore has a key role to play and it will only be able to fulfil this role if there is total confidence in the process and methodology used to perform the assessment.

An overall system, starting with a robust assessment of needs, feeding into a clear prioritisation of projects and which builds confidence that these needs will be swiftly and consistently acted upon, will find no shortage of UK pension scheme capital available to support those projects structured to deliver long term, low risk, inflation linked cash flows.

## Overview of PiP Response

### Introduction

1. The Pensions Infrastructure Platform ("PiP") is the UK infrastructure investment business set up "by pension funds for pension funds". Its objective is to facilitate investment into UK infrastructure projects by UK pension schemes, by developing investment vehicles which meet their needs in terms of structure, returns and cost.
2. PiP was established in 2012 following the signing of a Memorandum of Understanding by the National Association of Pension Funds ("NAPF"), the Pension Protection Fund ("PPF") and HM Treasury. The development was supported by 10 of the UK's largest defined benefit pension schemes.
3. On 22 April 2016 PiP announced a £125m first close of its PiP Multi-Strategy Infrastructure Fund. This is the first Fund to be designed and supported by pension schemes for pension schemes and is managed internally by the dedicated PiP team. The Fund is targeted to raise a further £875m to invest into core UK infrastructure projects.
4. PiP's first externally managed investment fund was launched in 2014 and invests in PPP/PFI equity. It is managed by Dalmore Capital. The second external fund invests in small scale (sub 5MW) rooftop solar PV installations. This was launched in February 2015 and is managed by Aviva Investors.
5. PiP supported the Bazalgette Consortium on its successful bid to construct and operate the new Thames Tideway Tunnel (TTT). PiP mobilised £370m of equity contribution to the project by UK pension schemes.
6. Since its establishment, PiP has now helped secure almost £1.2bn of committed investment into UK infrastructure projects.
7. PiP is a specialist equity and debt financier, working on behalf of UK pension schemes to facilitate, source and manage effective investment by them into UK infrastructure projects. We do this because we believe the stable long term, inflation linked cash flows that can be generated by core UK infrastructure projects is a good match for the long term pension payment liabilities within such schemes. At PiP we believe there is one fundamental criteria above all else that determines whether pension schemes will invest into infrastructure; will the entry price, the risk taken on and the returns to be generated over the full project life improve the ability of pension schemes to pay their members pensions in full when they become due?

If this criteria is not met, there will be no investment since it would breach the basic fiduciary duty of the Trustees who are responsible for the financial security of the schemes they manage. No amount of political expediency, publicity or perceived "national interest" will overcome this basic requirement to safeguard the retirement provision for UK pension scheme members.

## Background

8. When pension schemes assess investment into long term, illiquid assets, which typically will be bought and held for at least 20-30 years, a key consideration is the stability of the operating regime and therefore the robustness of the long term financial forecasts which need to be made. Political, regulatory, legal and subsidy environments are core parts of this stability assessment.
9. The perceived stability and predictability of the UK are real competitive advantages. Indeed, the reason why the UK has been so successful to date at attracting pension scheme investors into infrastructure projects is because it is viewed as having a very stable political, legal and regulatory environment. It is impossible to look forward to the potential for any future infrastructure investment projects without stating the essential precondition that the Government should NOT enact any retrospective legislation that would subsequently change legal contracts that have been freely entered into. Any such legislation would undermine the stability argument and severely damage long term investor confidence.
10. Where a system of subsidy payments forms a significant part of the operational economics of a project, it is equally important that these are predictable for the long term. This applies through the full project life from the earliest stages of investment appraisal, while funding sources are being secured and after project contracts have been signed.
11. Pension schemes have a fundamental obligation to pay accrued pension benefits to members, usually on a monthly basis. It is therefore vitally important that pension schemes have a reliable stream of income from their investment portfolios to enable them to fund their pension payments. This need for income imposes a finite limit to the proportion of every scheme's investment portfolio that can be invested into non-yielding assets, such as infrastructure projects which do not return any cash to investors during a construction period. In general, the longer the period of no income, the less attractive an asset is for pension schemes to invest in.

The recent Thames Tideway Tunnel project provides a good example of how multi-year construction projects can be structured to make them attractive to pension scheme investors. Equity investors begin receiving returns on their investment as soon as cash is drawn down to fund construction. The project delivers a yield from day one. To balance risk between investors and users, there are also contractual risk sharing mechanisms to maintain the incentive on the construction team to deliver an operational asset on time and on budget.

12. We now turn to the specific questions posed by the consultation.

## Response to specific questions

1. The Government has given the National Infrastructure Commission objectives to:
  - foster long-term and sustainable economic growth across all regions of the UK
  - improve the UK's international competitiveness
  - improve the quality of life for those living in the UK

What issues do you think are particularly important to consider as the Commission works to this objective?

**How progress towards the objectives is assessed and measured, including how “sustainable economic growth” will be defined?**

**How will geographic regional priorities or balance be taken into account once the initial objectives have been achieved?**

2. Do you agree that, in undertaking the NIA, the Commission should be:
  - Open, transparent and consultative
  - Independent, objective and rigorous
  - Forward looking, challenging established thinking
  - Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

**Yes**

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

**No**

3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

**Yes, but in addition we would recommend the inclusion of social infrastructure as a sector to be covered.**

4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

**We are content with the focus described.**

5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?

**We foresee critical interdependencies in the areas of internet access, communication, smart transportation (autonomous vehicles) and urban transportation systems.**

6. Do you agree that the NIA should focus on these cross-cutting issues?

**Yes**

7. Are there any other cross-cutting issues that you think are particularly important?

**No**

8. Do you agree with this methodological approach to determine the needs and priorities?

**Yes**

9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

**No**

10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?

**Generally yes. We would also include the overall level, and regional variances in population health and education/skills.**

11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

**An overall cost/benefit analysis which takes account of diversification benefits, for example across different technologies or geographic regions.**

12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

**No**

13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

**We support the engagement strategy as defined.**

## Further Information

For further information please contact:

[name redacted]

[job title redacted]

Pensions Infrastructure Platform

[\[email address redacted\]](#)

[phone number redacted]



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**From:** [name redacted] [email address redacted]  
**Sent:** 31 May 2016 11:27  
**To:** NIA Evidence  
**Subject:** Evidence on Heat Infrastructure  
**Attachments:** Future of Energy - Final Report - [name redacted] - TLE.pdf

I am very pleased to see that in its Consultation on the National Infrastructure Assessment the Commission recognises “the importance of looking at the future of heating and the shift to low carbon solutions in the context of the UK’s carbon targets, and the important role that increasing energy efficiency could potentially play”. This is an important area which has received very little serious attention in the wider energy debate.

Along with colleagues from Imperial College, I have recently published a report into heat infrastructure solutions. Copies of the report and its annexes are available at:

Main report: <http://provpol.com/wp-content/uploads/2016/05/Heat-infrastructure-paper.pdf>

Annexes: <http://provpol.com/wp-content/uploads/2016/05/Heat-infrastructure-annexes.pdf>

This quite unique report focusses on networks, including the repurposing of gas grids for use with hydrogen, and looks at the practical issues that will arise during the transition rather than just the overall economics. It aims to identify orders of magnitude, rather than detailed numerical values and compares the relative scale of impacts and costs across the solutions for a number of different housing types. As well as the networks, the report also analyses the issues surrounding low carbon heat supply (including interactions with electricity and transport), works in customer premises and regulation. Alongside these technical and economic factors, the report highlights the wider challenges in setting up appropriate governance to deal with heat, which is not covered well by existing arrangements in the UK.


In association with this work, we are also looking to organise a Heat Summit to present our findings alongside those of a number of other heat studies due for publication in the coming weeks. We would be delighted to welcome representatives of the Commission to participate. Please let me know whom we should contact.

Last year I published a report (attached) to the Scottish Government looking at energy efficiency investment. One of the main recommendations has now been adopted with the announcement that energy efficiency investment in buildings would be made a national infrastructure priority in Scotland. This is obviously linked to heat decarbonisation as both together will be needed to deal with the challenge of reducing carbon emissions from the building stock, and will hopefully also be of interest to you.

I would be very happy to take you through the main findings of both reports, if this would be helpful.

Best wishes

[name redacted]

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**1. Introduction**

The RAC Foundation is an independent transport policy and research organisation which explores the economic, mobility, safety and environmental issues relating to roads and motoring. The Foundation carries out independent and authoritative research with which it promotes informed debate and advocates policy in the interests of responsible road users.

The National Infrastructure Commission’s remit comprises transport, energy, water and sewerage, flood defences, digital communications and waste<sup>1</sup>. In the UK transport sector roads are, by any reasonable measure, the principle means of transport. Road transport also has implications for other infrastructure elements – notably energy and digital communications. This response is in respect of UK road infrastructure.

**2. Responses to Specific Questions**

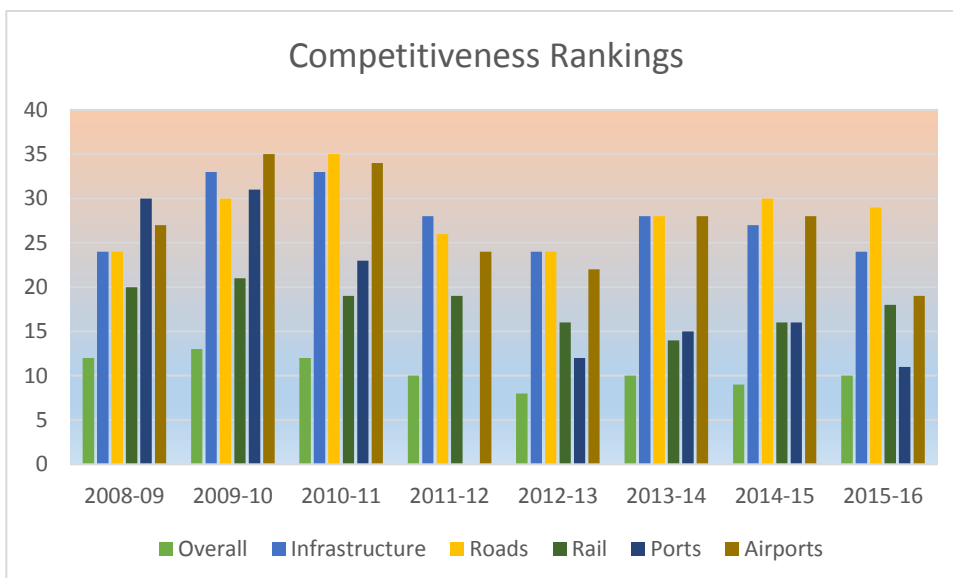
*Q1. The Government has given the National Infrastructure Commission objectives to:*

- *foster long-term and sustainable economic growth across all regions of the UK;*
- *improve the UK’s international competitiveness and*
- *improve the quality of life for those living in the UK*

*What issues do you think are particularly important to consider as the Commission works to this objective?*

**The Foundation’s response:**

Figure 1: WEF Global Competitiveness Rankings 2008/09 – 2015/16



Sources: WEF, 2008/09 – 2015/16.

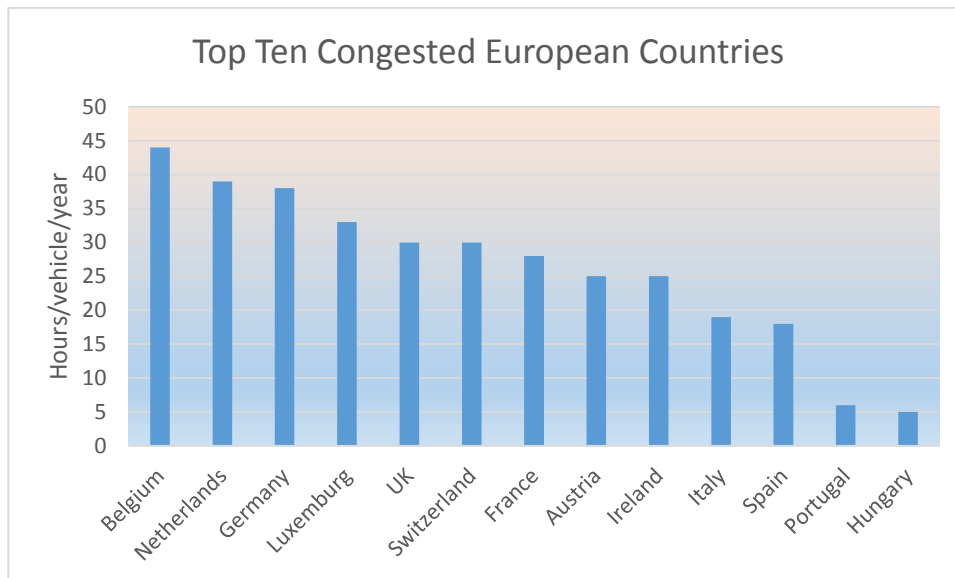
<sup>1</sup> NIC 2016.

The Foundation believed that the national road system is vital to achieving these three objectives. Roads carry 90% of all domestic personal travel in Britain<sup>2</sup> and 73% of goods movements<sup>3</sup>. They are almost always the only means of access to property and provide critical easements for a range of other public utility networks. As such they rank as one of the prime components of the national infrastructure.

The present condition of the road network and its operations hold back the UK's international competitiveness. The World Economic Forum's most recent Global Competitiveness Index (see figure 1) ranks the UK's Infrastructure as being the 24<sup>th</sup> out of the 140 countries scored. With the exception of mobile telephone subscriptions, roads are ranked the lowest of all types of infrastructure at 29<sup>th</sup>. The mobile telephone ranking (53<sup>rd</sup> compared with 99<sup>th</sup> for the USA and 3<sup>rd</sup> for Gabon) reflects the high penetration of land lines (9<sup>th</sup> overall).

This picture is confirmed by a recent review of global infrastructure gaps<sup>4</sup> which showed the UK to be at the bottom end of the range of government gross fixed capital formation as share of GDP for six major developed economies and needing to increase its share of GDP invested in infrastructure by 20%.

Figure 2: The Ten most Congested European Countries - 2015



Source: INRIX 2016a.

One of the major factors contributing to this is the level of traffic congestion. In a survey by Inrix of the most congested corridors in select countries in Europe and United States of America<sup>5</sup> by metropolitan area, 17 stretches of roads in London are included in the top 100 and London ranks as the most congested of all the cities included. At the national level the picture is not much better with the UK coming out as the 5<sup>th</sup> (equal) most congested European country. A study by CEBR forecasts that traffic congestion will grow by 63% in the UK between 2013 and 2030 compared with 31% in France and Germany<sup>6</sup>.

Other European countries have been investing relatively more in their road systems than the UK as is illustrated in figures 3a, 3b & 3c (N.B. the scales of the 3 figures are different). The variations in roads spending are substantial and, in part reflect the differing levels of development and geographies of

<sup>2</sup> DfT 2015a plus most pedestrian traffic.

<sup>3</sup> DfT 2015b.

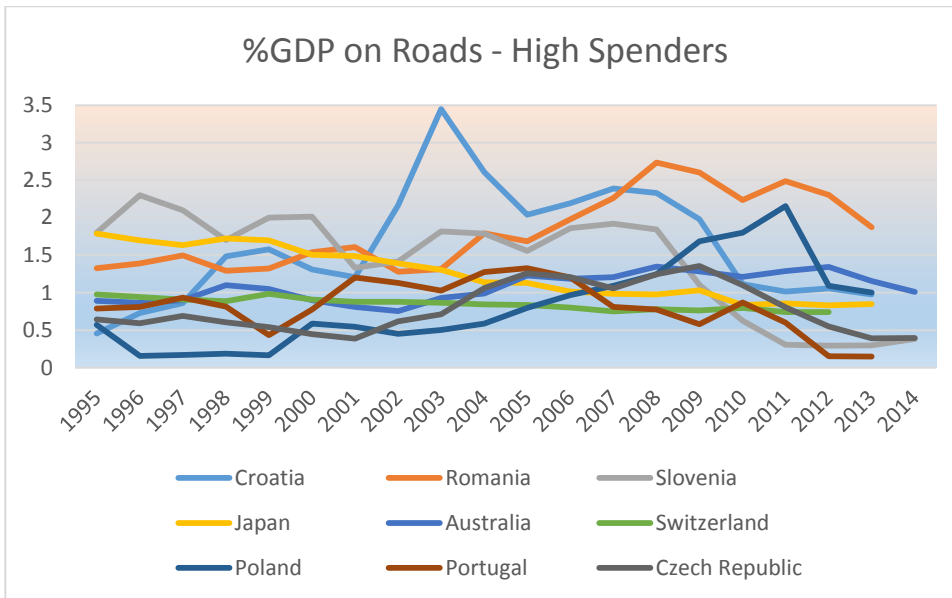
<sup>4</sup> MGI 2016.

<sup>5</sup> INRIX 2016b.

<sup>6</sup> CEBR 2014.

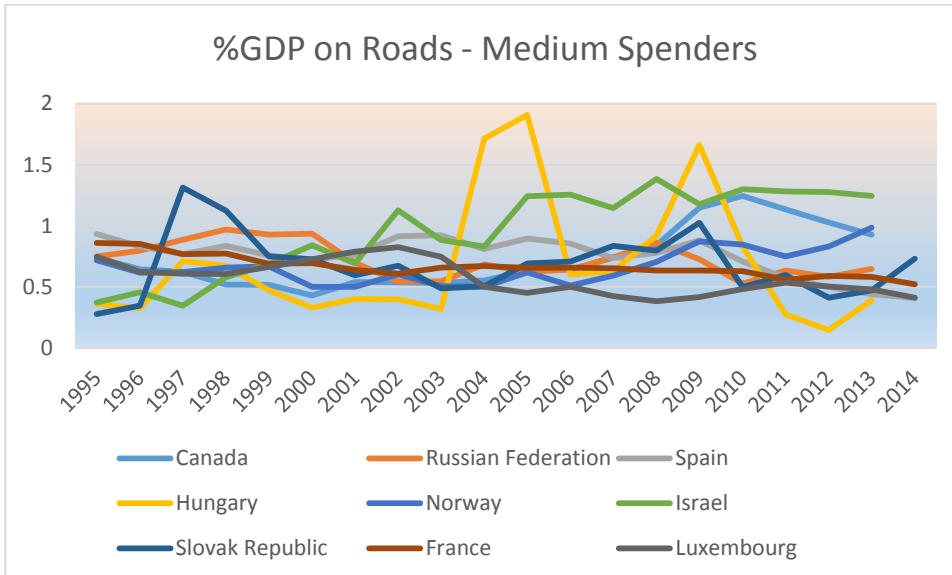
different countries The UK is amongst the low spenders and over this twenty year period has invested just 0.34% of GDP in roads compared with 0.67% in France, 0.51% for Italy and 0.48% for Germany. Data is available for some of these countries for a longer period going back to 1980 but this has not been analysed in this response<sup>7</sup>.

Figure 3a: %age of GDPs Spending<sup>8</sup> on Roads 1995 – 2014: High Spending Countries



Source: ITF 2016

Figure 3b: %age of GDPs Spending on Roads 1995 – 2014: Medium Spending Countries

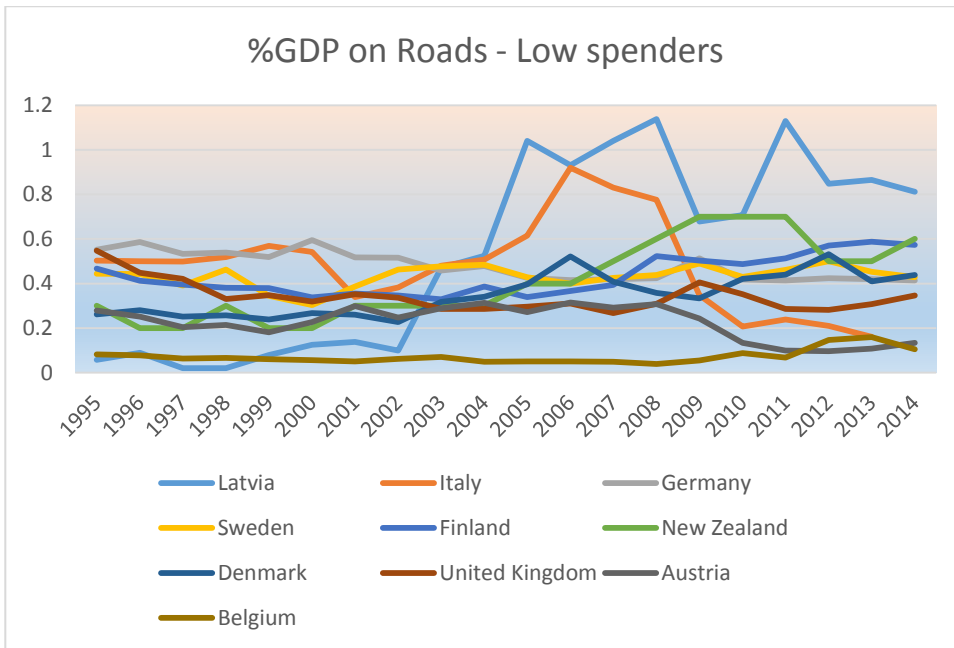


Source ITF 2016

Figure 3c: %age of GDPs Spending on Roads 1995 – 2014: Low Spending Countries

<sup>7</sup> ECMT 1992 and ECMT 1999.

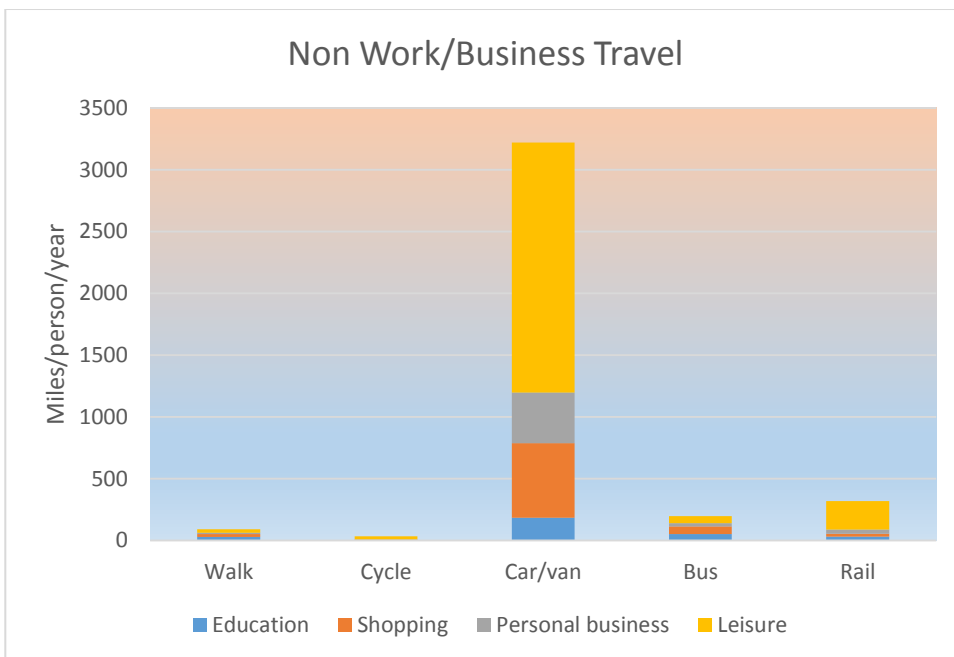
<sup>8</sup> Investment and Maintenance Expenditure.



Source ITF 2016.

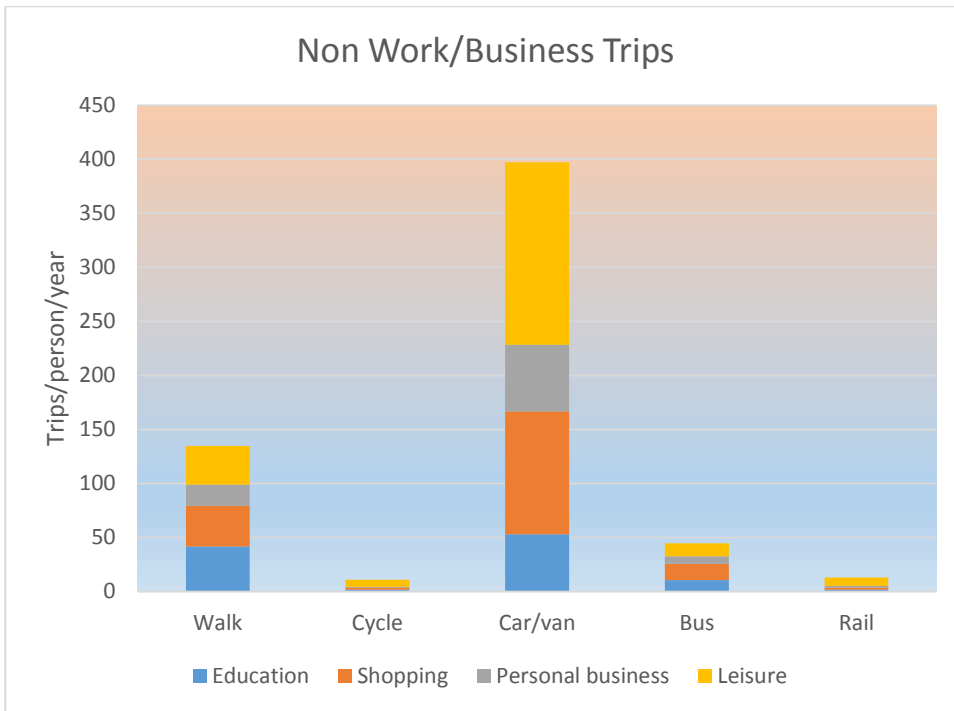
Road transport is also important to the social and cultural life of the nation. Figures 4a and 4b show the importance of road based modes of transport to non-work/business travel in England with 83% of person miles and 98% of journeys going by one or other form of road transport.

Figure 4a: Non Work/Business Personal Travel in England by Mode - 2014



Source: DfT 2015c.

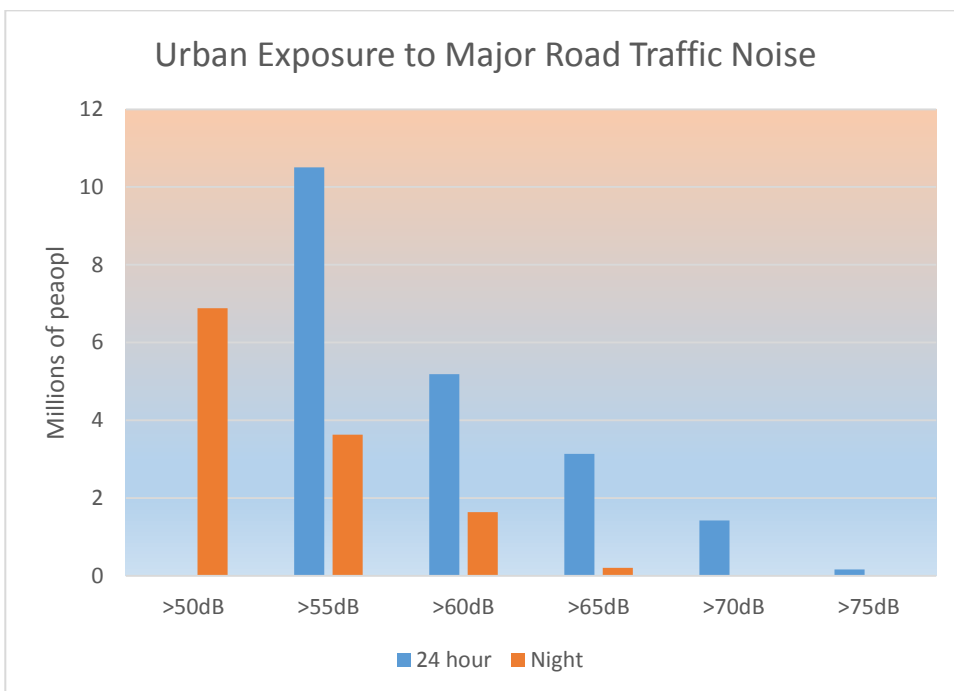
Figure 4b: Non Work/Business Personal Trips in England by Mode - 2014



Source: DfT 2015d.

Road transport has some adverse impacts on the quality of life. Figure 5 illustrates exposure of main road (motorways and 'A' roads) traffic noise in England's main urban areas.

Figure 5: Main English Urban Areas Exposure to Main Road Traffic Noise: 2012.



Source: DEFRA 2016.

The World Health Organisation guidance<sup>9</sup> is that 'to protect the majority of people from being seriously annoyed during the day-time, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB LAeq for a steady continuous noise.'... 'At night, sound pressure levels at the

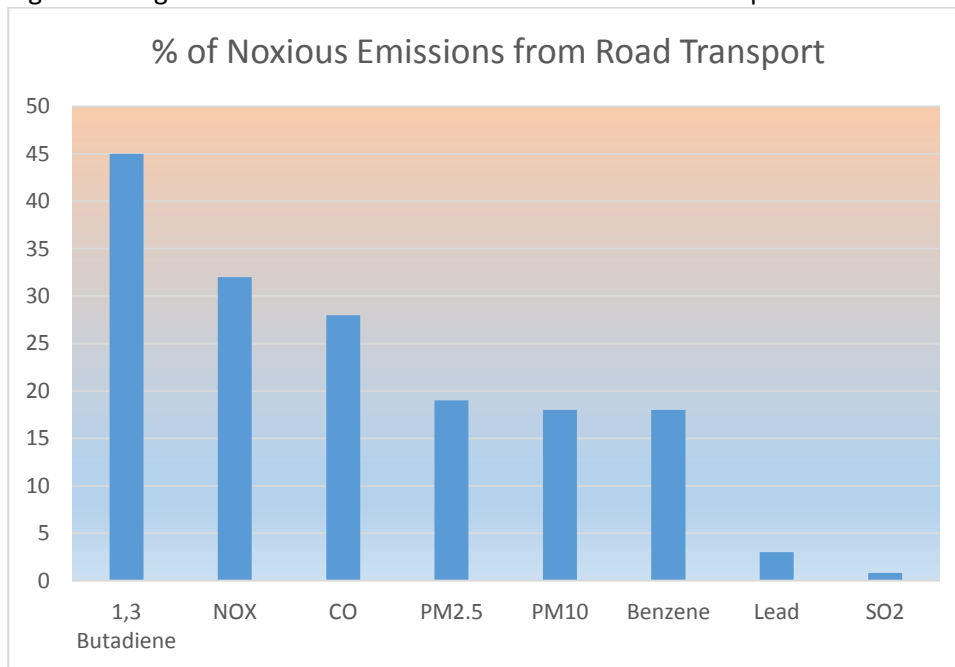
<sup>9</sup> WHO 1999.

outside façades of the living spaces should not exceed 45 dB LAeq and 60 dB LAmax, so that people may sleep with bedroom windows open.’ This suggest that many residents of urban areas are exposed to excessive traffic noise although it appears that in recent years complaints about traffic noise have been fairly stable whilst those in respect of other sources have been rising<sup>10</sup>.

The design and layout of roads can materially affect noise nuisance from their use by installing low noise surfacing and sound barriers on existing roads and designing new roads to minimise noise intrusion from the outset.

As well as producing 21% of Greenhouse Gases<sup>11</sup> road transport is an important source of pollution as can be seen from figure 6. Whilst the main method of mitigating these features of road transport will be changes in vehicle motive technologies, a road system which operates with reduced road congestion also has a significant rôle to play.

Figure 6: %age of the UK’s Noxious Emissions from Road Transport - 2013



Source (DfT 2015f)

Q2. Do you agree that, in undertaking the NIA, the Commission should be:

- *Open, transparent and consultative*
- *Independent, objective and rigorous*
- *Forward looking, challenging established thinking*
- *Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?*

*Are there any principles that should inform the way that the Commission produces the NIA that are missing?*

**The Foundation’s response:**

The Foundation agrees with the Commission’s approach, in particular the need to take a whole system view. It is important to recognise that there is a large body of research in roads transport both in the UK

<sup>10</sup> CIHE 2006.

<sup>11</sup> DfT 2015e.



and internationally and it would be remiss not to take advantage of this, even where it supports the *status quo*. Whilst past trends do not predict future developments, they provide a valuable starting point and context for understanding and determining prospective points of departure in the future. On the other hand, there is a task to be done in challenging the efficiency, cost and durability of current engineering and construction practices, and foster the development of better materials for use in road construction, maintenance and repair.

Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

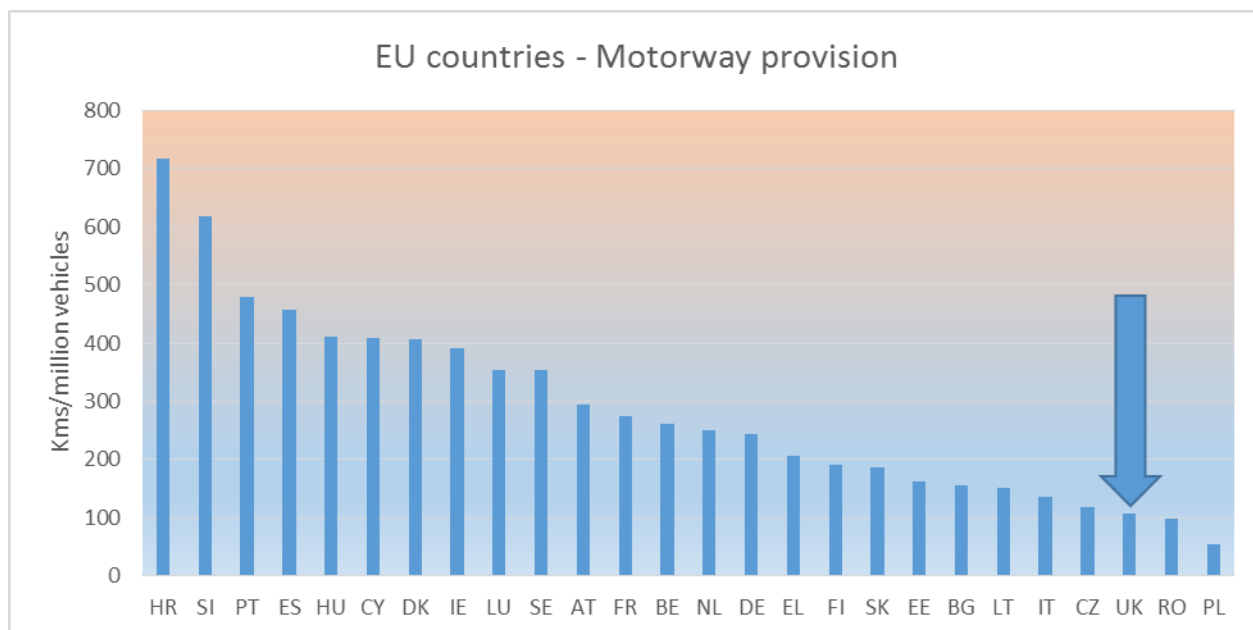
**The Foundation’s response:**

The framework proposed by the Commission appears to be sufficiently comprehensive and flexible to do justice to the types of infrastructure in the remit. However, in addition to economic growth and productivity, population and demography, technology and climate change & environment, the potential implications of social and cultural developments should also be taken into account. An outstanding example of such a change was the take up of television and home viewing in the 1950s which sharply reduced cinema attendances (from 1,396 million in 1950 to 501 million in 1960)<sup>12</sup> and bus usage in the evenings and weekends<sup>13</sup> which helped undermine the commercial viability of many bus operations.

Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

**The Foundation’s response:**

Figure 7: Motorways (kms) per million vehicles in EU countries with Motorways– end 2012.



Source: EC 2015.

A particular aspect of the UK’s road system is the limited provision of high quality traffic routes compared with other major European Countries. Just 23% of major roads<sup>14</sup> are dual carriageway and only 7% motorways<sup>15</sup>

<sup>12</sup> UK Cinema Association 2016.

<sup>13</sup> Barker and Robbins 1974, p349.

<sup>14</sup> Motorways and ‘A’ roads

<sup>15</sup> DfRD 2015 & DfT 2015g.

Figure 7 shows the levels of motorway provision in relation to the number of road vehicles of the 26 EU countries that have motorways. The UK comes 24<sup>th</sup> ahead of Poland and Romania - with just 46% of the EU average.

The other worrying aspect of UK roads is the relatively poor state of repair of many roads. Special ad hoc allocations of funds to repair potholes have become a recent feature of roads management. The condition and funding of England's local roads was looked at by the Foundation recently<sup>16</sup> and this concluded:

- central government knowledge of their condition is limited;
- the frequency with which road surfaces are treated has been falling for many years and the reliance on surface dressing of A roads rather than resurfacing and strengthening grown and this has resulted in a significance increase in 'potholing' of local roads;
- it could take over 12 years to clear the current backlog and cost in excess of £10bn;
- the funding of local roads maintenance is complex and problematic with the prospects for funding routine maintenance are the next few years being quite bleak and
- the difference between the planning and development of the national road network and that for local roads has never been starker.

The Institution of Civil Engineers 2013 State of the Nation infrastructure review<sup>17</sup> gave local transport the lowest score of *D-* and worsening; and a more recent assessment of the condition of local roads in Scotland<sup>18</sup> concluded that around a third of Scotland's local roads are in an unacceptable condition and the maintenance backlog stood at over £2bn.

*Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?*

**The Foundation's response:**

The prospective changes in road transport technology will depend on parallel developments in a number of areas. In particular the prospect of increased use of electricity from the grid as the motive power for road vehicles will have substantial implications for power demand levels and profiles and the loads on distribution networks. The Annex sets out an illustration of the potential scale of this; which could add a load in excess of existing electricity consumption by 2040. By the same token, road transport's demand for oil as a source of fuel will be reduced with substantial implications for levels of demand and storage and distribution. Another key issue is likely to be the capacity for vehicle ↔ infrastructure and vehicle ↔ vehicle communications required by the prospective increased automation of vehicle operations, with consequential implications for broadband network speed, coverage and capacity.

*Q6. Do you agree that the NIA should focus on these cross-cutting issues?*

**The Foundation's response:**

These cross cutting issues do merit special attention as, too often, individual infrastructure agencies pay insufficient attention to the implications their activities and proposals have for other types of infrastructure and vice versa. However analysis of cross cutting issues must be based on a sound understanding of the problems and operations of each particular type of infrastructure.

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<sup>16</sup> Bayliss 2015.

<sup>17</sup> ICE 2013.

<sup>18</sup> ICE 2014.

*Q7. Are there any other cross-cutting issues that you think are particularly important?*

**The Foundation's response:**

There will be some generic issues that have to be addressed in establishing how best to maintain, upgrade and develop out national infrastructure. The shortage of skilled engineers is one such<sup>19</sup> - with problems in specific areas where recruitment has long been a problem (e.g. railway signalling engineers) and where the UK has fallen behind in recent years (e.g. nuclear engineering). The competition for oil has shown us that limited supplies and high costs (sometime exacerbated by geo-political tensions) of materials can impede the development of some technologies and affect their relative advantages – it is unlikely the recent rapid increase in efforts to develop efficient and affordable electric road vehicles would have occurred if oil prices had remained below \$25/barrel (at current prices) as they during the 28 years following WW2<sup>20</sup>. New technologies may require new materials and contemporary electric batteries for road vehicles are generally based on Lithium where almost 60% of reserves are in three South American countries<sup>21</sup> and an explosion in demand, especially if used for domestic<sup>22</sup> and industrial power storage, could lead to scarcity, high prices and early exhaustion of these reserves.

Infrastructure development projects can be very expensive as the current discussions over the £18bn<sup>23</sup> Hinkley Point power station and the third South East Runway, with the recommended option costing £18.6bn<sup>24</sup> illustrate this. Funding these projects can put considerable strain on public finances and innovative means may be needed to secure private finance to ease this. However such arrangements are not always cost effective and careful planning and budgeting will be needed to ensure overall affordability.

Another cross-cutting issue pertinent to infrastructure network resilience is the fact that many of our key distribution networks – power, water, sewers etc – run underneath our roads. Breaking the road in order to carry out maintenance and repairs is a necessary fact of life given the extensive nature of these networks, but it is equally important to have sight of the traffic impact of works, the quality of re-instatement, and the potential for new materials and new technologies to minimise streetworks in future.

*Q8. Do you agree with this methodological approach to determine the needs and priorities?*

**The Foundation's response:**

Subject to its comments on question 3 the Foundation agrees with the approach set out in the consultation document. However, too often scenario development sets out a series of alternative end states whereas to be useful to planners and policy makers they should identify alternative pathways from the present - with changing trends and disruptive events individually identified to aid understanding of their rational and to help decision makers monitor progress<sup>25</sup>. Amongst the events leading to the unfolding picture will be changes to different components of the national infrastructure and a time stream related scenario process can help determine the points at which these changes would best be made.

There are some aspects of the nation's infrastructure (e.g. the condition of local roads) where central monitoring data is limited. As part of its first round of work the Commission should review the

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<sup>19</sup> Engineering 2015.

<sup>20</sup> Macrotrends 2016.

<sup>21</sup> US Geological Survey 2016.

<sup>22</sup> See TESLA 2016.

<sup>23</sup> EDF 2016.

<sup>24</sup> Airports Commission 2015.

<sup>25</sup> Khan & Weiner 1968.

availability of information on the nation's infrastructure and advise government on where and how this needs to be strengthened in order for future sound assessments to be made.

*Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?*

**The Foundation's response:**

The methodology for Department of Transport's National Road Traffic Forecasts<sup>26</sup> has recently been developed to include a range of scenarios in which five principal scenarios are used as the basis for estimating future road traffic levels.

Work by the Foundation which bears on future road needs are<sup>27</sup>:

- *Motoring Towards 2050*<sup>28</sup>, which considered a range of factors that had a bearing on future travel demand along with options for accommodating this.
- *Roads and Reality*<sup>29</sup>, which analysed the effects of different scales of strategic road expansion on demand and congestion with and without efficient pricing,
- *Governing and Paying for England's Roads*, which explores funding and governance options for England's main road network.

An important assessment of the relationship between transport and the economy was also carried out in 2006 by Sir Rod Eddington<sup>30</sup>. This comprised four parts – Understanding the Relationship between Transport and the Economy, Defining the Challenge, Meeting the Challenge and Taking Action. The third part of the Eddington Study set out proposals for the better management and enhancement of the road network,

*Q10. Do you believe the Commission has identified the most important infrastructure drivers (Population and demography, Economic growth and productivity, Technology and Climate change and environment)? Are there further areas the Commission should seek to examine within each of these drivers?*

**The Foundation's response:**

It probably bears saying that in 'demography' we think it is important that the NIC has an eye to the patterns of household formation and housing location, which are key drivers of demand for all of the network infrastructure services in the NIC's scope, in particular transport.

As set out in its response to question 3 the Foundation believes that social and cultural changes should also be taken into account. The inclusion of climate change and the environment raises two separate issues. The first is the impact that these can be expected to have on infrastructure needs and performance; and the second is the constraints they impose on infrastructure planning and development.

Climate change is expected to changes in weather patterns and ambient temperatures which will need to be taken into account of in the planning and management of roads - and other types of infrastructure. More intensive storms will change the demands on drainage and vulnerability to high winds. Higher peak temperatures will result in higher thermal stresses and the possibility of some types of surfacing materials becoming more plastic. In recognition of this a greater degree of resilience will be required

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<sup>26</sup> DfT 2015h.

<sup>27</sup> There are several other reports which have a (less direct) bearing on the Commission's remit available on the Foundation's website.

<sup>28</sup> RAC Foundation 2002.

<sup>29</sup> Glaister et al 2007.

<sup>30</sup> Eddington 2006.

both for new and existing assets. Retrofitting existing assets will require modification of some aspects of maintenance programmes to increase resilience and this is likely to lead to an increase in costs.

The need to mitigate road transport's contribution to climate change and to moderate its impacts on the environment will have implications for infrastructure as well as vehicle technologies and operation. This will require infrastructure design, management and, where appropriate, user charging, which enables and facilitates 'low impact' road transport operations. Where new infrastructure elements are introduced their design must be sensitive to local environmental needs and help promote environmentally sensitive operations.

*Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?*

**The Foundation's response:**

Establishing an infrastructure investment portfolio is a formidable task and is unlikely to be completed in a single round of analyses. An initial broad review, including a review of alternative interventions, should set out high priority and pressing needs in the context of a more general review of the scale and priorities across the board. A key component of this should be to get an overall view of the funding and resource needs which will provide an essential context for the development of sectoral programmes.

Development of a clear set of objectives for the performance of each type of infrastructure will be essential at this early stage but this will be subject to review and refinement as understanding of the challenges and opportunities within each sector become more evident.

Prior to 'firm entry' stage cost benefits analysis should be carried out. There is a long tradition of the use of cost benefit in roads and transport project appraisal in the UK stretching back to the pioneering work of Beesley and Reynolds<sup>31</sup> and currently available as the DfT's WebTAG<sup>32</sup>.

*Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?*

**The Foundation's response:**

The Commission's approach appears to be soundly based and recognises the uncertainties inevitably associated with an exercise of this kind and the need for robust proposals in light of these. Whilst existing models will be of considerable assistance in the Commission's work there are some major risks and uncertainties that are not amenable to formal modelling. The Commission should consider the use of polling expert opinions through techniques such as the Delphi method<sup>33</sup> for capturing a wider range of factors than can be embraced by formal models.

*Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?*

**The Foundation's response:**

Regular briefings on the Commission's work will enable interested organisations and individuals to keep up to date and the Commission's website can be used to provide feedback. Once the Commission's work programme is formulated it could invite interested parties to join one or more 'community of interests' where they would be circulated with relevant material for comment and input. The major institutions and professional bodies working in the infrastructure sphere should be invited to join these and could be

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<sup>31</sup> Beesley et al 1960.

<sup>32</sup> DfT 2013.

<sup>33</sup> Helmer 1967.

approached directly to contribute on specific issues. Special advisory panels could be set up as necessary to bring in specialist expertise on matters such as funding and to help with some of the more complex issues such as suggested in the preceding paragraph.

The Foundation stands ready to participate, as we have with a number of events convened thus far by the Institution of Civil Engineers for Sir John Armit.

*[name redacted]*

**[job title redacted]**

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## ANNEX: Electric Vehicles and Demands on the National Grid

### Introduction

The demands for energy from the transport sector are likely to change significantly over the next 25 years most notably through the replacement of liquid hydrocarbon fuels by electricity. This trend has already started at the lighter weight end of the vehicle range (cars and Light Goods Vehicles - LGVs) but, as yet, electric traction has not been developed as a cost effective alternative to diesel power for Heavy Goods Vehicles (HGVs) and does not appear to provide the main prospect for reducing emissions in the foreseeable future<sup>34</sup>.

### Estimates of future electric road vehicles

In 2015 there were 31.17 million cars registered in the UK<sup>35</sup> and these are forecast to grow to between 38m and 42m in 2040<sup>36</sup>. Using a low (conservative) sensitivity to GDP gives a forecast of 38.7 million cars<sup>37</sup>.

Official forecasts for the number of vans are not published. In 2015 there were 3.74 million vans registered in the UK<sup>38</sup> and, if these number only grow as fast as those for cars then by 2040 this would increase to 4.6 million. However van numbers have been increasing more rapidly than those of cars (65% between 1994 and 2024 compared with 40% for cars) and a figure of circa 5m seems more likely.

At present the extent of electric traction with power imported directly from the grid (i.e. plug in hybrid vehicles and battery electric vehicles) is small. In March 2016 there are roundly 57 thousand<sup>39</sup> plug in grant eligible electric cars and 2.4 thousand vans<sup>40</sup>, this amounts to little over 0.2% of the Light Duty Vehicle (LDV) parc. Forecasts for the future growth of electric LDVs vary widely and a report for the Foundation in 2013<sup>41</sup> concluded plug in LDVs are 2020 they are likely to account for anything between 5% and 15% of new car sales in 2020, and for between 20% and 50% by 2030. If this trend continued by 2040 it would appear that Electric Light Duty Vehicles (ELDVs) could account for between 40% and 80% of new sales. Beyond 2040 it appears that fuel cell technology will have become commercially competitive and may provide the new vehicle traction growth technology.

More recently the Committee on Climate Change has forecast that around 60% of new car and van sales could be a plug in hybrid (PHEV) or battery electric vehicle (BEV) by 2030 (35% PHEVs and 25% BEVs)<sup>42</sup>. In the longer term hydrogen fuel cells could be used in long distance HGVs. New car sales do not define the proportion of vehicles in the fleet as only about 8% of the car fleet and 9% of the LGV and HGV fleets are renewed each year<sup>43</sup>.

Recent guidance by the DfT estimates that in 2030 5.3% of car travel will be electric (based on 2010 fleet data)<sup>44</sup>. It is clear therefore that there is great deal of uncertainty about the demand for grid power for electric LDV use more than a few years ahead. Figure 1 illustrates three scenarios assuming that by 2040 Plug in ELDV sales will have reached either 40% (low) 60% (medium) or 80% (high) of all LDV sales. In these it is assumed that average Plug in ELDVs lives will be ten years which, although significantly longer than anticipated battery lives, it is assumed to be necessary to make then competitive with other types of LDVs. The low scenario would mean that by 2040 30% of LDVs would be plug in electric and the high

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<sup>34</sup> Ricardo - AEA 2012a.

<sup>35</sup> DfT 2015a.

<sup>36</sup> DfT 2015b, para 2.34, grossed up to whole of the UK.

<sup>37</sup> DfT 2015b, scenario 4.

<sup>38</sup> DfT 2015c.

<sup>39</sup> DfT 2016.

<sup>40</sup> This can be compared with 42 thousand electric vehicles in Britain in 1982 (DoT 1983a, table 2.18) – before the near demise of the milkman in his electric ‘float’.

<sup>41</sup> Kay et al 2013.

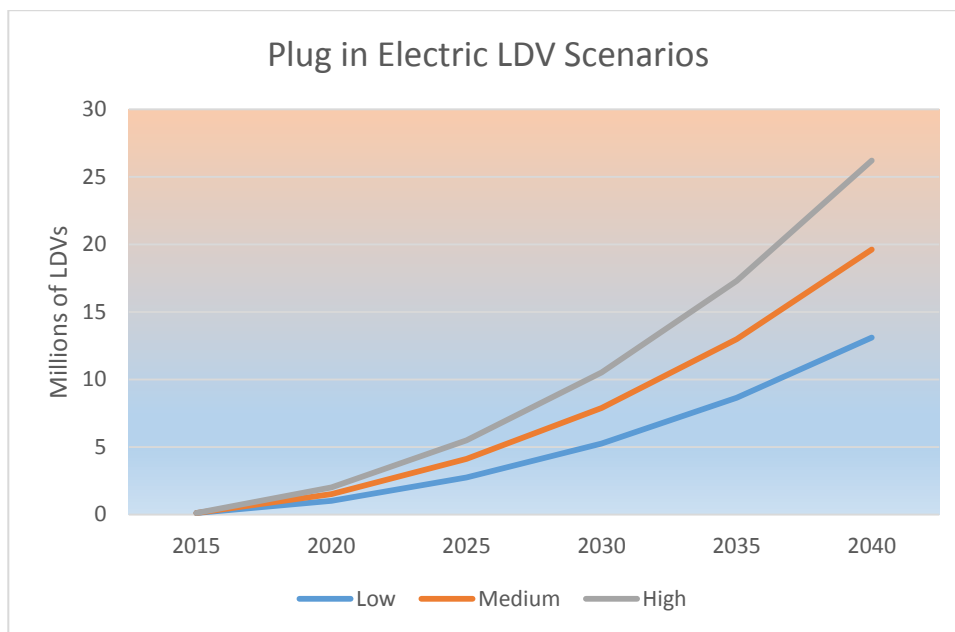
<sup>42</sup> CoCC 2015.

<sup>43</sup> DfT 2015a & 2015e.

<sup>44</sup> DfT 2015d, table A1.3.9.

scenario 60%. These are lower than the sales figures assumed because of the time taken for the legacy of other vehicle types to ‘tail off’ and as the Plug in LDV market matures a growing proportion of new purchases are replacing older Plug in LDVs that are life expired (almost half by 2040).

Figure 1: Low, High and Medium Scenarios of UK ELDV Parc sizes.



Source: Author’s estimates

#### Power demands by electric vehicles

Clearly the growth of this parc will make additional demand on the electric power supply system. How much will depend on the balance between externally drawn power, self-generated power (e.g. regenerative braking and on board generation) and the extent of other motive systems such as fossil fuel powered range extenders. A crucial factor in this is the capacity of LDV battery systems.

It is reasonable to assume that with diesel/petrol costing about £1.50/litre in 2040 and electricity 20p/kwh<sup>45</sup> motorists will tend to maximise their use of electric traction: these being equivalent to 6-7p and 2½p per vehicle kilometre<sup>46</sup>.

Currently most electric LDV battery capacities are in the range 20 to 80 kilowatt-hours (KWhs) using lithium-ion battery packs<sup>47</sup>. Energy densities are rising and TESLA claim an energy density of 132 watt hours/kilogram (Whs/kg) compared with 80 – 100 Whs/kg for current models by Ford, Nissan and Mini<sup>48</sup> and this battery technology could probable reach densities of 200 Whs/kg or more. There are other battery technologies that offer the possibility of substantially higher energy densities but the viability of these in LDVs remains uncertain. However a doubling of battery storage capacities – and vehicle range-over current levels seems quite realistic and should be allowed for in LDV electricity demand estimation.

An average individual LDV battery capacity of 50 KWhs would mean a parc capacity of between 650 and 1,300 gigawatt hours by 2040. In 2014 electricity generation in the whole of the UK was 339 Terawatt hours (TWhs) or about 1TWh on an average day. Thus in the 2040 high demand scenario electric road vehicles, if all were fully discharged and charge each day, could require more than current UK electricity consumption. On the face of it this seems extraordinary; however given that (all forms of) transport consumed 38% of final energy consumption in 2014 and petroleum products provided 2½ time as much

<sup>45</sup> DfT 2015d, table A1.3.7

<sup>46</sup> Ibid, table A1.3.11

<sup>47</sup> Just Auto 2016.

<sup>48</sup> Tesla 2016.

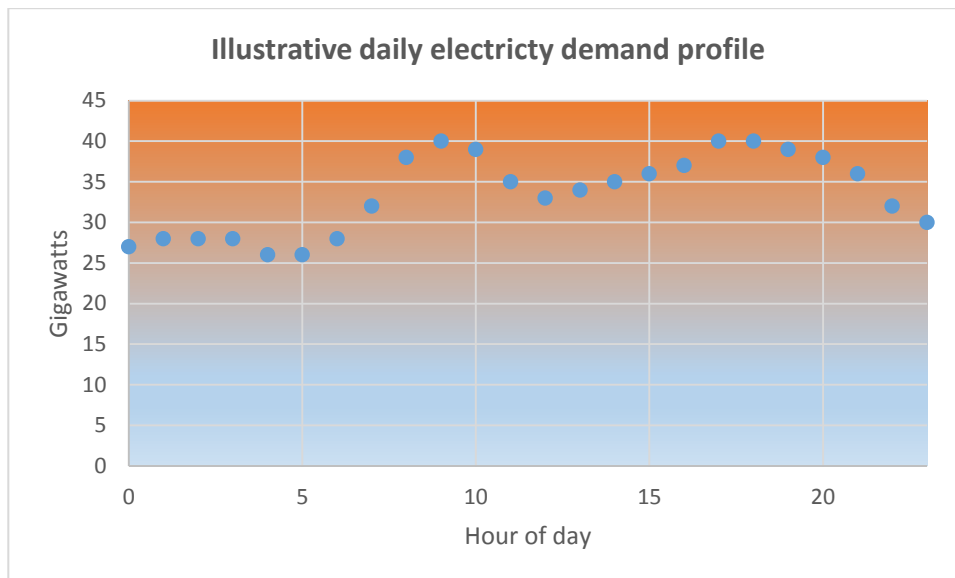
energy as electricity<sup>49</sup> a major switch from petroleum to electricity can be expected to result in a major increase in the demand for electricity. If higher average battery capacities were achieved then the load on the grid would be correspondingly higher.

This is an extreme example and a 50% recharge in the low scenario would require only about a third of current electricity generation capacity. However it is clear the switch to grid sourced electricity for road transport would impose a substantial load on the national grid.

#### Potential for off-peak charging

The demand for electricity is not uniform by time of day, day of the week or season. Figure 2 gives an indication of how daily demand varies on a January weekday.

Figure 2: Illustrative UK electricity demand profile on a typical January weekday.



Source: National Grid 2016a

From this it is clear that there are times of the day (e.g. between midnight and 06.00hrs) when the full potential of the grid is not being utilised and when there is scope for charging electric vehicle batteries. This is also the time when most LDVs are parked, between midnight and 0600hrs traffic volumes amount to about 5% of the weekly total<sup>50</sup>, and therefore in a position to receive grid power.

However the types of sources of power to the grid affect the availability of electricity with some (e.g. nuclear) best suited to even output over long periods whilst others (e.g. wind and solar) are dependent on variable, and uncertain, environmental conditions. If electricity for LDVs is to be sourced from the grid with a strong 'off peak' profile then this will have to be taken into account in designing the power generation and storage mix.

#### Local power distribution

Extensive use of overnight charging of EVs would impose new loads on local power distribution networks. The scale of this will depend on the take up of EVs, metering and tariff arrangements and charging transmission rates. In a, possibly extreme, example given in a Royal Academy of Engineering Report on electric vehicles<sup>51</sup> charging an EV at home in the evening requires double the previous peak load and therefore could treble demand for a short period and concluded 'Unless there were to be a wholesale upgrading of the local distribution system, the widespread adoption of EVs would require a smart grid that not only matched electricity use to generation but also managed charging loads in a

<sup>49</sup> DECC 2015b, chart 1.5.

<sup>50</sup> DfT 2015f.

<sup>51</sup> RAEng 2010a.

street.' And 'it is likely that many EV battery charging loads will have to be controlled to limit currents in the final 415V distribution circuit, rather than by price signals emanating from a national electricity reseller or the grid control centre. It is not clear how a competitive retail market would work if a distribution company (by necessity, a local monopoly) has control of the times when EV charging may take place.

### Conclusions

If there is a substantial take up of electric Light Duty Vehicles (ELDVs) there will be important impacts on the scale and pattern of demand for power from the National Grid.

The extent to which ELDVs will form part of the future road vehicle park is dependent on a wide range of factors and must at this stage be speculative. However, based on earlier work done for the Foundation a range of ELDV numbers in 20140 of 9½ - 19 million has been estimated.

The power storage capacity of these vehicles, based in improvements in existing (lithium ion) battery technology has been assumed to average 50KWh which, at most, would amount to about 90% of existing electricity consumption. The widespread take up of ELDVs would therefore have major implications for future grid electricity needs.

Whilst it is possible that most grid power draw down by LEDVs could be off peak this would mean that the mix of primary power sources for grid electricity, and any grid linked power storage systems would have to be designed to accommodate a much higher demand in what are currently off peak periods.

Finally if much of the charging of ELDVs is from residential premises the loadings on local distribution networks would increase substantially and, even with smart metering, it is probable that many of these would also need strengthening.

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**The National Infrastructure Assessment**

**Process and Methodology - A Consultation**

**Response by Radioactive Waste Management Limited**

**August 2016**

Radioactive Waste Management (RWM) is the public body responsible for delivering a UK Geological Disposal Facility (GDF), one of the UK's most important infrastructure projects, which will provide for the permanent disposal of the nation's higher activity radioactive waste.

RWM is a wholly-owned subsidiary of the Nuclear Decommissioning Authority (NDA), and is internationally-recognised as a leading expert in radioactive waste management and geological disposal. It manages an extensive collaborative research programme, working with scientists, academics and radioactive waste management organisations across the world, to ensure that a GDF can be built and operated safely in the UK, consistent with the latest scientific and technical knowledge, and to the UK's internationally-respected regulatory standards.

In addition to being the GDF developer, RWM works closely with radioactive waste owners to ensure that waste is securely and effectively packaged so as to be suitable for geological disposal. The waste packages are then safely stored in specialised interim storage facilities, awaiting permanent disposal in a GDF.

RWM is actively working to raise awareness and understanding of the need for geological disposal, and to inform communities and their representatives about the consent-led process to find a suitable site for a GDF. From this perspective, we feel it appropriate to respond to consultations questions 1 and 2 only as follows.

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

Finding a site for the GDF is built on a unique 'consent based' approach which requires a willing community to be an active partner in the project's development, thus going to the very heart of delivering devolved decision-making, and creating the



opportunity for a community to play an active role in determining its own long-term socioeconomic development and prosperity.

The GDF project is likely to have a transformative effect on the local and regional economies adjacent to the site, providing jobs and supporting related economic activity for the 150+ years of its construction and operational life, while acting as a catalyst for wider public and private sector investment. The nature of the programme means that investment, social and economic growth are likely to be delivered in a very stable way since its operations are likely to be resilient to normal commercial economic cycles over a long period of time.

In 2015 the GDF was brought within the definition of a Nationally Significant Infrastructure Project (NSIP) in the Planning Act 2008, and the Government has indicated significant investment for the host community over and above the direct and associated benefits related to construction and operation of the facility. Geological disposal has been the policy of successive Governments, and is being implemented by most major 'nuclear' nations as the sustainable approach to protecting the environment and future generations.

Alongside the economic benefits, there are clear ethical and environmental drivers to ensure future generations are not burdened with the costs, responsibility, and risks of managing this generation's waste, some of which will remain hazardous through periods of future social, environmental and climatic change.

It is particularly important that the Commission carefully considers the interrelationships and interdependencies between major infrastructure projects in determining the nation's priorities. For example, the Government has recognised that confidence in the UK's future ability to dispose of its nuclear waste is a necessary precondition for any new nuclear build programme, hence the importance of the GDF in the nation's infrastructure priorities. A GDF supports the development of new nuclear power stations; nuclear power stations provide energy security and the low carbon, price-stable energy required to support long-term national prosperity; therefore the GDF is key to securing broader long-term national interests as well as providing a transformative inter-generational development opportunity for the region which hosts the facility.

We conclude that the National Infrastructure Commission objectives support delivery of a UK GDF, and that the Commission should give careful consideration to the interrelationships and interdependencies between infrastructure projects, both within and across sectors in determining priorities.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **open, transparent and consultative**
- **independent, objective and rigorous**

- **forward looking, challenging established thinking**
- **comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

International experience, and experience from previous attempts to site a UK GDF, has underlined the potential benefits of taking a consent-based approach to siting a GDF.

The need to secure local community support, and for the community to be actively engaged in the process, provides the foundations for people to be directly involved in shaping a long-term sustainable socioeconomic vision for their own locality. The complexity and scale of the challenge presented by this approach to local devolved decision-making cannot be underestimated, but could provide an informative case study for future infrastructure projects on how more direct involvement of local communities might help better address the issues, and define the long-term benefits, related to infrastructure projects. Openness and transparency lie at the heart of this approach and their importance cannot be overstated. In the case of a highly technical issue, like geological disposal, the underpinnings of objective and rigorous analysis are essential to building trust, as is the need to consider and explain the proposals in the wider context. Again this points to the importance of a clear understanding of interdependencies.

**Should the Commission have any questions relating to this consultation response, please contact:**

[name redacted]

[job title redacted]

Radioactive Waste Management Limited, Building 587, Curie Avenue, Harwell  
Oxford, Didcot OX11 0RH

Telephone [phone number redacted]

## Rail Delivery Group

Response to consultation:

### The National Infrastructure Assessment: Process and Methodology

Date: 5 August 2016

**Rail Delivery Group response to consultation:  
The National Infrastructure Assessment:  
Process and Methodology**

**Name:** [name redacted]

**Organisation:** Rail Delivery Group

**Address:** 200 Aldersgate Street, London EC1A 4HD

Business representative organisation

**Introduction:** The Rail Delivery Group (RDG) was established in May 2011. It brings together Network Rail and passenger and freight train operating companies to lead and enable improvements in the railway. The purpose of the RDG is to enable Network Rail and passenger and freight train operating companies to succeed by delivering better services for their customers. Ultimately this benefits taxpayers and the economy. We aim to meet the needs of:

- Our Members, by enabling them to deliver better outcomes for customers and the country;
- Government and regulators, by developing strategy, informing policy and confronting difficult decisions on choices, and
- Rail and non-rail users, by improving customer experience and building public trust.

For enquiries regarding this consultation response, please contact:

[name redacted]

[job title redacted]

[email address redacted]

[phone number redacted]

**Rail Delivery Group**

2nd Floor, 200 Aldersgate Street

London EC1A 4HD

## Overview

The Rail Delivery Group (RDG) welcomes the opportunity to contribute to the National Infrastructure Commission consultation on the methodology and process of National Infrastructure Assessments (NIA). The key points of the RDG's response are as follows:

- The RDG and its member organisations are supportive of the aims of the Commission and welcome the opportunity for our organisations to work collaboratively in the years ahead.
- Rail already plays a significant role in supporting the British economy, transporting goods and enabling travel for work and leisure across Great Britain. The RDG shares the aim of the Commission to effectively target investment in infrastructure to further boost economic growth.
- The GB rail industry already has a well-developed process for forecasting demand and evaluating the interventions required to meet current and future passenger traffic. The RDG supports the Commission having a key role in complementing and informing the work of individual actors by focussing on cross-cutting issues and developing shared assumptions and scenarios which can be used across infrastructure sectors.
- The rail sector does not exist in isolation, and its interdependencies with wider trends and other areas of policy are many and varied. The RDG welcomes the Commission's recognition of these dependencies but would stress the importance of residential and commercial development patterns.
- The Commission should clarify at the earliest opportunity some areas of ambiguity in the consultation document. In particular, we would appreciate clarification of the type and scale of infrastructure under consideration; and the timescale regarded as immediate future when deciding which decisions will not be reopened by the Commission.

## Remit and plan

### Principles

**Q1: The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

Rail is already playing a key role in supporting the UK's economy and the quality of life of its residents. Research produced by Oxera on behalf of the RDG in 2014 valued the contribution of rail to the economy to be of the order of £10 billion, including alleviating congestion in the road network and facilitating the development of economic activity. More than four million train journeys a day are taken to work, study, or visit friends and family; and each year goods worth over £30 billion are carried by the rail freight industry.

It is important that the Commission's work builds upon the detailed planning carried out by the individual actors within each sector and adds value rather than complexity to these processes. Planning activity within the rail industry is overseen by the RDG's Planning Oversight Group (POG), which exists to assemble an industry view on key, high-level, strategic planning issues; and to communicate this to key stakeholders in order to provide clarity, direction and funding to deliver tomorrow's railway.

The planning work overseen by POG is produced in a number of areas, for example infrastructure, rolling stock, depots and stations. A key input is the Long Term Planning Process (LTPP), led by Network Rail and bringing together a range of stakeholders to develop and present choices to funders about the mix of outputs deliverable at different levels of cost. The Commission's objectives reflect those set out by the LTPP:

- enabling economic growth
- reducing carbon and the impact of the transport sector on the environment

- improving the quality of life for communities and individuals
- improving affordability and value for money (to funders).

**Q2: Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

The rail industry would support the Commission producing the NIA in a manner consistent with all the suggested principles.

We welcome the Commission operating in a collaborative manner, recognising the specific expertise within each sector and using the detailed long term planning which is already done within the rail industry as a building block for its own work. A similar argument could apply to those areas of the country where multi-modal infrastructure planning is already being led by sub-national devolved bodies. By taking a comprehensive, whole system approach to infrastructure provision the Commission can complement and inform the work of individual actors.

It is important that the Commission's role in the established processes for planning, funding, developing and delivering projects is clearly defined. There are some areas of ambiguity in the consultation document, in particular the type and scale of infrastructure under consideration. The Commission does not set out a clear threshold project size threshold below which it would not seek to intervene.

The timescale referred to in the document that '...the Commission will not re-open decision making processes where programmes and work...will be decided in the immediate future' should also be clarified. This is currently of particular relevance as the process under which the industry identifies its priorities for investment over the coming years is already underway as part of the Office of Rail and Road's Periodic Review 2018.

Whereas previously enhancement projects were funded primarily through multi-year funding settlements, in the future the industry expects enhancement projects to be funded progressively on an ongoing basis. This should be taken into account if rail enhancement schemes are to be funded within the Commission's fiscal remit.

### **What the NIA will cover: Sectors**

**Q3: Do you agree that the NIA should cover these sectors in the way in which they are each described?**

The multi-modal approach proposed in the consultation document should add value to decision making and would be welcomed by the rail industry. A key driver of rail demand is the location and relative cost of use of other transport infrastructure. A number of airports are served by rail, and a combination of their development plans and the commercial strategies of the airlines will influence the level and nature of demand for rail access. The same applies to ports, particularly for freight traffic. A more universal factor is the influence of the road network, both as a competitor to rail and as the mode through which significant numbers of rail journeys begin and end. By taking a multi-modal perspective on the transport sector the Commission can ensure that a consistent view of demand is taken in the planning of different transport modes.

The key aspects of rail infrastructure provision which the Commission should be aware of are set out in the response to Q4 below.

**Q4: Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

The Commission should be aware of the complexity of the rail system which is a defining feature relative to other transport modes. Capacity for passenger and freight traffic is provided by a combination of infrastructure types – the track, signalling and structures themselves, along with rolling stock, stations, depots and freight terminals – with the structure of fares and charges providing a route to manage demand. The scope of the Commission’s analysis and the roles played by public bodies and train operators should be recognised in this context.

The Commission should also take account of the potentially transformational impact on the transport sector which could result from the development and deployment of new technology. Through the Digital Railway programme the rail industry is developing plans for the use of new technology on the railway to accommodate more trains, and to increase the reliability and flexibility of the railway for passengers. The accelerated introduction of technology will help to free up more capacity from the existing railway infrastructure, tackling the capacity challenge in a targeted way and reducing the need for conventional infrastructure enhancement schemes.

The NIA should have regard to existing planning processes and approaches to funding investment; primarily through a combination of public sector investment through five-yearly Control Periods and private sector investment through the passenger franchising process and by freight operators.

**Q5: The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

The key interdependency which acts as a driver of rail demand is with the built environment in terms of the location of housing and commercial developments. The concentration of commerce in central London and a green belt policy which encourages more distant residential development has for many years been a key driver of rail demand in the South East of England. Similar circumstances apply in other parts of the country and have, along with other factors, driven the significant growth in demand which has been a defining feature of the GB rail market for a number of years.

The consultation document recognises the dependency between transport and the energy sector, which is seen as key by the rail industry. The industry is currently delivering a significant programme of rail electrification across the country and it is crucial that the UK’s energy infrastructure is able to support the increasing use of electric trains which are faster, more reliable and more environmentally friendly than diesel powered trains.

Rail also has an interdependency with the digital and communications sector. As described, the industry has begun planning for the Digital Railway which will utilise high specification digital signalling and train control to make more efficient use of infrastructure assets. This requires not only increased use of technology in signalling and control but also a greater reliance on secure mobile telephony to bridge the air gap. The Commission could also explore how better connectivity on the move might influence the decisions that passengers make about the journeys that they take and their productivity while travelling. This will influence the future demand for transport infrastructure.

There is an important interdependency between the transport sector and climate resilience, including flood defences. Improving the resilience of the railways to extreme weather is a key concern and the issue is being considered through the National Task Force Weather Resilience & Climate Change workstream, part of its ‘Better Assets’ theme. Network Rail has in parallel published weather resilience and climate change adaption plans for each of its routes, and is developing a Network Study on the resilience of the railway network. The Commission could usefully incorporate this work into a national, multi-sector view of the resilience of the UK’s key strategic infrastructure.

### **Cross-cutting issues**

**Q6: Do you agree that the NIA should focus on these cross-cutting issues?**

The RDG agrees with the cross-cutting measures which the Commission is proposing to focus on through its National Infrastructure Assessments. All are pertinent to the rail sector at the present time.

**Q7: Are there any other cross-cutting issues that you think are particularly important?**

The RDG considers that the Commission has identified a comprehensive set of cross-cutting issues which are relevant to the rail industry.

## Methodology

### Building the evidence base: Vision and priorities

#### Q8: Do you agree with this methodological approach to determine the needs and priorities?

In developing the NIA it will be essential that the Commission engages with the detailed planning work within each infrastructure sector. The approach proposed by the Commission is analogous to the rail industry's LTPP, which assesses the industry's infrastructure requirements over a 30-year planning horizon. The Passenger Demand Forecasting Handbook (PDFH) forms the basis of any assessment of the impacts of the drivers of rail demand. It also includes a number of cross-elasticities which allow the forecasting of impacts across modes.

As the consultation document recognises, the chosen approach needs to consider a range of scenarios to reflect economic growth and other wider factors. The LTPP considers four long term economic outcomes considered, overlaid with different social and environmental planning environments:

- **Prospering in global stability.** In this scenario the British economy is strong, prospering through its integration with other national economies by exporting high value products and importing low value products. Britain takes an active role in solving social and environmental problems, partly to maintain a stable service industry for its high value activities and a stable supply chain for the imports it requires, and partly because its technological advancement and high national wealth allows this to be done without worsening individuals' standard of living.
- **Prospering in isolation.** In this scenario the British economy is strong, prospering by concentrating on domestic production in isolation from global market pressures. Britain takes little interest in solving social and environmental problems. This is partly because it has neither a dependency on stable foreign import markets, nor a stake in global technological innovation, and partly because the mixture in value of domestic economic activities undertaken to maintain self-sufficiency prevents redistribution of domestic resources without worsening individuals' standard of living.
- **Struggling in global turmoil.** In this scenario the British economy is performing poorly, struggling to compete in high value export markets as the global supply chain and credit markets are volatile and other countries improve their employee skill levels and resource base. Britain takes an active role in addressing social and environmental problems, partly in an attempt to stabilise global import and credit markets, and partly because global technological innovation allows it to do so without worsening individuals' standard of living.
- **Struggling in isolation.** In this scenario the British economy is performing poorly in the absence of both an export market for its high value products and a source of inexpensive imported materials and technological innovation to support domestic production. Britain takes little interest in solving social and environmental problems as it has neither the wealth nor the technology to achieve this without worsening individuals' standard of living.

In considering the evidence base which already exists the Commission should have regard to the range of planning activity already produced, and the portfolio of interventions already in development or delivery. The Commission can add value by focusing on the cross-cutting issues identified in the consultation and by developing consistent planning assumptions and scenarios which can be used across the various sectors. Such assumptions could cover strategic priorities, levels of funding available, appraisal assumptions (including recognition of wider economic benefits) and future housing provision, and would ensure that different infrastructure sectors are planning for a consistent set of outcomes.

#### Q9: Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

The rail industry uses the LTPP to facilitate long-term, complex strategic prioritisation in an uncertain environment. It consists of a number of different elements which seek to define the future capability of the rail network:



- Market Studies, which forecast future rail demand and develop conditional outputs for future rail services. These outputs are based on stakeholders' views of how rail services can support delivery of the industry and Government's strategic goals
- Route Studies, which develop options for future services and investment in the rail network. Options are based on the conditional outputs and demand forecasts from the Market Studies and are assessed against industry appraisal criteria to provide choices for funders
- Cross-Boundary Analysis, which considers options for services that run across multiple routes to make consistent assumptions in respect of these services
- Network Route Utilisation Strategies (RUS), which look at issues affecting the whole national rail network and considers future capacity issues and technology solutions.

Further examples exist in other areas of the sector – one example being the annual 'Passenger Rolling Stock Strategy for the Rail Industry' which is linked with the LTPP and supports a cross-industry assessment of requirements for maintenance and stabling facilities.

**Q10: Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

One omission from the list of the most significant infrastructure drivers is the impact of government policy, a prime recent example being to stimulate economic growth in the north of England through the 'Northern Powerhouse' agenda.

The Commission should also be mindful of a number of cross-cutting issues such as working habits (for example, the extent of home working, which is partly driven by demography, economy and technology). The extent to which technology is adopted in the sector is also important. For example, the rail industry is developing technology-led proposals for signalling and ticketing which will enhance the efficient use of capacity on the network.

## Finalising the National Infrastructure Assessment

**Q11: The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

The Commission can add value to existing planning processes by ensuring that the portfolios of investments recommended for each sector are consistent in the outcomes which they deliver. For example, the investments proposed by the energy sector must be sufficient to deliver any additional capacity required for electrification schemes being delivered by the transport sector. Similarly, the Commission can consider the transport system as a whole and ensure that investments made across the different modes support a coherent set of outcomes.

**Q12: In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

The RDG would welcome the Commission's consideration of the future distribution of new housing and how the infrastructure sectors can best plan to accommodate this. Without considering and making assumptions about future housing development it will be difficult for the Commission to plan future infrastructure needs effectively or develop business cases for proposed interventions.

## Engagement: Getting your voice heard

**Q13: How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

The RDG would welcome the Commission's engagement with the rail industry's existing planning processes. The Commission's proposed call for evidence during the autumn of 2016 will allow the industry to provide further details, and the RDG and its members would welcome ongoing dialogue with the commission as well as the opportunity to contribute to the expert panels and workshops detailed in the consultation document.

## REA response to National Infrastructure Commission National Infrastructure Assessment plan

The Renewable Energy Association (REA) is pleased to submit this response to the above consultation. The REA represents a wide variety of organisations, including generators, project developers, fuel and power suppliers, investors, equipment producers and service providers. Members range in size from major multinationals to sole traders. There are over 750 corporate members of the REA, making it the largest renewable energy trade association in the UK and the only trade body covering power, heat and transport. In addition, the REA has nearly 50 energy storage members from across the supply chain.

We are particularly keen to work with the Commission and its Commissioners on energy storage and the value it can bring to the UK.

We are supportive of the NIC establishing working groups and involving industry in the decision making process, as proposed. The Rea would be interested in being directly involved in any such groups or nominating members to sit on them.

In terms of the organisation's priorities, we would like to reiterate that the REA believes the National Infrastructure Commission (NIC) should take into account the following priorities:

- **Support new build energy storage projects.** Under the UK's legally binding climate change targets, there is a limit on the energy we can generate from fossil fuels, and this reduces steadily over time. Therefore the UK must design an energy system that incentivises large amounts of low carbon capacity and increased flexibility. Under the Committee on Climate Change's scenarios, we will also need to significantly increase electricity supplies as transport and heating are electrified. In this context, the Capacity Market (the only publicly-backed contracts available for energy storage in the UK) should be reformed in order to support energy storage. This would enable storage companies to secure finance on the back of the mechanism, which they presently cannot due to the short term nature of support. Increasing flexibility in the system is a win-win situation and one which should not result in 'stranded assets' as the need for flexibility will always exist and increasing low carbon energy sources and new infrastructure, such as Electric Vehicle charging points, will significantly increase this requirement.
- Energy storage helps provide not only security of supply and other important technical support to the grid network, but also a level of stability to the power market and wholesale prices
- **Consider a carbon emissions test in new infrastructure.** In line with the CCC's advice on meeting legally binding carbon budgets, the Commission should consider or require Government to consider, the carbon and environmental impact of new infrastructure projects, for example road projects or support for fossil fuel powered energy. Government has recently committed to the Fifth Carbon Budget which underlines the need to consider these factors in new-build infrastructure.

### **New-build energy storage: balancing supply and demand on the system**

New-build energy storage projects help balance the energy system and incentivise and enable low-carbon technologies. They help stabilise energy prices by enabling peak shifting. Many storage projects also strengthen the grid network, at a lower cost than building new overhead lines or underground cables. See Low Carbon Network Fund projects for more details<sup>1</sup>. Further benefits to the System Operator are illustrated by the fact that National Grid are currently running an auction process for support for 'frequency response' services, which is specifically targeted at battery storage providers due to the speed and scale at which they can respond.

These projects, due to the current regulatory and legal framework, and only short term nature of support currently available, often struggle to secure finance in the market. Our energy storage member companies tell us that if longer term support was available then securing finance would be eased.

Therefore we strongly agree that energy storage projects should be a key priority for the Commission.

### **Storage services**

Energy storage technologies provide a range of services to the grid and the System Operator. These include:

- **Balancing electricity supply and demand:** storage technologies can respond within milliseconds (batteries) to signals to discharge to the grid. Other bulk technologies (pumped hydro) can still respond within 1-4 hours, and provide very large amounts of capacity.
- **Frequency response:** National Grid has recently launched a tender programme for capacity specifically to assist with regulating the frequency of electricity on the network, targeting rapid (seconds) response, for which battery storage is ideally suited. The system frequency must be kept within statutory limits to prevent damage to consumers and businesses, but frequency stability has reduced in recent years partly due to an increase in non-synchronous generation.
- Long term contracts for these services would be useful for financing storage projects.
- **Voltage stabilisation:** Alongside the range of other services, energy storage devices can assist in regulating network voltage, another critical aspect of the grid system. Storage is typically more versatile than generators at providing this service.
- **Avoiding grid infrastructure reinforcement:** UK DNOs have used batteries as a substitute for upgrading overhead lines and in the right environment this could be commonplace. The Capital costs of the first demonstrator projects are already believed to have reduced in the roughly two years since they were commissioned, and have the potential to offer a significant cost saving to traditional circuit reinforcement upgrades.

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<sup>1</sup> Low Carbon Network Fund, UKPN, Leighton Buzzard Battery, [http://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-2-projects/Smarter-Network-Storage-\(SNS\)/](http://innovation.ukpowernetworks.co.uk/innovation/en/Projects/tier-2-projects/Smarter-Network-Storage-(SNS)/)

By integrating energy storage into the UK's system we can reap the benefits of low carbon energy and reduce the costs associated with this transition. An Imperial College/Carbon Trust report into the benefits of storage discusses the net saving to UK consumers of large amounts of storage on the system, for example a £2billion net saving from 5GW of storage capacity, which rises to £10billion by 2050 in a high renewables system<sup>2</sup>.

Many other countries around the world have realised the benefits of energy storage, such as the US and Germany, and installations globally this year topped 1GWh or large-scale storage devices. See the REA's high-level Overview report for full list of other countries' energy storage projects, which can be [read here](#)<sup>3</sup>. The UK must develop its market now in order to avoid missing out on the supply chain and investment opportunities this global market offers. For example, some early stage companies are manufacturing in the UK, sometimes through contractors who are active already in other markets (for example Cumulus storage).

### **Costs of energy storage**

It is often stated that there are parallels to be drawn between solar PV and lithium-ion batteries, as costs are reducing at a similar rate. Lithium-ion batteries have come down roughly 16-18% in costs each year for the past five years, with the trend expected to continue. Solar PV costs have fallen by over 75% in the past five years.

The REA commissioned a report from KPMG earlier this year which projected cost reductions of 50% in the next five years for Lithium-ion battery storage.

### **Opportunities for overcoming barriers to storage and developing the market in the UK:**

- Provide signals of high-profile Government support to provide investor confidence, potentially in the form of a 2020 capacity target for storage.
- Reform the Capacity Market:
  - Energy storage projects should be eligible for longer term contracts – this should be the 15 years available to new build conventional plants, or at least of seven years in order to offer adequate options for finance. This will enable financeable contracts with lower equity costs leading to greater savings for consumers – enabling more capacity for the same amount of money.
  - Remove any restrictions on 'stacking' revenues for energy storage projects – ie allowing these projects to receive income streams from multiple sources and therefore enable more to go ahead.

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<sup>2</sup> Strbac et al, 2012, 'Imperial College/Carbon Trust: Strategic Assessment of the Role and Value of Energy Storage Systems in the UK Low Carbon Energy Future', <https://www.carbontrust.com/media/129310/energy-storage-systems-role-value-strategic-assessment.pdf>

<sup>3</sup> REA, 2015, 'Energy Storage in the UK: An Overview', [http://www.r-e-a.net/upload/rea\\_uk\\_energy\\_storage\\_report\\_november\\_2015\\_-\\_final.pdf](http://www.r-e-a.net/upload/rea_uk_energy_storage_report_november_2015_-_final.pdf)

- Clarify the time restrictions for energy storage and DSR providers, so they know how long they would need to supply power for. Associated fines for non-delivery should be capped at the minimum required period of supply. Storage projects vary in length in terms of how long they can store and discharge power for but they may not always be fully charged when a request from the SO comes to provide power back to the grid.
  - Storage projects could be further incentivised by allowing higher payments to be paid to projects able to provide quicker response times and additional services to the grid such as frequency response.
- 
- Improve access to finance – eg through providing Green Investment Bank finance
  - Continue to develop support for joint renewable energy / storage deployment. We would be happy to work with Government on policy proposals in this area.
  - Set an agreed 'definition' for energy storage in legislation and clarify its regulatory position.
  - Develop technical standards and consumer guidance for installing and using energy storage technologies – the REA is working on this at present with a number of partners
  - Confirm reforms to the CfD mechanism to enable storage and renewable hybrid projects and roll these out to FiT and RO projects.

### **Conclusion**

We agree that the Commission should work with industry to carry out its work and would welcome the opportunity to be involved in any working groups or similar bodies.

We look forward to working with the NIC on developing its priorities, one of which we agree should be energy storage and low carbon energy production, and we are happy to provide provide cost information and market knowledge we hope will be of use.



5<sup>th</sup> August 2016

[NIAEvidence@nic.gsi.gov.uk](mailto:NIAEvidence@nic.gsi.gov.uk)

Dear Sir/Madam

**Written response by RES to: NIC's National Infrastructure Assessment consultation**

RES is one of the world's leading independent renewable energy companies working across the globe to develop, construct and operate projects that contribute to our goal of a secure, low carbon and affordable energy future. RES has been an established presence at the forefront of the renewable energy industry for over three decades. Our core activities are the development, design, construction, financing and operation of wind and solar PV projects and we are also active in electricity storage, DSM and transmission. Globally, we have built approximately 10GW of renewable energy generation, including almost 10% of the UK's current wind energy capacity.

We consider ourselves well-placed, therefore, to comment on the important issues addressed in this consultation and are grateful for the opportunity to respond. We hope you find our comments below of interest and we will be more than happy to assist with any further information as required. The key points we would like to make are:

1. The challenge the NIC has been given should not be underestimated, this has never been successfully done to date and we are in an area with an unprecedented rate of change. We are supportive of the NIC's desire to be forward looking and non-traditional in their approach and agree that new holistic thinking and new tools are essential if the NIC is to fulfill its aims effectively.
2. We also agree that that environmental and climate change considerations need to be absolutely central to the NIC's approach. A consistent and strict approach with our broader national and international commitments is necessary to minimise financial risk and investor uncertainty associated with any uncertainty around this agenda.
3. Going forward, much of our economic growth is expected to come from innovation and efficiency improvements. The NIC's Smart Power report highlights well how using existing assets better has the potential to provide significant benefits and this type of thinking, including principles like Closed Cycle economy, will be central to success.
4. Infrastructure projects, especially big bits of kit, have a history of been justified based on underestimated costs and overestimated benefits. It is essential that Optimise Bias is carefully understood and accounted for in the work of the NIC.

Please do not hesitate to contact me should you have any questions.

Yours faithfully

[name redacted]

[job title redacted]

E : [email address redacted]

T : [telephone number redacted]

M : [telephone number redacted]

## RES Response to: NIC's National Infrastructure Assessment consultation

1. The Government has given the National Infrastructure Commission objectives to:
  - a. foster long-term and sustainable economic growth across all regions of the UK
  - b. improve the UK's international competitiveness
  - c. improve the quality of life for those living in the UK

**What issues do you think are particularly important to consider as the Commission works to this objective?**

1. The biggest challenge the NIC will have is to account for the transformation change associated with the decarbonisation agenda and speed of technology innovation, including digitalisation of the economy.

### Decarbonisation

2. The power sector is a prime example of these complex interactions which today means that many stakeholders fundamentally do not understand the underlying nature of the power sector and the electricity market arrangements.
3. This is exacerbated by a lack of understanding around the decarbonisation imperative and how this is no longer just driven by political forces but also by investors' risk perception of carbon intensive investments.
4. A clear commitment to our decarbonisation ambitions in the power sector, such as the maximum 100gr CO2/KWh would help lower investor uncertainty and therefore risk perception around our future direction of travel.
5. Any future infrastructure investment must therefore be completely compatible with our Climate Change Act and Committee on Climate Changes carbon budgets.

### Ensuring sound analysis

6. RES is a strong supporter of the UK's tradition of stakeholder engagement as this tends to lead to robust outcomes however some stakeholders groups remain difficult to engage with namely independent businesses and the end consumer.
7. It is therefore key that the NIC actively seeks to engage with traditionally underrepresented user groups, including consumers, academia, small and independent businesses or at least find ways to represent their views.
8. Additionally, traditional cost and benefits assessments have limitations when considering complex issues and which are hard to quantify accurately. The commission will need to consider more complex/holistic tools than Cost Benefit Analysis (CBAs) for example, multi-decision criteria analysis tool which allows for qualitative assessments to be integrated into a quantitative process.
9. It is also true that even with quantifiable items, infrastructure investments are consistently subject to Optimise Bias. Thus, quantification of cost and benefits often prove to be very wrong with costs greatly underestimated and benefits repeatedly and consistently overestimated. The NIC must find ways of accounting for this risk and whilst there is a supplementary Green Book Guidance<sup>1</sup> document on Optimise Bias this remains a very complex high risk issue.

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<sup>1</sup> SUPPLEMENTARY GREEN BOOK GUIDANCE -OPTIMISM BIAS,  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/191507/Optimism\\_bias.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/191507/Optimism_bias.pdf)

2. **Do you agree that, in undertaking the NIA, the Commission should be:**
  - a. **Open, transparent and consultative**
  - b. **Independent, objective and rigorous**
  - c. **Forward looking, challenging established thinking**
  - d. **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

10. We agree with these principles.

#### **Forward looking, challenging established thinking**

11. Understanding the decarbonisation agenda, rate of technological change and digitisation of the economy clearly necessitates a forward looking approach that challenges existing thinking.
12. The power sector must move away from unabated fossil fuel generation and for the foreseeable future the only available technologies to do this are Solar PV, Wind energy and Nuclear Power which all have the same cost structure; they are high capital, low operation cost technologies.
13. Taking into account the need for 130TWh to 160TWh of new low-carbon generation on the system by 2030, nearly 50% of our entire demand today, it becomes very clear that the cost effectiveness of the sector is going to be entirely dependent on how cheaply we can deliver the required new low-carbon generation capacity.
14. In order to do this it was decided by the UK Government that there needed to be efficient investment vehicles to bring forward this capacity and that our historical market structure was not such a vehicle.
15. Thus the Electricity Market Reform (EMR) was brought forward, creating new market arrangements in the form of the Capacity Market and Contract for Difference investment vehicles as enduring elements.
16. The Competition Market Authority has however highlighted concerns around decisions to allocated CfDs outside the competitive structure of the CfD and around how the budget is split between CfD pots. These concerns mirror independent reports on the cost effectiveness of the Government decisions and the CMA makes recommendations<sup>2</sup> on how Government should proceed which would greatly increase accountability and cost efficiency of decisions for consumers.
17. In addition we find that anchorage in traditional solutions, such as very large transmission connected generators, continues to drive expectations, thinking, design of market and policy instruments.
18. We therefore very strongly agree that the NIC must be forward looking, and willing to challenge established thinking if it is going to deliver true added value.

#### **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

19. This point is absolutely crucial and the complexity involved can be overwhelming. For instance in the power sector, an imbalanced focus on:
  - a. Electricity prices and limiting peak pricing, instead of overall cost to consumers, potentially undermines the Energy Efficiency and Demand Side Response agenda.
  - b. Decarbonising the heat sector without maximising heat efficiency of building could create significant risk of stranded assets generation and network assets.
  - c. Traditional solutions, such as large centralised power generation units, have dominated market design and success metrics when the future is likely to be dominated by distributed generation as highlighted in the EUK pathways 2030 report.
20. We can therefore not stress enough the importance of both understanding whole system interactions and interdependencies.

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<sup>2</sup> Energy Market Investigation 2016, CMA, <https://www.gov.uk/cma-cases/energy-market-investigation>



## Optimisation

21. The majority of economic growth in western society is going to come from innovation and efficiency gains.
22. Today's electricity market design does not account for innovation, and is far from being optimised. It is important that reforms focus on facilitating both innovative technologies and business solutions whilst ensuring investment decisions are being optimised.
23. For example, the Capacity Market design and success indicator seems to be to focus on traditional new-build solutions with a strong desire to see new build Combined Cycle Gas Turbines be successful in auctions. This focus comes at the expense of flexible smart solutions such as Demand Side Response solutions and electricity storage that facilitate a more optimum use of existing asset base.
24. Finally, part of system optimisation must consider the circular economy, or closed cycle principle, and how we minimise resource dependency, waste and maximise use, reuse and recycling.

## Option Value

25. Because many of our future solutions are greatly dependent on technological innovation it is very hard to predict the exact nature of what is possible going forward.
26. It is therefore important that investment decisions help maximise our ability to respond to change if the UK is not to lock itself into unnecessary investments and is able to maintain a high degree of option value.
27. For example, in the power sector mature renewables offer a perfect example of a flexible solution that provides excellent option value, however this is not currently factored into decision making. The need for further generation in the build-up to 2020 has decreased in urgency and this has resulted in the route-to-market for mature RES being blocked. These decisions are resulting in significant losses of jobs, skills and local supply chain because decisions have not factored in the option value of mature renewables to the UK economy post 2020.
28. Indeed, mature renewables are numerous, small and geographically distributed assets. They have relatively short life spans for generation technologies and as such they are technologies that can be phased out relatively quickly if desirable and this with limited (if any) residual impact on the environment.
29. In addition, these technologies offer a resilient solution that, with a constant rolling deployment, provides stable jobs and supply chain opportunities and has driven constant innovation that has resulted in an unexpected rate of cost reduction.
30. The Option Value of flexible generation technologies also needs to be considered in relation to the alternative investment options over time. For example, projects such as Hinkley Point C, have a longer life span (+50yrs) but currently require 35yr guaranteed contracts once build (~10yrs build timeline). Five years ago this project looked like a sound economic decision, today the rate of cost reduction for other available low-carbon generation means the cost effectiveness of this project has been questioned by the National Audit Office (NAO)<sup>3</sup>. A better quantification of the Option Value, accounting for innovation and longer term dynamics might have resulted in different decisions being made.

## Identification of building blocks

31. Because so much is uncertain around the future we feel it is important the NIA seeks to identify necessary building blocks and decisions milestones.
32. In the energy sector, the delivery of energy efficiency is a strategic imperative that must progress faster than the decarbonisation of our heating sector if we are to avoid the risk of stranded energy supply infrastructure investments.
33. Another example relevant to the heating sector is that our current strategy focuses on the decarbonisation of power sector and electrification of domestic and commercial heating appliances. At a whole system level, such a solution requires huge infrastructure investment. Thus it is important to establish first if there are any

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<sup>3</sup> Nuclear power in the UK, NAO, <https://www.nao.org.uk/report/nuclear-power-in-the-uk/>

alternative options that could provide a lower total system cost however it is not clear how much time we have to do this.

### **3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

34. We agree that the National Infrastructure Commission should look at the energy system from a whole system view and pay attention to the interrelated nature of heat, transport and electricity.
35. In this regard, we are supportive of the Smart Power report published earlier this year, we believe it is absolutely key that Government looks at innovative ways of balancing supply and demand through emerging technologies including energy storage, demand-side response and smart technology rather than through building new capacity in order to avoid stranded investment and maintain important option value going forward.

### **4. Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

36. Decarbonising the power sector beyond the 100gr level, which is expected to be beyond 2030 time horizon, is going to be a challenge in a system dominated by variable renewables with current technology. It is therefore important that innovation, compatible with high levels of variable renewable penetration, are developed.
37. We have identified three technical solutions, of which at least one solution is deemed essential:
- Cost effective load shifting capability (storage, DSR, interconnectors, green gas network)
  - Cost effective modular nuclear reactors with flexible output
  - Carbon Capture and Storage with flexible generation
38. The Institute of Engineering and Technology (IET) recently published Future Power System Architecture (FPSA) highlights significant challenges face the energy sector going forward. It recommends the need for a 'System Architect' that can help ensure a holistic view across energy vectors, technologies, institutions and digitalisation.<sup>4</sup>
39. We support the need for an independent body and believe the implementation of such a body is an urgent enabler of change and this brings to the fore the question around appropriate institutional arrangements.

### **5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

40. Please refer to our comments in points 19, 37, 38

### **6. Do you agree that the NIA should focus on these cross-cutting issues?**

41. Yes we believe that such a role is key going forward and the NIC is uniquely placed to do this.

### **7. Are there any other cross-cutting issues that you think are particularly important?**

42. The NIC must find ways to integrate how modern connectivity and innovation in the digital sphere. It must also seek to identify 'information infrastructure gaps'. For instance, one of the major barriers to a 'smart grid' and 'smart consumers' in the power sector is a data management challenge and individual actors often view this as an insurmountable barrier. Some of these challenges are raised in the ETI's FPSA document.
43. Additionally, employment and distributional effects of investments are going to be significant influencers of decisions and it is important that the benefits are accurately portrayed.
44. For instance, we are very concerned around the challenges that have been brought by the NAO<sup>5</sup> and other stakeholders against the Hinkley Point C project. We are particularly concerned that no Optimise Bias analysis seems to have been undertaken around the cost and benefits of this specific project and that their seems to be

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<sup>4</sup> Future power system architect, IET, <http://www.theiet.org/factfiles/energy/brit-power-page.cfm>

<sup>5</sup> Nuclear power in the UK, NAO, <https://www.nao.org.uk/report/nuclear-power-in-the-uk/>

no indications that HMG will implement the recommendations of the CMA by implementing a proper analysis of the alternative investment options.

#### **8. Do you agree with this methodological approach to determine the needs and priorities?**

45. The proposed methodology appears sensible.
46. We do however feel that it is important to highlight that the fiscal remit provided might not necessarily be compatible with a holistic approach.
47. Indeed RES' recent experience within the power sector with the current design of the Levy Control Framework (LCF) budget is not good. It is an inappropriate metric by which to measure cost effective outcome for consumers and does not provide certainty to investors.
48. This is because it attempts to measure the level of subsidy that is being paid for by consumers, however the chosen reference prices is not actually reflective of the cost of new-build generation. At the same time, the current reference price is an estimate, that has proven highly inaccurate, and detracts decision makers from the real cost to consumers of a project.

#### **9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

49. We agree that there are significant limitations to models and the scale of the NIC's ambitions is unprecedented.
50. In addition, one of the key drivers of price is investment risk and this is very badly captured in traditional models which will tend to grossly underestimate the cost of investments as a consequence.
51. For example, it would appear that the Trafford Combined Cycle Gas Turbine (CCGT) power plant bid into the first capacity market auction on the basis of commodity prices and normal IRR expectations. They have subsequently announced that the hurdle rate from debt finance, which today factors carbon agenda risk, was significantly higher than they had anticipated and this would appear to make the project impossible to finance at the current bid price.<sup>6</sup> this also changes one's views on the cost of CCGT compared to alternatives such as mature Renewables which are actually cheaper alternatives today.
52. We believe proactive engagement with academia might yield interesting solutions that might not emerge otherwise.

#### **10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each driver?**

53. We agree with the identified drivers.

#### **Climate change and the environmental driver now goes beyond the policy context**

54. Traditionally this driver has been viewed as policy lead however we would argue that this is no longer completely the case, especially in developed nations.
55. This driver is now also linked to commercial and reputational risk as well as simple economics. The International, European and National policy agenda is therefore being reinforced by business imperatives.
56. We would now argue that the direction of travel of this driver is very clear and that policy process will only affect the speed at which the UK economy will make the necessary transition.
57. Initiatives like the carbon tracker<sup>7</sup> and recent work<sup>8</sup> around the risk of stranded assets provide some insight into this.

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<sup>6</sup> Blow to UK energy plans as new gas plant in doubt, Telegraph, <http://www.telegraph.co.uk/news/earth/energy/11925444/UK-energy-crisis-Trafford-gas-plant-in-doubt.html>

<sup>7</sup> Unburnable Carbon, Carbon Tracker, <http://www.carbontracker.org/report/carbon-bubble/>

<sup>8</sup> Ex: The '2°C capital stock' for electricity generation: Committed cumulative carbon emissions from the power sector and the transition to a green economy, Oxford Institute of new economic thinking, <http://www.inet.ox.ac.uk/library/view/696>

### **Population and demography driver also needs to factor in employment**

58. Employment is going to be a key driver of policy decisions going forward and there is a clear interactions between infrastructure agenda and the employment agenda.
59. To manage this driver properly, Optimism Bias associated with employment benefits needs to be carefully addressed. It is important the NIC's work remains impartial and realistic in its assessment of these benefits and the government's green book provides a starting point the politicization of this agenda will make it challenging.

### **Economic growth and productivity driver should focus on increasing efficiency and stimulating innovation**

60. Growth that is expected in developed countries going forward will be associated with the drive for efficiency and innovation and this should be one of economic focuses of the National Infrastructure Commission.
61. For instance, in the power sector the NIC Smart Power report highlights how flexibility can provide benefits of up to £8bn. This benefit is in great part associated with more efficient utilization that we can get out of all the energy infrastructure, from networks to generators, thanks to flexible solutions.

### **International drivers might need to be considered**

62. Whilst some of the drivers cover international dimension, this could deserve a category of its own. For instance, international competition for resources is increasing which has a very important impact on how the UK's economy and growth will evolve going forward. Such a view increases the desirability of closed cycle economy and use of renewable resources.

### **11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

63. n/a

### **12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

64. n/a

### **13. Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

RES would welcome the opportunity to represent the independent energy sector in the proposed Expert Roundtables, and Panels of Experts including in particular the panels covering finance and investment, and engineering and science.

## Roadchef response to National Infrastructure Commission consultation on the National Infrastructure Assessment

Roadchef welcomes the establishment of the National Infrastructure Commission (NIC), and we are grateful for the opportunity to feed into the NIC's plans for producing a National Infrastructure Assessment (NIA).

This consultation response provides some information about Roadchef, and puts forward our view as a business about what the NIA should cover in relation to the transport sector.

### About Roadchef

Roadchef is one of the UK's leading motorway service operators, running 30 motorway service areas (MSAs) across Britain. Over 50 million motorists visit our service areas every year.

In the last five years we have invested over £40 million in improvements across our portfolio, including adding more popular branded offers, increasing parking capacity, improving toilet and shower facilities, and delivering electric vehicle charging points.



We invest in listening to the opinions of road users on an ongoing basis, through conducting market research and engaging with motorist organisations, so we have a clear idea of what it is road users want from MSAs.

Roadchef employs over 3,600 people, and is the only MSA operator to achieve Gold Status as Investors in People. Roadchef was an early adopter of the National Living Wage.

**Q3: Do you agree that the NIA should cover these sectors in the way in which they are each described?**

**Q4: Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

#### ***Transport***

*The Commission will adopt a multi-modal approach to the analysis of transport need, looking at how key road, rail, ports, airports and other transport arteries support the movement of people and freight into and across the country. A critical interdependency which the NIA will aim to better understand is the impact of future transport provision on the energy sector; in particular the potential implications of large-scale car, lorry and rail electrification.*

Motorway Service Areas (MSAs) play a vital role in supporting the movement of people and freight around the country.

MSAs give drivers the opportunity to refuel and rest, and also provide information to drivers about weather and traffic conditions.

MSAs are particularly important to the UK's freight industry, given the regulations around drivers' rest periods. 82 per cent of the UK's goods are moved by road, and as such MSAs are crucial to supporting the UK's road arteries and the underpinning the wider economy.

MSAs will play an increasingly important role as electric vehicles become more common on British roads. This is particularly the case as the Government is committed to placing the UK at the forefront of development, manufacturing and use of ultra-low emission vehicles. The large-scale electrification of cars and lorries will therefore need to take the provision of electric vehicle chargers into consideration, and MSAs will be essential in supporting the use of electric vehicles on the motorway network.

Transport Focus, the independent transport user watchdog, recognises that service areas are an integral part of the road user experience. In its recent report – *Take a Break* – Transport Focus recommended that Highways England should explicitly acknowledge this, and Roadchef believes that the NIC should take a similar view of MSAs.

Roadchef therefore urges the National Infrastructure Commission to take a holistic approach in analysing transport needs and to consider MSA provision when formulating its National Infrastructure Assessments.

#### **Contact**

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5 August 2016

## **National Infrastructure Commission (NIC): Consultation on a National Infrastructure Assessment**

### **Introduction**

RICS – Royal Institution of Chartered Surveyors - is pleased to respond to the above consultation. Intelligent infrastructure planning is vital to the social and economic health of the country, and the creation of the NIC to identify the UK's infrastructure priorities is hugely welcome.

RICS is the leading organisation of its kind in the world for professionals in property, construction, land and related environmental issues. We accredit over 118,000 professionals (FRICS, MRICS, AssocRICS and trainees) and any individual or firm registered with RICS is subject to our quality assurance.

It regulates and promotes the work of these property professionals throughout 146 countries and is governed by a Royal Charter approved by Parliament, and monitored by the Privy Council, which requires it to act in the wider public interest.

Since 1868, RICS has been committed to setting and upholding the highest standards of excellence and integrity – providing impartial, authoritative advice on key issues affecting businesses and society. RICS is a regulator of both its individual members and firms enabling it to maintain the highest standards and providing the basis for unparalleled client confidence in the sector.

### **RICS and Infrastructure**

Our members are integral to providing the necessary project management and cost savings through the whole life of infrastructure projects. They use professional standards and relevant guidance, as well as benchmark data, to deliver projects on time and on budget. This ensures that infrastructure projects are considered, planned for, financed and executed appropriately, crucial to ensuring business and investor confidence. In addition, we can provide expertise on spatial planning and locational investment to equip the Commission to make effective strategic choices on the UK's infrastructure priorities.

### **Response to the consultation on the National Infrastructure Assessment**

This submission addresses the questions as raised in the consultation.

- Q1. The Government has given the National Infrastructure Commission objectives to:
- Foster long-term and sustainable economic growth across all regions of the UK

- Improve the UK's international competitiveness
- Improve the quality of life for those living in the UK

What issues do you think are particularly important to consider as the Commission works to this objective?

In meeting its objectives, the NIC must be cognisant that its findings and recommendations do not have, or appear to have, regional boundaries and biases. Accusation that infrastructure investment is prioritised in the south east, at the expense of all other regions, will only be eliminated if the NIC provides clear recommendations that will foster economic growth across all the UK regions. These recommendations will be legitimised further if there is significant input from the stakeholders in the regions themselves. The NIC must ensure it engages or makes a real concerted effort to engage with these bodies, however reluctant some may initially be.

If it is judged that economic growth will be achieved through a link to the south, e.g. the provision of improved connectivity facilitating the mobility of the highly skilled south east to different UK regions, the NIC must make recommendations that involve infrastructure investment commencing from the north. This will not only lead to the creation of jobs, contributing to economic growth, but will also appease sceptics. The concept of the Northern Powerhouse, in the last parliament, went some way to highlight the importance of regions beyond the south east and received international acclaim. If a similar realistic concept can be identified for the other regions, with mobility facilitated, the UK as a whole will increase its attractiveness for foreign investment, making it more internationally competitive and, in turn, improve the quality of life of people living in the UK.

It may not always be the case that there is a need for entirely new infrastructure. In instances, maintenance and sustainability of existing infrastructure may result in the same output as new infrastructure, but achieved in a quicker time frame. This, in most cases, is likely to be a more cost efficient method of dealing with infrastructure need. Detailed analysis should be undertaken when looking at costs associated with the recommendations made.

The NIC should have its scope broadened to include social infrastructure, in particular housing, as this contributes to the quality of life. Following its evidence gathering phase, where it will access valuable information, the NIC can position itself to make a contribution to the housing shortage debate and other social infrastructure.

Q2. Do you agree that, in undertaking the NIA, the Commission should be:

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?



Are there any principles that should inform the way that the Commission produces the NIA that are missing?

It is imperative that the NIC remains open, transparent and consultative in order for it to provide an informed and evidence based national infrastructure assessment. Every person residing in the UK has a vested interest in the country's infrastructure, therefore being open and transparent is mandatory for the NIC in meeting its objectives. The NIC has begun its work by being consultative and this must continue, as the resulting expertise can only inform the NIC's findings and add legitimacy to its recommendations. Where there is a need to be confidential, the NIC must also respect this.

The independence and objectivity of the NIC will be important for it to carry out an accurate assessment of infrastructure in the UK. If government is seen to influence the outcome of its finding and recommendations, the NIC will lose credibility and stakeholders may be reluctant to engage, thereby discrediting the outcome of the NIC's findings. A rigorous and challenging approach to the status quo, e.g. contradicting government policy already announced, will add credibility to the NIC as this will reinforce its independence.

As part of its overall assessment, the NIC should place greater emphasis on evidence from stakeholders, both professionals and individuals, to identify regional needs that are necessary for economic growth. Once information has been collated on infrastructure need, interdependencies can be assessed.

Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

The descriptions of the identified sectors are clear and have been left open for further expansion. This is important as the NIC is forward looking, so these descriptions are likely to evolve. The interdependencies in infrastructure, in particular for the sectors being looked at, means the NIC would be in a good position to make recommendations in areas of social infrastructure.

Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

All the areas identified are of significant importance to the UK, however, if one area was to be chosen to meet the NIC's objective to foster economic growth and international competitiveness, focus could be placed on transport, in particular, improving connectivity around the whole of the UK. Mobility will allow skills to be transferred and is inextricably linked to economic growth, influencing inward investment. It is, however, worth highlighting that the interdependence between the sectors identified, means without a constant supply of secure energy the ability to be mobile will be constrained.

- Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?

Infrastructure, as a whole, has interdependencies without any two specific named sectors being any more important than an alternative pair. In order to select areas of importance it is necessary to identify the objective. For instance, if the NIC's objective was to compliment the government's ambition to increase the supply of housing stock for a growing population, the interdependencies between transport (all areas as set out in the consultation), energy, digital and communications, waste and social infrastructure will be prevalent. Depending on geographical location, flood defences may also need to be factored in.

- Q6. Do you agree that the NIA should focus on these cross-cutting issues?

The, non-exhaustive, issues identified will help contribute to carrying out an infrastructure assessment. The assessment can, however, benefit from the addition of other cross-cutting issues.

- Q7. Are there any other cross-cutting issues that you think are particularly important?

There are likely to be a number of issues that are likely to arise over the course of the assessment. It is therefore important that the NIC remains open to the option of considering additional issues as they materialise.

The RICS believes the current list will benefit from the addition of Planning and Land Value Capture, cross-cutting issues that are key for the development of infrastructure and have interdependencies with those already set out in the consultation. Arcane planning restrictions can be an obstacle for infrastructure developments. Additionally, land value capture may be worth factoring in as part of the NIA as this can influence future cost models associated with infrastructure delivery.

- Q8. Do you agree with this methodological approach to determine the needs and priorities?

Although, making an assessment of infrastructure need over the next 10-30 years is challenging, the methodology highlighted in the consultation clearly sets out how the NIC aims to do this. The use of empirical evidence based on past economic trends will need to be reassessed to factor in various assumptions resulting from the referendum outcome, where necessary. A review of models factoring in the assumptions will impact previous quantitative and qualitative forecasts, in particular, for the economy. Additionally, the ever changing demographics, including population growth and

increasing life expectancy, will impact infrastructure requirements as different people have different needs. This approach, and continued review, will allow Commissioners to better position themselves to make informed recommendations.

The RICS welcomes the NIC's plans for engagement and its approach for considering a range of infrastructure needs and priorities. This would benefit from more detail being set out on possible future funding sources, particularly the appetite of long-term investors, for meeting the identified needs over a 10-30 year period.

- Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

n/a

- Q10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?

The drivers identified: economic growth and productivity, population and demography, climate change and environment, and technology, are appropriate. The findings of the NIC would be more impactful if assumptions could be made on potential regional growth, contributions to GDP and increases in productivity, resulting from infrastructure investment recommendations. This could also include economic growth resulting from increased and better connectivity between regions across the UK.

The topic of productivity could benefit from being tied in with the skills gap that will exist in the UK, if it proceeds with its decision to leave the EU and restrictions are imposed on the movement of labour. Without migrants from the EU, schools, hospitals and industries such as farming and building would be short of labour. The finding and recommendations of the NIA would benefit from analysis on skills over the next 10-30 years.

In terms of energy, a full analysis of the government's energy plans for the future will also be important. It is well documented that there is a need for a range of energy sources in the long-term and the government is considering all the options. The NIA can help inform this debate through thorough analysis on policy decisions and make recommendations on alternatives, where it represents better value for money and improved energy efficiency.

- Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

A number of methodologies can be used to set up portfolios of investments to raise finance. A non-exhaustive list of options have been set out below, however, detailed due diligence and analysis would need to be undertaken to determine their feasibility and credit worthiness.

The first option could be to establish regional portfolios comprising of projects from that particular region. This would allow the region to raise the liquidity needed for project delivery. Where there is overlap with neighbouring regions or there is a need to increase the size of a portfolio to make it investor friendly, infrastructure projects from different regions could merge to form a portfolio. Potential investors may, however, refrain from investing in certain regions, the north-east, as they deem the risks greater than investing in the south. If investors adopt this approach the north east, in this example, may end up having to pay a higher yield to attract investor.

Breaking the portfolio down by sectors can mitigate the regional risk, or bias, as set out above. If portfolios are set up by sector, as identified in paragraph 42-47, for the UK as a whole, investors will be taking risk solely on sectors rather than region and sector. Investors will be attracted to this where their portfolio objectives require certain sector investment.

Alternatively, as investors are generally attracted to a diversified portfolio, the NIA could recommend creating portfolios with projects from different sectors and regions. If all the portfolios have the same or similar risk weighting, with high NPVs, investors will be incentivised, to some degree, to invest without being particularly attracted to a certain portfolio. An investment decision will ultimately be based on the outcome of due diligence, so to calculate the portfolio effects of diversification and correlation between projects. The portfolio would benefit from limited interdependencies as the failure in one project could have a domino effect on other projects in the portfolio.

Exiting the EU means the UK will no longer be subject to state aid rules. It can therefore mitigate the risks as set out in the methodology for the project portfolios above, if the government could issue guarantees to investors. This will mean investors will be taking sovereign risk rather than project risk, so the content of a portfolio will not be influential. Guarantees will, however, be accounted as contingent liabilities and impact the government's balance sheet and, ultimately, the sovereign rating. They will also need to be assessed within the context of macro-economic variables of GDP, inflation and interest rates (where applicable).

Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

The NIA's methodological approach could benefit from looking into skills, as set out above. Investors would want reassurance that projects will not stall because of a shortage in skills and capability that is required to deliver the projects in which they are

seeking to invest. This is something that will become more important in the next 10-30 years.

Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

As a newly created statutory and independent body the NIC must ensure it promotes itself nationally to ensure all stakeholders are aware of its objectives and it openly welcomes participation. It should also consider hosting roundtables for non-experts. Local authorities and LEPs must also ensure they capture and accurately reflect thoughts and concerns of the wider public. As the NIC's scope cuts across a number of sectors, in particular the energy sector, it is important to get engagement, and buy-in if possible, however challenging, of environmental groups.

Although the NIC has stated it intends to incorporate expertise and opinions of experts, it is also important for it to spend time with the Built Environment specialists, such as the RICS members, as they will have great specialist insight that can add substance to the evidence and conclusions. In addition the RICS can share thoughts on its global professional standards that can be adopted to provide reassurance to investors. RICS members can also provide valued insight on effective project management which will result in cost savings for big infrastructure projects.

Finally, the NIC should list the stakeholders with which it has engaged and received evidence. This will add legitimacy to its conclusion and recommendations.

I hope you find this submission helpful and informative. We are happy to meet with NIC officials and facilitate further engagement with experts, subject to their approval, to expand on the above responses if helpful.

Please contact me using the details below if you have any further questions.

Yours faithfully,

[name redacted]

[job title redacted]  
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## **NATIONAL INFRASTRUCTURE COMMISSION:**

### **CONSULTATION RESPONSE FROM THE RSA (ROYAL SOCIETY FOR THE ENCOURAGEMENT OF ARTS, MANUFACTURES AND COMMERCE)**

#### **Introduction**

Although climate change is referred to briefly, overall we regard the attention given to this and other sustainable development issues as insufficient and not in the UK's best interests.

This apparent lack of concern contrasts with legal obligations to have regard to sustainable development in the current planning system; the Climate Change Act; UK international obligations under the Climate Change Convention, the Paris Agreement, and the Convention on Biological Diversity; UK Government endorsement of the UN Sustainable Development Goals; and the growing scientific evidence of ecological deterioration (e.g. in the Millennium Ecosystem Assessment) and climate change (e.g. in the IPCC assessments). All of these together contribute to the larger context within which infrastructure planning takes place.

One reason why this is important is that (as para 20 reiterates) infrastructure development in the UK has been subject to a "fragile and incomplete political consensus." The aim of creating a firm consensus was one of the main reasons, perhaps even the most important reason, for the proposal to establish the National Infrastructure Commission on a statutory basis. Yet such a consensus will be impossible to achieve if the Commission is seen not to be taking proper account of environmental and sustainability considerations.

#### **Responses to consultation questions**

1. To ensure economic growth is sustainable and the UK economy is competitive, and if it is working on a 30-year time horizon, the Commission will need to consider long-term trends in the world economy, including factors such as population, food supply, climate change, water availability, and changes in land use. A methodology which considers the UK economy in a purely national perspective, ignoring world conditions, will have no credibility.
2. Each of these objectives is complex and must be clearly defined so as to be effective. This is particularly the case with the idea of a "whole system approach, understanding and studying interdependencies and feedbacks". To do so will require an approach that clearly incorporates whole life value, the value of "natural capital", resilience and sustainability. This should therefore be explicitly stated within the Commission's remit. The document's indications as to the scope it envisages for "the whole system" implies that it has a view of the economy which fails to acknowledge its dependence on natural resources, including land and water, and on relative environmental stability, including climatic conditions. These factors should be included as part of the "whole system".

Our concerns here are reinforced by the box on page 14 on the remit letter. This is proposed to come from the Chancellor of the Exchequer, rather than jointly with, for example, DECC, Defra, and DCLG, or from the Prime Minister on behalf of the Government as a whole. This implies overriding priority for Treasury considerations. The only limit referred to is the proposed “fiscal envelope”, when attention should also be given to the limits of water supply, land supply, and acceptable levels of carbon emissions.

3. With regard to transport, although the consultation rightly suggests the Commission adopt a multi-modal approach, the emphasis within this appears to be on large-scale transport infrastructure. This threatens to further reinforce the current bias in transport spending against schemes to facilitate walking, cycling, a pleasant street environment, road safety, repairs to pavements and road surfaces, etc. This is not to argue for the inclusion of these within the Commission’s remit, but to warn against any methodology which results in decisions which do not take a truly holistic multi-modal view.

Similarly in the case of energy, there is a danger – particularly important given recent changes in technology – of a disproportionate focus on large-scale infrastructure at the expense of the development of distributed forms of energy generation, such as solar and wind. We support the consultation’s suggestion that the Commission consider future energy demand, energy efficiency and low-carbon solutions. We suggest the Commission have an explicit duty to give consideration to the Energy Hierarchy when considering assets in this sector.

Again, in the case of waste, an emphasis on infrastructure may result in insufficient attention being given to the waste hierarchy, waste minimisation and “circular economy” design.

4. We would not want to see the Commission becoming a barrier to the creation of improved urban environments, distributed renewable energy, and the reduction of waste. There is a natural danger of this inherent in its emphasis on large-scale infrastructure.

One of the most important and difficult tasks of the Commission will be to address the question of infrastructure without falling into the trap of adopting a methodology which automatically prioritises increased infrastructure provision over all other policy approaches (this issue is touched on in paragraph 61 of the document) – i.e. without assessing need and managing demand as a “first resort”.

5. The interdependence of infrastructure and housing is crucial. It will be important not to allow the profitability considerations of private developers to take priority in infrastructure planning over issues such as the need for affordable housing. Different forms of housing design obviously have different infrastructure implications, and it is important that energy and water efficiency are encouraged, rather than inefficiency being catered for through unnecessary additional infrastructure capacity.
6. These are important cross-cutting issues. However the questions of “geography and local growth” and “governance and decision-making” need to be considered in relation to local democracy, which should be seen positively rather than simply as a barrier to increased quantities of infrastructure. The issue of “risk” needs to be considered in relation to the danger

that taxpayers will bear more than their fair share of risk and developers therefore receive more than their fair share of profits.

7. The question of “evaluation and appraisal methodology” should be expanded to include a consideration of the way in which discount rates currently create a built-in bias against the interests of future generations – important when the Commission is considering a 30-year time horizon. This implies the need for a different approach to that followed by the Treasury Green Book. “Evaluation and appraisal methodology” should also be expanded to require whole-life-value assessment. This will assist in overcoming potential capital vs operational expenditure barriers and help ensure both long-term-value and resilience of assets.
8. The “baseline stock” (para 64) should not include projects where construction work has not started, as that would bias the Assessment towards existing plans instead of offering an opportunity re-evaluate them. We suspect that much more work will need to be carried out by the Commission itself than is implied here if it is to avoid reliance on existing industry methodology (para 66), which would result in it giving too little attention to climate change and other sustainability considerations, factors such as distributional impacts, and to the effects of the types of policies referred to in para 61.

The concept of “drivers” is a questionable one, because it carries the implication that an assessment of the “need” for infrastructure can be derived from sets of information about likely trends, rather than being chosen by society because that is what we actually want. It may be that faced with the consequences of existing trends, society decides it does not want to pursue those trends – a possibility the Commission’s proposed approach appears to reject a priori. This implies a danger that the Commission will merely attempt to forecast trends, rather than question or explore their desirability, and as a result end up adopting the discredited “predict and provide” approach.

9. We are not aware of any already existing methodology that would enable the Commission to successfully deal with the whole range of issues it faces.
10. A key consideration here is the potential impact of different infrastructure options on different sections of the population, which could be analysed in terms of location, income, wealth, gender, ethnicity, disability, etc. The Commission’s work should analyse these aspects, which would enable it to highlight the significance of different options for its “quality of life” objective. This is particularly important for transport expenditure, where the prioritisation of major infrastructure development generally fails to serve the interests of disadvantaged groups.

Under the heading of “climate change and environment”, there is no mention here of biodiversity, nature conservation, air pollution, noise or land use. A major problem for infrastructure planning is that infrastructure building generally takes up land for which there are other competing potential uses, and it can of course also cause pollution and habitat loss. The idea that national consensus can be built by a Commission which appears set to ignore these issues is clearly untenable.



It is somewhat out-of-date to select “climate change and environment” as a driver rather than the broader “sustainability and value”. We suggest this driver may need to be revised with input from sector specialists to help identify a list of the considerations that fall within this, as inaccurate or incomplete consideration of sustainability often leads to gaps in decision-making, and lack of appropriately framed consideration of value often impedes ability to optimise the outcomes.

11. The appropriate methodology is one which does not simply extrapolate, or even forecast in a highly sophisticated way, major trends and then propose infrastructure development to fit in with them, but one which helps to enable society to make an informed choice as to which direction to take, bearing in mind the impact of different choices on different social groups and on the environment, and not only on measurements of the national economy. Otherwise, despite the range of issues highlighted in this document, the Commission will fall back into the old discredited “predict and provide” approach.
12. The key relevant factor here is the need for normative judgements, which have to be made politically and cannot simply be found through an “objective” analysis. The danger here is that highly contentious normative judgements will be “smuggled into” the Commission’s analysis through biases in its methodology.
13. The Commission’s current bias is evident in the reference to “promoting the benefits of infrastructure” (para 74). It should be equally willing to promote consideration of its costs, and consideration of alternative policy approaches, such as demand management measures. It is similarly evident in the statement that “the views and opinions of people who are active day to day in delivering major infrastructure will be especially important” (para 75), when clearly such people have a vested interest in increasing the rate of infrastructure construction, rather than seeking to balance this desire against other considerations. The wording here and elsewhere in this section indicates a very definite bias in the Commission’s approach, which raises doubts as to the genuineness of the consultation processes being proposed. This implies to us a need to include a much wider range the range of people, organisations, and disciplines in consultation processes than is suggested here.

It would be instructive for the Commission to hear, for example, from objectors to local fracking proposals, members of organisations dedicated to the conservation of particular areas of green space, and people whose main concern about transport is the lack of an adequate bus service to get them to the shops, or about pavements which need to be repaired to help people who are walking with walking sticks or small children. The wording of this consultation document gives the impression that the Commission will not be listening to such voices.

### **Comments on Section 5**

The composition and method of appointment of the Commission is a crucial concern. The proposal that all its members would be appointed by the Chancellor of the Exchequer, rather than by a range of different departments and organisations, will clearly undermine the credibility of the claim that it will properly consider climate change and sustainability.

Para 91 is particularly concerning because it does not mention any requirement for the Commission to work with the Climate Change Committee, Natural Capital Committee, or Environment Agency.

## National Infrastructure Commission

### The National Infrastructure Assessment Process and Methodology consultation

August 2016

Name and Position: [name redacted], [job title redacted].

Name of Organisation: The RSPB

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#### SUMMARY

The RSPB welcomes the creation of the National Infrastructure Commission (NIC) and the opportunity this provides to analyse long-term national infrastructure needs in a coordinated and strategic way.

We agree that *'better infrastructure is vital to improve the lives of British people'*<sup>1</sup>, but it is also vital – in order to achieve truly sustainable development – that this infrastructure is delivered in harmony with nature and planned to achieve reductions in greenhouse gas emissions, whilst providing resilience to the impacts of climate change. Taking this approach would not only help to save nature, it would also provide a wide range of social and economic benefits, such as providing opportunities for people to connect with nature.

Our key recommendations are outlined below:

#### Environmental assets

- All new infrastructure proposals should seek to avoid the most important sites for wildlife, such as Natura 2000 sites, nationally designated sites and locally important wildlife sites.

#### Spatial approach

- The NIC should recommend the creation – and lead on the development - of a 'light-touch', non-statutory UK-wide spatial plan for the provision of key national infrastructure needs over the next 30 years.

#### Planning

- The NIC should look at all models for infrastructure delivery – i.e. at strategic plans prepared by combined authorities, local and neighbourhood plans, and community-led proposals as well as large-scale, nationally significant infrastructure projects.

#### Vision Report

<sup>1</sup> Statement from Chancellor George Osborne, launching the National Infrastructure Commission on 30<sup>th</sup> October 2015.

<https://www.gov.uk/government/news/infrastructure-at-heart-of-spending-review-as-chancellor-launches-national-infrastructure-commission>

- The spatial analysis developed as part of the RSPB's 2050 Energy Vision should be used by the Commission in developing its own vision, not just for energy infrastructure but other types of infrastructure as well.

### **Natural capital and green infrastructure**

- The NIC should give due consideration to natural capital and to wider protection, enhancement and creation of green infrastructure, including consideration of the UK's strategic, long-term green infrastructure requirements as determined by the Natural Capital Committee. Such consideration must be designed to ensure that NIC recommendations complement, not undermine, the Government's proposed 25 year plan to save the UK's biodiversity.

### **Energy**

- All the scenarios developed for the Commission's Vision Report must be compatible with the UK's 2050 climate targets and interim carbon budgets. They must take account of likely revision of the long-term target in the context of the 1.5°C target agreed in the Paris Treaty. This will require looking at the energy system as a whole. All scenarios must also take into account obligations and commitments to protect the natural environment.
- The Commission should undertake spatial mapping for all other spatially specific energy infrastructure to be included in the Vision Report scenarios and subsequent reports prepared by the Commission. In the absence of spatial analysis by the Commission, the maps produced for the RSPB's 2050 Energy Vision (see Annex 1 of this consultation response) should be used to inform a national spatial plan for energy infrastructure, taking account of ecological sensitivity, as this is the best currently available evidence.
- Evidence-based ecological constraints should be fed into the Commission's scenario modelling for the Vision Report. If the Commission does not carry out spatial mapping (described above) to identify ecologically sustainable deployment levels of energy technologies the maximum deployment figures identified in the RSPB's 2050 Energy Vision should be treated as 'caps' for deployment of these technologies (see Table 1).
- Scenarios generated for the Vision Report should support a positive vision of a sustainable, low carbon energy system and avoid creating bottlenecks for any sustainable low carbon pathways. This means including scenarios with high levels of renewable energy, taking into account opportunities for innovation in key areas such as energy storage and deep water marine renewables, in order that energy infrastructure is planned to facilitate sustainable renewable energy and technology innovation.

### **Water**

- The Commission should consider all options for delivery of water infrastructure, including catchment-type solutions, which can increase resilience to pollution and flooding, alongside hard, engineered solutions. This can be supported by making use of TOTEX (total expenditure) to decide on investment priorities, rather than treating operating and capital expenditure separately.

### **Challenging established thinking**

- The Commission should be prepared to challenge existing approaches to infrastructure planning (and the assumptions underpinning these) and think creatively about potential novel and innovative solutions to infrastructure needs, such as floating offshore wind.

### **Energy demand**

- Reducing energy demand should be central to the Commission's analysis of future energy infrastructure needs – this should be a UK-wide priority and hence will require the Commission to work closely with the devolved administrations.

### **Cross-cutting issues**

- Particular attention should be given to climate change and biodiversity as cross-cutting issues

## **INTRODUCTION**

1. The Royal Society for the Protection of Birds (the RSPB) is the charity that takes action for wild birds and the environment. We are the largest wildlife conservation organisation in the country with over one million members. We own or manage 151,954 hectares of land for nature conservation on 213 reserves throughout the UK.
2. We believe that sustainability should be at the heart of decision-making. The RSPB's policy and advocacy work covers a wide range of issues including planning policy, climate change, energy, marine issues, water and agriculture. As well as commenting on national planning policy issues, the RSPB's professional conservation and planning specialists engage with over 1,000 cases each year throughout the UK, including development plans and individual planning applications and proposals. We thus have considerable planning experience. The RSPB also makes over 100 planning applications a year on its own reserves and estate.
3. The RSPB welcomes the creation of the National Infrastructure Commission (the Commission) and the opportunity this will provide to analyse and assess long-term infrastructure needs in a coordinated and strategic way.
4. Whilst we accept that '*better infrastructure is vital to improve the needs of British people*', it is also vital – in order to achieve truly sustainable development - that this infrastructure is delivered in harmony with nature and planned to achieve reductions in greenhouse gas emissions, whilst providing resilience to the impacts of climate change. In particular, this infrastructure should be delivered in a way that:
  - Avoids adverse effects on our existing environmental assets, particularly those of national and international importance.
  - Delivers a net gain in biodiversity and contributes to establishing coherent and resilient ecological networks.
  - Contributes to people's health and wellbeing.
  - Mitigates and facilitates adaptation to the impacts of climate change.
5. Taking this approach would not only help to save nature, it would also provide a wide range of social and economic benefits, such as providing opportunities for people to connect with nature.
6. We have provided some overarching comments structured around the chapters in the consultation document (as relevant), as well specific information on a number of the proposed infrastructure sectors. The final section of this response provides an answer to each of the questions included in the consultation document.

## **GENERAL COMMENTS**

### **TAKING ACCOUNT OF ENVIRONMENTAL ASSETS**

8. **All new infrastructure proposals should seek to avoid the most important sites for wildlife** such as Natura 2000 sites, which are protected under the EU Birds and Habitats Directives, as well as nationally designated sites such as SSSIs, ASSIs and locally important wildlife sites (as well as the equivalents in Scotland, Northern Ireland and Wales). The NIC should use SEA to consider ecological impacts (see paragraph 14 below), and site-specific proposals should carry out thorough environmental assessment of potential impacts (alone and in combination with other developments), and adopt a precautionary approach if impacts on vulnerable species or habitats are unclear or unknown.
9. Recommendations on future investment priorities should result in no significant adverse effects on nature conservation designations of national and international importance.
10. It is important that any outputs from the Commission are compatible with the UK's obligations for biodiversity protection and enhancement, including for example country-specific biodiversity strategies and global Aichi targets set under the Convention on Biological Diversity. To achieve this, biodiversity should be given particular attention as a cross-cutting issue for consideration as the NIA is developed (see our response to question 7).

### **TAKING A SPATIAL APPROACH**

11. The delivery of the UK's long-term infrastructure needs will, to a large extent, be spatial in nature (i.e. particular infrastructure will be delivered in particular locations). As such, strategic spatial planning should play a key role in the Commission's analysis and assessment of these infrastructure needs.
12. Whilst the Local Plan process can help to identify specific locations for specific infrastructure improvements, this scale of spatial planning will not be sufficient to facilitate the delivery of the UK's infrastructure needs. This will be true even where local authorities take a more coordinated approach to infrastructure provision, for example, through the devolution of powers to combined authorities. What is needed is a 'light-touch', non-statutory, UK-wide (or country-specific, for devolved issues) spatial plan showing options and proposals for key infrastructure provision over the next 30 years.
13. As such we reiterate our earlier recommendation to the UK Government that **the Commission should lead on the development – of a 'light-touch', non-statutory, UK-wide spatial plan for the provision of key national infrastructure needs over the next 30 years**. This would complement other recommendations we propose (see points under 'Energy' below) and would enable all infrastructure choices to be mapped, assessed and reported on in a strategic and transparent way.
14. Strategic environmental assessment (SEA) should play a key role in the spatial planning process. SEA can be a particularly useful tool when considering the range of alternative options for future infrastructure provision, including consideration of different technologies and locations. SEA should be started at the earliest possible stage to genuinely influence infrastructure choices and give the public an opportunity to respond on decision-making.
15. Further advice on spatial planning with nature in mind is provided in the RSPB/RTPI publication, *Planning Naturally*.<sup>2</sup>

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<sup>2</sup> RSPB (2013) *Planning Naturally: spatial planning with nature in mind in the UK and beyond*.  
[http://www.rspb.org.uk/Images/planningnaturally\\_tcm9-349413.pdf](http://www.rspb.org.uk/Images/planningnaturally_tcm9-349413.pdf)

## PLANNING

16. The planning process (both under the Town and Country Planning Acts and the Planning Act 2008) enables public engagement and the consideration of environmental issues in the development process, so that development takes place in the public interest. These features are fundamental to planning systems in the UK and must be preserved in any new arrangements for infrastructure planning.
17. There is a need for clarity on how the outputs from the NIA (as well as other formal outputs with scope to inform policy) should be delivered through the different planning routes in England and the devolved countries of the UK and how the public will be engaged – the Commission could include a specific section on planning as part of the NIA outputs. We recommend that **the Commission looks at all models for infrastructure delivery – i.e. at strategic plans prepared by combined authorities, local and neighbourhood plans, and community-led proposals as well as large-scale, nationally significant infrastructure projects.** If the Commission is minded to prepare a ‘light-touch’ spatial plan for the UK’s infrastructure then this would provide an overarching framework.
18. We note from the response to earlier consultations that the Government will amend the National Planning Policy Framework to give decision-makers clarity on how Endorsed Recommendations should be taken into account. This is welcome, provided that Endorsed Recommendations do not override the strong biodiversity protection policies of the NPPF. We recommend that further guidance is provided as to how planning authorities can help deliver the recommendations arising from the NIA.
19. We also note that the Government will legislate so the Secretary of State can take a decision in line with Endorsed Recommendations where there is a conflict between National Policy Statements and Endorsed Recommendations and will have powers to intervene in local decision-making where there is a risk to a delay of an Endorsed Recommendation – there must remain scope for communities and affected planning authorities to make representations on decisions that affect them.

## COHERENCE AND CLOSE WORKING WITH GOVERNMENT DEPARTMENTS

20. There have been significant changes to Government in the last few weeks including the creation of new Government Departments. The Commission will need to work closely with the new Secretaries of State and Ministers to ensure the outcomes of the NIA are aligned with new and existing Departmental policies – particularly those affecting land use and which have spatial implications or relate to decisions on infrastructure priorities.

## **CHAPTER 2: REMIT AND PLAN**

### **THE KEY PUBLICATIONS: VISION AND PRIORITIES**

21. We note that the consultation document does not specifically cover the Vision Report, which will determine a vision of the UK up to 2050 to identify long-term infrastructure need in light of that vision and that this will be published in summer 2017. We would be keen to support the Commission during the development of the Vision Report through the Call for Evidence planned for the autumn and other formal and informal opportunities for engagement. We have outlined our work on energy known as the RSPB's 2050 Energy Vision which we believe will be particularly useful to the Commission as it develops its Vision and Priorities for the NIA. **The spatial analysis developed as part of the RSPB's 2050 Energy Vision should be used by the Commission in developing its own vision, not just for energy infrastructure but other types of infrastructure as well.**

### **ROLE AND REMIT**

22. We believe that the Commission must be subject to an 'Environmental' or 'Sustainable Development' duty (if the latter is adopted this could provide a link to the UK Sustainable Development Goals), and that this should be included on the face of the Neighbourhood Planning and Infrastructure Bill. Solely considering 'economic' infrastructure is at odds with the planning systems' wider aims of social, environmental and economic sustainability. The wider aspects of sustainability should be considered.
23. The National Infrastructure Commissioners should have expertise in keeping with the Commission's overall duties and remit, and this should include one Commissioner or more with environmental expertise. The Commission should also engage with non-departmental environmental public bodies such as the Committee on Climate Change, the Natural Capital Committee and Natural England, and this should be a statutory duty.

### **CONSIDERATION OF NATURAL CAPITAL**

24. The Natural Capital Committee (NCC) made the explicit recommendation that the National Infrastructure Plan should incorporate natural capital into each of the main infrastructure sectors, following the mitigation hierarchy for managing impacts (avoid, minimise, restore, offset). The NCC recommends that an investment programme for natural capital should also explicitly feature in the National Infrastructure Plan. Further details on embedding natural capital into the NIA approach are provided in our response to Question 1.

### **SECTORS UNDER CONSIDERATION**

25. We note that the Government will set out in legislation the Commission's main duties, and its remit in relation to economic infrastructure. However, the Government's Response to Consultation<sup>3</sup> stated that the scope of the remit is unlikely to be extended beyond that set out in the March 2016 consultation document. **Notwithstanding this, we still recommend that the Commission gives due consideration to natural capital and to wider protection, enhancement and creation of green infrastructure.** Furthermore, **we reiterate our previous recommendation that fracking should not be included as a nationally significant infrastructure proposal and should not form part of the Commission's remit.**

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<sup>3</sup> HM Treasury: National Infrastructure Commission: response to the consultation (May 2016).



## GREEN INFRASTRUCTURE

26. We note that Green Infrastructure is not explicitly mentioned as one of the infrastructure sectors. **We reiterate our recommendation to HM Treasury<sup>4</sup> that the Commission's remit should include consideration of the UK's strategic, long-term green infrastructure requirements as determined by the Natural Capital Committee.** Such consideration must be designed to ensure that NIC recommendations complement, not undermine, the Government's proposed 25 year plan to save the UK's biodiversity.

## ENERGY

27. The RSPB welcomes the National Infrastructure Commission's focus on energy infrastructure, and the long-term assessment of the UK's energy system requirements that the National Infrastructure Assessment (NIA) provides. Energy is an area in which the RSPB has considerable experience and expertise, through our engagement with individual planning applications, our policy and advocacy work, and our scientific research into the biodiversity impacts of energy developments. We recently produced a report '*The RSPB's 2050 Energy Vision: Meeting the UK's climate targets in harmony with nature*' which analyses and demonstrates how the UK can deliver its 2050 climate targets and transition to low carbon energy with lowest risk to sensitive species and habitats. The conclusions of our research, and our direct experience in engaging with energy infrastructure planning, have direct relevance to the process and methodology used in the NIA.
28. **Climate targets:** We welcome and support the commitment for the NIA to be '*compatible with all legally binding and long-term obligations including carbon targets*'. Climate change is one of the greatest long-term threats to wildlife, and the RSPB has campaigned for ambitious climate action at national, sub-national and international levels including the UK Climate Change Act 2008, the Climate Change (Scotland) Act 2009 and the Paris Agreement in 2015. All scenarios developed as part of the Commission's 'Vision Report' must be compatible with the 2050 target set by the Climate Change Act (an *at least* 80% reduction in emissions against 1990 levels).
29. The scenarios should also take account of the interim 5-yearly Carbon Budgets, and the RSPB recommends that a clear assessment of compatibility of each scenario with existing Carbon Budgets to date (up to 2032) is made. It is important to note that the 2050 emissions reduction target may change following the Paris Agreement, which enshrines a commitment to pursue efforts to limit global temperature rise to 1.5C rather than the previously agreed 2C. This implies zero carbon emissions by 2050 and the Government has committed to enshrine this in legislation<sup>5</sup>. Therefore, as far as possible, the scenarios should take this target into account and plan the UK's energy infrastructure in line with the UK's contribution to the 1.5C commitment (further clarity should be achieved when the Government enshrines this in legislation and when the Committee on Climate Change assesses the implications for the UK in the autumn of this year).
30. **Biodiversity targets:** In addition to carbon targets, it is important that the NIA is compatible with the UK's obligations for biodiversity protection and enhancement. If inappropriately sited, designed or managed, energy infrastructure can have significant adverse impacts on sensitive species and habitats. It is crucial that the NIA takes these potential impacts into account when developing scenarios, and incorporates an assessment of key ecological risks and how the energy infrastructure proposed in each scenario could be delivered without resulting in significant detrimental environmental impacts. Obligations that should be taken into account include '*Biodiversity 2020: A strategy for England's wildlife and ecosystem services*'; '*2020 Challenge for Scotland's Biodiversity: A strategy for the conservation and*

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<sup>4</sup> See the RSPB's response to HM Treasury's consultation on the NIC's role and remit provided in March 2016.

<sup>5</sup> <https://www.theguardian.com/environment/2016/mar/14/zero-carbon-emissions-target-enshrined-uk-law>

*enhancement of biodiversity in Scotland*’; ‘*Valuing Nature: A biodiversity strategy for Northern Ireland to 2020*’; ‘*Environment (Wales) Act*’; ‘*Environment Strategy for Wales*’; the global Aichi targets set under the Convention on Biological Diversity (CBD); and the biodiversity goals and indicators set under the UN Sustainable Development Goals. Note also that 94% of people in the UK agree there is a moral obligation to halt biodiversity loss<sup>6</sup>, meaning that scenarios which protect and enhance the natural environment and that involve infrastructure which is in harmony with nature, would benefit from increased public support and acceptability.

31. **A low carbon, wildlife friendly future:** The NIA consultation document explains that ‘*The Commission intends to analyse the likely paths going forward, create and debate credible scenarios, and open up an informed discussion about infrastructure needs and priorities*’. It is important to account for the potential impacts on wildlife when developing the energy infrastructure components of these scenarios, and to ensure that they can be delivered without significant adverse impacts on wildlife and the natural environment. To achieve this, the RSPB recommends the following approach (as demonstrated in the RSPB’s 2050 Energy Vision report):
1. Analyse the ecological risks of all energy technologies that are to be included in the scenario modelling (see steps 2 and 3 for further detail);
  2. Where possible, spatially analyse the areas of the UK where technologies could be deployed taking into account resource opportunity, deployment constraints and ecological sensitivity to produce estimates for capacity that could be achieved practically and with low ecological risk (see maps in Annex 1 by way of example);
  3. Where mapping is not appropriate (i.e. for technologies that are not spatially specific or do not require ecological sensitivity mapping, such as rooftop solar,), conduct a literature review to estimate the energy generation potential whilst limiting ecological risk;
  4. Use these results to inform energy scenario modelling, taking the maximum deployment of technologies that is estimated to be achievable with low ecological risk as a ‘cap’ to generate scenarios that meet carbon reduction targets sustainably.
32. The RSPB has undertaken this process for energy technologies included in the DECC 2050 Pathways Calculator model. We have used this model, following the approach outlined above, to develop three scenarios that meet the UK’s 2050 climate targets with low ecological risk, as well as taking account of other defined objectives (affordability and security of supply). The technologies that were spatially analysed as part of this study are onshore wind, solar farms, bioenergy crops, offshore wind (fixed and floating turbines), wave and tidal stream.
33. The results of our research showed that ambitious levels of renewable energy are possible at low ecological risk, and renewable energy should be prioritised in the UK’s energy system. The deployment levels of renewable energy in the scenarios are provided in Table 1 (showing 2030 and 2050 deployment figures, and maximum deployment figures estimated to be achievable with low ecological risk based on current understanding and available data).
34. The latter (right-hand) column indicates the maximum levels of each technology that the RSPB considers can be accommodated in the UK with low ecological risk. The maps that inform Table 1 are available in Annex 1, and more detailed information about all technologies in the Low Ecological Risk scenarios is available in Annex 2. The maps and the methodology used to create them have been peer-reviewed and published in a respected scientific journal<sup>7</sup>. The 2050 electricity mix in each of the Low Ecological Risk (LER) scenarios is shown in Figure 1, with a comparison to the 2015 electricity mix provided in Figure 2.

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<sup>6</sup> European Commission (2013) ‘Attitudes towards biodiversity’  
[http://ec.europa.eu/public\\_opinion/flash/fl\\_379\\_en.pdf](http://ec.europa.eu/public_opinion/flash/fl_379_en.pdf)

<sup>7</sup> Gove, Benedict, Leah J. Williams, Alison E. Beresford, Philippa Roddis, Colin Campbell, Emma Teuten, Rowena H. W. Langston, Richard B. Bradbury (2016) ‘Reconciling Biodiversity Conservation and Widespread

**Table 1. Deployment figures for renewable technologies that were spatially analysed in the RSPB's 2050 Energy Vision**

Renewable technology	2030 deployment level (across the LER scenarios*)	2050 deployment level (across the LER scenarios*)	Maximum UK deployment level with low ecological risk
Onshore wind	31.2 – 38.4GW	32 – 42.8GW	53GW
Solar farms**	16.1 – 69.3GW	94.7 – 122.7GW	312GW*
Bioenergy crops**	N/A***	N/A***	23GW***
Fixed offshore wind	22.1 – 26GW	24 – 26GW	26GW
Floating offshore wind	0 – 63.4GW****	0 – 155.3GW****	1,268GW
Wave	0.3 – 1.3GW	2.9 – 21GW	64TWh†
Tidal stream	0.1 – 2GW	1.9 – 20.4GW	50GW

\* 3 Low Ecological Risk (LER) scenarios were created for the RSPB's 2050 Energy Vision report.  
 \*\* The amount of agricultural land assumed to be available for energy production has been capped in order to take into account indirect land-use change and potential impacts on food production.  
 \*\*\* The DECC 2050 Calculator did not allow us to fully reflect constraints on agricultural land that we think should be applied to bioenergy crops, therefore the figures in the LER scenarios should not be used as a guide. Instead, the upper limit of 23GW (assuming the availability of 3500km<sup>2</sup> agricultural land) should be applied when considering the sustainable deployment of bioenergy crops.  
 \*\*\*\* These figures range from 0 because in one of the LER scenarios it is assumed that floating offshore wind does not become commercially available. It should also be noted that we have capped fixed offshore wind deployment at 26GW as our spatial analysis shows this is the maximum deployment with low ecological risk; however the DECC 2050 Calculator does not apply this cap, and therefore makes different assumptions about the breakdown between fixed and floating turbines.  
 † Installed capacity of wave energy was not calculated within our study; instead we took a 'frontier approach' which enabled us to estimate the potential annual energy output at low ecological risk.

35. **The RSPB recommends that the Commission conducts this type of spatial analysis for all energy technologies to be included in the Vision Report scenarios and as part of the NIA and other assessments.** The maximum level of each technology that this analysis shows to be achievable with low ecological risk should be treated as a cap in the scenarios developed by the Commission. In the absence of any spatial analysis undertaken by the Commission, as a minimum we recommend that the levels identified in the right-hand column of Table 1 are treated as caps as we believe this to be the best available evidence on the levels of renewable energy that can be delivered in the UK with low ecological risk. We would also recommend that the maps in Annex 1 are used to inform the NIA. **It is emphasised that the maps are not intended for individual site selection and local environmental assessments such as EIA must still be applied.** However, they do provide a high-level indicative estimate of the capacity of technologies that is likely to be able to be delivered without conflicting with nature conservation, and indicate areas that are more and less likely to be suitable for renewable energy development. They could therefore be used for strategic spatial planning purposes to support a national spatial plan for infrastructure, and incorporated into the modelling undertaken for the Vision Report.

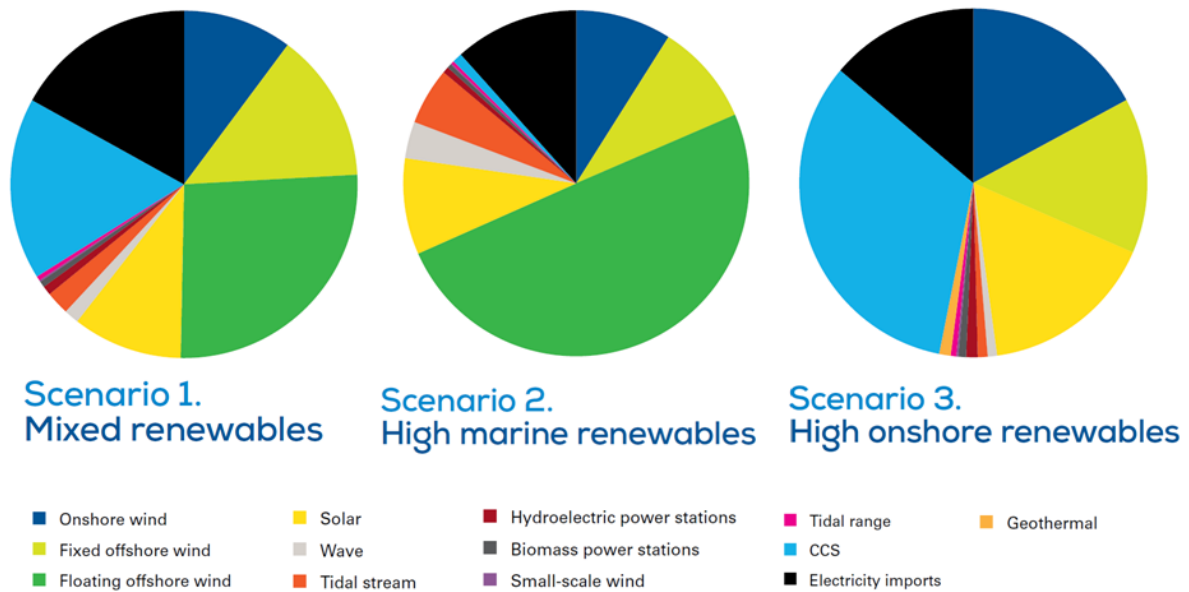


Figure 1. The 2050 electricity supply mix in the Low Ecological Risk (LER) scenarios from the RSPB's 2050 Energy Vision

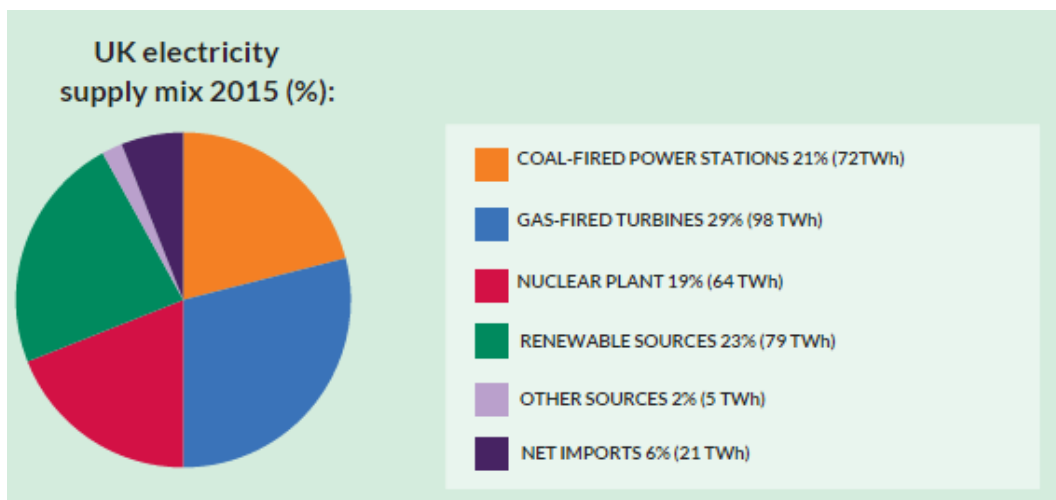


Figure 2. The UK's electricity supply mix in 2015 (Ofgem, E-Serve news and media, available at: <https://www.ofgem.gov.uk/environmental-programmes/e-serve/e-serve-news-and-media/scheme-facts-figures>)

36. **Key findings of the RSPB's analysis of low ecological risk 2050 Energy Scenarios:** As well as providing indications of the maximum deployment of a range of renewable technologies that can be achieved in the UK with low ecological risk, the RSPB's 2050 Energy Vision report also provides some key conclusions that are relevant to the NIA's consideration of energy infrastructure:

- The UK can meet its climate targets with low risk for sensitive wildlife and habitats using high levels of renewable energy sources such as wind, solar, wave and tidal – provided that measures are implemented to steer development to areas of lowest ecological sensitivity.

- Energy efficiency and reduction in overall energy demand will be key to meeting the UK's climate targets with low ecological risk; in each of the Low Ecological Risk (LER) scenarios, total final energy consumption is reduced by approximately a third by 2050 from 2010 levels.
- Electrification of heat and transport will also be key to meeting targets sustainably; the RSPB has sustainability concerns around the reliance on alternatives such as bioenergy and biofuels in these sectors, though we are supportive of bioenergy from genuine waste streams and residues, limited use of woody energy crops and the use of ecological arisings from nature conservation management.
- A more flexible energy system including distributed renewable generation, energy storage, smart grid networks and demand-side response will be needed – in line with the key findings of the Commission's 'Smart Power' report.
- Established renewable technologies such as onshore wind and solar will be key to rapid decarbonisation of the UK's energy system; our research suggests there is potential for a seven-fold increase in deployment of onshore wind in areas of low ecological sensitivity in the UK, and an almost thirty-fold increase in solar farm deployment (together generating up to a quarter of the UK's current final energy consumption).
- New innovative technologies such as floating wind turbines have the potential to unlock huge renewable energy capacity in UK waters with low ecological risk, depending on how understanding of ecological impacts develops. If this industry can be developed sustainably, the UK has the potential to generate up to 4 times its total current energy consumption from renewable energy sources with low ecological risk by 2050.
- There could be a role for CCS power stations in the UK's future energy mix, and CCS technology will be particularly important to reduce emissions from the industrial sector. If CCS power stations are not commercialised, significant investment in deep-water marine renewables such as floating offshore wind will be required – with a view to commercialisation well before 2030.
- Investment in grid network expansion, including greater interconnection between the UK and its neighbours, is necessary to optimise the use of renewable energy. Assessment of expansion options must take into account the wildlife impact of potential projects so that impacts can be avoided or substantially mitigated. Where possible, upgrading existing infrastructure should be favoured over building new connections.

**37. Security of supply and affordability:** Each of the Low Ecological Risk scenarios achieve the 2050 climate target (and the interim carbon budgets) at a similar cost to other decarbonisation pathways in the DECC 2050 Calculator<sup>8</sup>. Our approach therefore demonstrates good value for money. However, it is noted that in this (and other) areas, the Calculator has limitations and we acknowledge that more sophisticated analysis is required to understand these issues in depth. The scenarios also ensure that security of supply is maintained throughout the year, including under the 'stress test' that the Calculator applies (five cold, almost windless days). None of the scenarios require back-up generation from unabated gas plant, which the Calculator automatically includes if the scenario does not pass the stress test. Again, we recommend more sophisticated modelling in this area in order to more accurately model supply and demand, as this stress test is precautionary and does not model the benefits of a diverse range of renewables deployed across the UK. It is possible that, using the same levels of renewable energy in combination with demand reduction, interconnection and

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<sup>8</sup> The other pathways reduce emissions by at least 80% for an average cost increase of 9.3% above business-as-usual. By comparison, the LER scenarios are estimated to cost between 8.2% and 9.5% above business-as-usual.

energy storage, more sophisticated modelling tools would suggest that the role of CCS power stations could be lower than the levels in the LER scenarios – and/or lower levels of renewables generation would be required to meet peak demand in the scenario with no CCS.

38. It is important that the Commission produce energy scenarios that both allow for statutory climate targets to be met, so as to not encourage any ‘planning for failure’, and for scenarios to avoid creating bottlenecks for what may be the most sustainable low carbon pathways. This means including scenarios with high levels of renewable energy, taking into account key opportunities for innovation in areas such as energy storage and deep water marine renewables, in order that energy infrastructure is planned to support and facilitate this innovation and reduce the risk of ‘bottlenecks’. This would enable the scenarios to inform a positive vision for a sustainable, low carbon energy vision and avoid artificially limiting ambition.
39. **The RSPB’s energy vision:** The RSPB’s vision for the UK’s energy future is one that protects, and where possible enhances, biodiversity. The UK must meet its climate targets and decarbonise its energy supply affordably, securely and in harmony with nature. By avoiding conflicts with nature protection at an early stage, much needed low carbon energy infrastructure would be delivered more quickly and cost-effectively, with less potential conflict with NGOs and other stakeholders, and with improved public acceptability. We believe this to be the smart approach to delivering new energy infrastructure in the UK.
40. We regard the NIA as an important opportunity to identify future energy infrastructure needs, and to assess how this infrastructure can be delivered without harming wildlife. It is important that the NIA aligns with other existing planning processes, in particular marine spatial planning, grid planning, local plans in England, and devolved planning processes in Scotland, Wales and Northern Ireland. The RSPB’s 2050 Energy Vision identifies deep-water renewables such as floating offshore wind as a key opportunity for the UK to deliver low carbon energy in harmony with nature, and we encourage the Commission to consider this type of offshore infrastructure particularly closely. We are pleased that the NIA will build on the work of the ‘Smart Power’ report, focusing on balancing the electricity system through measures such as energy storage and demand-side response. We also recommend that the NIA considers what, if any, large-scale grid infrastructure would be needed in the scenarios that are developed (including greater interconnection between the UK and its neighbours), and ensure this aligns with existing grid planning procedures. Where possible, upgrading existing infrastructure should be favoured over building new connections.
41. The RSPB is a member of the Renewables Grid Initiative which provides best practice guidance to industry across Europe in the development of grid infrastructure in harmony with nature. We would be happy to provide further advice in this regard.

### **Summary of recommendations on energy:**

- All the scenarios developed for the Commission’s Vision Report must be compatible with the UK’s 2050 climate targets and interim carbon budgets. They must take account of likely revision of the long-term target in the context of the 1.5°C target agreed in the Paris Treaty. This will require looking at the energy system as a whole. All scenarios must also take into account obligations and commitments to protect the natural environment.
- The Commission should undertake spatial mapping for all other spatially specific energy infrastructure to be included in the Vision Report scenarios and subsequent reports prepared by the Commission. In the absence of spatial analysis by the Commission, the maps produced for the RSPB’s 2050 Energy Vision (see **Annex 1** of this consultation response) should be used to inform a national spatial plan for

energy infrastructure, taking account of ecological sensitivity, as this is the best currently available evidence.

- Evidence-based ecological constraints should be fed into the Commission's scenario modelling for the Vision Report. If the Commission does not carry out spatial mapping (described above) to identify ecologically sustainable deployment levels of energy technologies the maximum deployment figures identified in the RSPB's 2050 Energy Vision should be treated as 'caps' for deployment of these technologies (see Table 1).
- Scenarios generated for the Vision Report should support a positive vision of a sustainable, low carbon energy system and avoid creating bottlenecks for any sustainable low carbon pathways. This means including scenarios with high levels of renewable energy, taking into account opportunities for innovation in key areas such as energy storage and deep water marine renewables, in order that energy infrastructure is planned to facilitate sustainable renewable energy and technology innovation.

## **WATER**

42. The RSPB's water policy specialists are able to provide technical advice on a range of water resource issues, including water supply and drainage and flood management. The challenges in the water sector which the Commission could help address include:

- Ensuring water companies work together for the national good. For example there has been minimal trading of water between companies despite it being shown by Ofwat to be a viable cost effective option. To counter this isolationist approach a national study will report soon on long term resilience of water resources and options to increase resilience nationally. The Commission should draw on the conclusions of this study as relevant.
- Water companies involved in water resources planning have historically not factored in other water users and their needs. However, a number of more recent projects in the South East are taking a long term multi-sector view (for example, Water Resources East and Water Resources South East). This new approach opens up the opportunity to develop new strategic water infrastructure which is funded by and benefits a wider range of users.
- Water companies have historically used the past to predict the future. This has inherent risk with climate change bringing unprecedented events. This has been recognised and a resilience duty placed on companies and Ofwat which is driving companies to look hard at a broader range of future scenarios. This may prompt infrastructure investment to increase resilience to future events. The Commission could help secure funding for investment in resilience to future events i.e. extreme summer heat.
- In the past, companies have struggled to promote schemes that require long term investment over several investment cycles. The Commission should be alert to this issue and seek to identify funding streams for the long term.
- The Commission should consider all options for delivery of water infrastructure, including catchment-type solutions, which can increase resilience to pollution and flooding, alongside hard, engineered solutions. This can be supported by making use of TOTEX (total expenditure) to decide on investment priorities, rather than treating operating and capital expenditure separately.

43. Our comments on chapters 3 to 5 in the consultation document are dealt with in response to the specific consultation questions below.

## **RESPONSE TO QUESTIONS**

**Q1 The Government has given the National Infrastructure Commission objectives to:**

- **Foster long-term and sustainable economic growth across all regions of the UK**
- **Improve the UK's international competitiveness**
- **Improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

44. **Long term sustainable economic growth:** must include meeting our climate change targets (through the Climate Change Act, 2008) and the 2015 Paris agreement on climate change as well as meeting our biodiversity commitments. A global average temperature rise of 2°C is projected for 2040 (possibly earlier). Failure to take full account of the impacts and uncertainties of changing climate conditions across the UK will increase vulnerability and risk to most aspects of infrastructure, including transport, power generation and supply, flood prevention and water provision, farming and forestry production, natural assets, human health and wellbeing etc.
45. Climate change mitigation and adaption must be a key priority for the Commission and we would welcome further discussion to understand how the Commission intends to keep it central and work with the new Government department for Business, Energy and Industrial Strategy. This year will be a critical one, with the forthcoming Low Carbon Plan crucial for giving policy backbone to the ambitious carbon budgets the Government has set.
46. In working towards sustainable economic growth, the Commission should also take account of the wider aspects of sustainability – aspects of the environment and social issues. We recommend a definition of sustainable development based on the UK Sustainable Development Strategy (2005). As well as consideration of climate targets, the Commission should consider rates of resource consumption, including renewable resources such as water and the generation of pollution.
47. **Quality of Life:** We are pleased that quality of life is one of the objectives the Commission will work to. Major decisions to invest, or not to invest, in infrastructure projects can often place costs on future generations, whether that be through opportunities foregone, ongoing maintenance or legacy commitments or because decisions are delayed, rather than the need for future investment removed. The needs of future generations are often not adequately considered in decision making.
48. It is essential that 'quality of life' is defined. This should include scope to protect and restore biodiversity, provide adequate high quality green infrastructure alongside development, ensure new infrastructure supports individual health and wellbeing as well as considering the needs of future generations.
49. Our response to question 6 highlights a number of important cross-cutting issues which the Commission needs to consider as it works to these objectives, particularly climate change and biodiversity.



## OTHER ISSUES TO BE CONSIDERED

50. **Infrastructure resilience:** In considering the resilience of infrastructure to a changing environment (particularly in the context of Water Resources), we draw the Commission's attention to the definition Ofwat uses in its work on the resilience duty imposed by the 2014 Water Act: '*Resilience is the ability to cope with, and recover from, disruption, trends and variability in order to maintain services for people and protect the natural environment, now and in the future*'.
51. **Natural capital:** Consideration of natural capital alongside other economic infrastructure is necessary in order to achieve the Commission's objectives. The Natural Capital Committee (NCC) was established in 2012 as an independent advisory body to Government. Reporting to the Economic Affairs Committee, chaired by the Chancellor of the Exchequer, the Committee's role is to advise the Government on how to ensure England's 'natural wealth' is managed efficiently and sustainably, thereby unlocking opportunities for sustained prosperity and wellbeing and helping meet the Government's commitment to protect and improve the environment within a generation.
52. The NCC made the explicit recommendation that the National Infrastructure Plan should incorporate natural capital into each of the main infrastructure sectors, following the mitigation hierarchy for managing impacts (avoid, minimise, restore, offset). It also recommends that an investment programme for natural capital should also explicitly feature in the National Infrastructure Plan.
53. As noted by the NCC, drivers of change such as population growth, economic growth and advances in science and technology have affected natural capital via land-use change, resource overexploitation (e.g. in fisheries) and the introduction of invasive alien species. In other cases, the negative impact of changing natural capital is actually felt on other productive assets, for instance manufactured capital, such as physical infrastructure affected by risks of flooding. The long-term sustainable growth, international competitiveness, and quality of life are all underpinned by a healthy natural environment.

### **Q2 Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

54. **Whole System Approach:** We agree with the principles set out above and on page 14 of the consultation document. The RSPB welcomes the intention to assess the infrastructure system as a whole: identifying interdependencies and resilience implications as well as highlighting the opportunities and risks of interaction. It is essential that environmental resilience is included within the "whole system" approach set out in paragraph 31 of the document. This will require consideration of whether existing operations and ways of working are placing additional costs on future infrastructure development. The most cost effective solution may therefore require a change to existing behaviours and ways of working.
55. For example, The Scotland Flood Risk Management Act (2009) requires Lead Local Flood Authorities to consider the role that natural flood management approaches might have before

moving to hard engineered solutions. The Environment Agency in England also advocates a similar approach in its internal guidance on natural flood management although this is not yet captured in statute. This type of approach may provide additional benefits in reducing the public capital and maintenance cost of new infrastructure, providing additional benefits such as wildlife habitat, enhanced landscape value and accessible green space. Similarly Ofwat, the water industry's economic regulator in England and Wales, has increasingly recognised in recent Price Reviews, that customers' interests are often best served by investment in catchment management to improve water quality and supply rather than in 'end of pipe' treatment solutions.

56. The role of green infrastructure should be considered alongside more conventional approaches. Natural habitats play a role in reducing flood risk, improving and buffering water quality alongside providing recreational opportunities for people and space for wildlife. Safeguarding existing habitat and considering the role it might have in planning and designing infrastructure could reduce the need to invest in hard engineering and reduce the lifetime cost of those assets.
57. It is important that the NIA considers cumulative and indirect impacts on and from infrastructure. An ongoing issue with respect to maintenance and improvement of natural capital assets is the failure of current decision-making and planning tools to consider the direct as well as indirect and cumulative impacts from the building and use of man-made infrastructure.

## **OTHER POINTS**

58. **Challenging established thinking:** It is important that the Commission is fully independent of the Government and supported by a wide range of technical experts, including environmental experts. The Commission should be prepared to challenge existing approaches to infrastructure planning (and the assumptions underpinning these) and think creatively about potential novel and innovative solutions to infrastructure needs. For example, the RSPB's recent Energy 2050 Vision Report estimated the amount of renewable energy that could be achieved by 2050 with a low risk to biodiversity – three scenarios were considered, one of which recognised the significant potential offered by novel technologies such as floating offshore wind. These may represent an innovative solution to delivering the required levels of renewable energy infrastructure. More detail is included in the introduction to this submission (see Energy section).
59. **Duties for the Commission:** We believe that the Commission must be subject to an 'Environmental' or 'Sustainable Development' duty (if the latter is adopted this could provide a link to the UK Sustainable Development Goals), and that this should be included on the face of the Neighbourhood Planning and Infrastructure Bill. The National Infrastructure Commissioners should have expertise in keeping with the Commission's overall duties and remit, and this should include one Commissioner or more with environmental expertise. The Commission should also engage with non-departmental environmental public bodies such as the Committee on Climate Change, the Natural Capital Committee and Natural England, and this should be a statutory duty.

**Q3 Do you agree that the NIA should cover these sectors in the way in which they are each described?**

60. We note the focus on 'economic' infrastructure. As already stated, it is essential that the wider aspects of 'sustainable development' (including social and environmental pillars) are taken into account – this could include wider societal commitments and delivery against the global Aichi targets set under the Convention on Biological Diversity.
61. The list of sectors proposed will make it more difficult to consider the multiple benefits of land use (consistent with the Natural Capital Approach). For example, peatland restoration that provides greenhouse gas sequestration as well as recreation, water quality and wildlife habitats would not fit into any of the sectors as currently outlined. Inclusion of Green Infrastructure as an infrastructure sector would help capture the value of natural assets, including the climate adaptation value (e.g. trees and parks providing shade and countering the urban heat island effect).

**Energy**

62. See our detailed comments on energy at paragraphs 27-41 above, including how the Commission could make best use of the RSPB's recently published 2050 Energy Vision Report.
63. With regard to energy infrastructure more broadly, we urge the Commission to recognise the inherent incompatibility of committing to continued use of fossil fuels if we are to meet our climate change targets. Furthermore, we reiterate our earlier recommendation (in our previous response to HMT, March 2016) on fracking – The RSPB does not support inclusion of fracking as a nationally significant infrastructure proposal and strongly recommends that consideration of fracking proposals do not form part of the Commission's remit. The RSPB is very concerned that new oil and gas infrastructure, in particular that fracked from shale formations, could result in lock-in to high carbon infrastructure and jeopardise the UK's carbon budgets.
64. The Committee on Climate Change's report, recently published by the UK Government, concluded that fracking is not compatible with the UK's carbon budgets unless new regulations are introduced. The UK Government responded by saying it will be introducing no new regulations to deal with these emissions. In view of this, the RSPB does not currently support fracking. While there has been some progress against a set of ten wider regulatory recommendations that we have made, not all of these have been completely fulfilled either.

**Water and drainage**

65. We are pleased to see 'high level priorities' such as better demand management and shifting the balance between capital and maintenance spend in paragraph 37 of the consultation document. This will be particularly important for water supply where a reduction in customer demand and investment in reducing loss through leakage might result in significant savings on new infrastructure costs.
66. In paragraph 45, we think it is critical that the environment is considered alongside water use by different sectors. Current plans to reform abstraction regulation in England will go some way to setting environmental limits on abstraction from sensitive water bodies. Consideration should be given to the needs that these environments have now and under future environment change scenarios.

67. We support the requirement for the NIA (paragraph 45) to consider the water requirements of the environment alongside sectors such as agriculture, energy and food. It will be important to understand how much water needs to be left in the environment for it to function sustainably; this will then help define the amount of water that can be abstracted from the environment to meet the needs of agriculture, food production and energy generation.
68. Water companies have not always worked together for the national good. For example, there has been minimal trading between companies despite Ofwat showing that it is a cost effective solution to issues of uneven supply and demand. A study by Water UK is due to report soon on long-term availability of water resources and options to increase resilience. The Commission should draw on the results of this report as relevant.
69. Water companies have often struggled to promote approaches that require investment over several investment cycles and it is important that the Commission's approach takes a long term view of where the most effective investment should be made.
70. We have provided some further comments in the Water section earlier in this response.

### **Flood defences**

71. Paragraph 46 of the consultation document notes that the NIA will assess the level of flood risk across the UK and how it might change over the period to 2050. We do not consider this to be long enough given the required lifetime of the assets under consideration. In taking a 'value for money' approach to dealing with the issue of floods in the long term, it will be important to consider the wider social, economic and environmental benefits of alternative strategic options in addition to flood damage avoided – e.g. recreation, water quality/ resources, biodiversity, climate adaptation. Specifically, spending on flood defences needs to consider:
- The extent to which changes in land use, land cover and the upstream hydrological regime could reduce flood risk and potentially offset the need to invest in conventional defence.
  - The opportunities to promote projects that deliver against multiple public policy objectives including nature conservation, water quality and quantity and climate adaptation.
  - The impact of proposed solutions on individual quality of life (e.g. visual and physical access to urban green space, wetlands, coast).

### **The built environment**

72. We are pleased to note that whilst the Commission's remit will not look at housing supply directly it will consider the potential interactions between its infrastructure recommendations and housing supply. Given the Government's commitment to the increased supply of housing, timely delivery of infrastructure will be key. We strongly recommend that the Commission promotes the highest standards of energy efficiency (implementing zero carbon homes as part of discussions around new homes and buildings). This will reduce the need for any new energy infrastructure. The Commission should also highlight the role that integrated urban design such as Sustainable Drainage Systems (SuDs) could have, including on reducing pressure on urban wastewater treatment (for example, through upgrading the status of SuDs to critical infrastructure). This would tie in with the Government's commitment (through the Housing and Planning Act 2016) to undertake a review of SuDs.
73. Understanding the different mechanisms for housing delivery and how these all fit together will be essential – e.g. through local and neighbourhood plans, strategic spatial plans

prepared by combined authorities, release of land by public sector bodies, growth points and large-scale housing such as Garden Cities. As noted, we recommend that the Commission prepares a 'light-touch', non-statutory UK-wide spatial plan for future infrastructure priorities – this could be used to view housing and infrastructure priorities in a national context (maps could be used to overlay major housing proposals alongside infrastructure to ensure the right infrastructure is being targeted to areas of greatest need). The spatial plan should incorporate environmental constraints and opportunities such as important sites for wildlife (Natura 2000 sites, nationally designated sites etc) and identify potential areas where new networks of green infrastructure could be delivered – of importance to the quality of life of existing and future residents.

**Q4 Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

74. **Energy:** We welcome the Commission's awareness of the importance of energy efficiency and reduction in overall energy demand as well as a shift to electrification of heat and transport – **reducing energy demand should be central to the Commission's analysis of future energy infrastructure needs – this should be a UK-wide priority and hence will require the Commission to work closely with the devolved administrations.** Addressing such issues is key to meeting carbon emission reduction targets sustainably. A more efficient energy system would also have significant social and economic co-benefits such as reduced fuel poverty. When considering the sustainability of the future energy system and what infrastructure is needed, the Commission must ensure it considers biodiversity impact as well as carbon emission reductions.
75. **Natural Capital Approach:** As per our responses to earlier questions (paragraphs 51-53), it is essential that the multiple benefits of land uses and natural assets are fully accounted for before committing to new forms of infrastructure.

**Q5 The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

76. **Energy:** there are clear interdependencies with transport, waste and the built environment. Electrification of heat and transport will be key to meeting climate change targets sustainably – the RSPB has sustainability concerns around the reliance on alternatives such as bioenergy and biofuels in these sectors, although we are supportive of bioenergy from genuine waste streams and residues, provided any new infrastructure avoids protected wildlife sites and the 'waste' output is selected in accordance with the waste hierarchy. New large scale energy from waste facilities should not be viewed as a priority, primarily as they undermine recycling and circular economy approaches by dis-incentivising waste minimisation.
77. To achieve a low carbon future in harmony with nature, in line with our 2050 Energy Vision, we have identified that there needs to be a significant shift to public transport, and by 2050 all domestic car travel makes use of low emission vehicles such as electric cars. Our scenarios show that, alongside efficiency improvements, there needs to be a major shift towards electrified passenger trains, rail freight and electric buses. This will lead to a significant increase in demand for renewable energy infrastructure.
78. In terms of built development, reducing the energy demand from new buildings (including housing) would help reduce the requirement for new energy infrastructure. As such we reiterate the need to implement a zero carbon standard for all new homes and buildings.

79. **Water / Flooding:** interdependencies across sectors are critical both for flood management and water supply. Both are closely linked with strategies for energy provision, food supply/agriculture as recognised by Sir John Beddington and others in describing the water: energy: food nexus.
80. Water companies have often not factored in the needs of other water users in their own resource planning. Some recent projects in the South East are now taking a longer term multi-sector approach including Water Resources East and Water Resources South East. It is hoped that this approach will open up opportunities to develop new strategic water infrastructure that is funded by and benefits a wider range of users.

**Q6 Do you agree that the NIA should focus on these cross-cutting issues?**

81. **Geography and Local Growth:** We are pleased that the Commission will look at the role of economic devolution in infrastructure development and consider how its recommendations affect the entire country and local areas. Eight of the current devolution agreements (and a further 10 devolution proposals) are re-introducing<sup>9</sup> mechanisms to improve strategic planning, including the development of strategic plans and spatial frameworks. In considering infrastructure delivery, the Commission must take account of emerging devolved structures and their strategic plans, as they cover similar sectors including energy generation and efficiency, flood risk and water management. The outputs from the Commission: the Vision and Priorities Report and the NIA should help provide a strategic context for devolved structures to undertake effective strategic spatial planning.
82. **Sustainability:** As discussed under question 2, the Commission should be bound by an ‘Environmental’ or ‘Sustainable Development’ duty – ensuring it is genuinely committed to sustainability in its broadest sense and covers environmental protection and enhancement. We recommend a definition of sustainable development based on the UK Sustainable Development Strategy (2005) and which refers to the UK’s commitments to the Sustainable Development Goals.
83. Under the sustainability theme, attention should be given to the wider components of sustainability such as access to high quality green infrastructure, quality of life, health and wellbeing and the ongoing provision of ecosystem services and natural capital benefits.
84. Particular attention should be given to climate change and energy as cross-cutting issues:
85. **Climate Change:** our climate change commitments under the Climate Change Act and the 2015 Paris Treaty; climate change impacts, vulnerabilities and adaptation requirements.
86. Many companies across all sectors, particularly the water sector, have used their past experience to predict future planning, resilience and demand for services. This has an inherent risk, with climate change bringing unprecedented events. This risk has been recognised in the placing of a resilience duty on companies and Ofwat is encouraging companies to plan for a wider range of future scenarios. The UK Climate Change Risk Assessment 2017 Evidence Report identifies flooding and coastal change risks as the highest priority for action now, whilst shortages of water, risks to wildlife and natural ecosystems are also directly relevant to the work of the Commission and are listed amongst the greatest direct threats due to climate change in the UK.

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<sup>9</sup> Regional Spatial Strategies, introduced through the Planning and Compulsory Purchase Act (2004), were revoked in 2010.

87. **Biodiversity:** The Government committed in its manifesto and subsequent statements to ‘develop a 25 year plan to restore the UK’s biodiversity’.
88. In 2013, 25 of the UK’s nature conservation and research organisations came together to produce the *State of Nature report*, setting out the state of our wildlife<sup>10</sup>. The key finding of this report was that 60% of the 3,148 species that were assessed have declined in the last 50 years and 31% have declined strongly. We are due to publish our follow up *State of Nature Report* later in 2016 which will be more wide-ranging than the earlier study. We believe it is essential that biodiversity be considered as a cross-cutting issue for the Commission in order for the Government to achieve its ambitions in respect of biodiversity. As such the Commission should work to contribute to our biodiversity targets (such as those set out in the *Biodiversity 2020: A strategy for England’s wildlife and ecosystem services* and devolved country equivalents).
89. **Governance and decision making:** We are pleased that the commission will consider the planning system and how this interacts with decision making to facilitate delivery. We make the following recommendations in respect of planning (in line with our consultation response to HMT in March 2016):
- The public should have an opportunity to respond to ‘Endorsed Recommendations’ and the revision of or preparation of new National Policy Statements.
  - The Commission should fully engage the public with decisions on infrastructure proposals to be determined at a local level and public engagement should begin as early as possible.
  - The Commission, in preparation of the Vision Report, NIAs and specific infrastructure studies, should clearly set out what planning regime (i.e. local or national) is anticipated and how the public will be engaged.
90. **Evaluation and appraisal methodology:** The role of high level appraisal mechanisms such as SEA and HRA in the evaluation and appraisal of infrastructure priorities and needs will be key. However, for high level appraisal to be effective it must start as early as possible in the process (i.e. form an integral part of the NIA and visioning document) and be used to appraise spatially-explicit proposals. In line with our recommendation to HMT (March 2016), we reiterate the need for SEA/HRA (and early engagement of the public) to take place before Endorsed Recommendations are published. SEA (and HRA as necessary) should be used as an ongoing tool to inform and support the NIAs and priority/specific infrastructure studies.
91. Lifecycle emissions assessments must be used to inform decisions around large infrastructure projects.
92. The outputs from the Commission (e.g. recommendations on nationally significant or major infrastructure projects) should take full account of environmental costs and benefits in line with the Green Book Guidance regarding changes in Natural Capital.

**Q7 Are there any other cross-cutting issues that you think are particularly important?**

93. **Communities:** The communities impacted by infrastructure decisions must form part of the suite of cross-cutting issues under consideration.

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<sup>10</sup> [http://www.rspb.org.uk/Images/stateofnature\\_tcm9-345839.pdf](http://www.rspb.org.uk/Images/stateofnature_tcm9-345839.pdf)

**Q8 Do you agree with this methodological approach to determine the needs and priorities?**

94. **Understanding the infrastructure baseline:** In appraising the infrastructure baseline (and data on the pipeline of projects) it will be important to look at the sustainability credentials of existing and planned infrastructure – i.e. does it deliver quality in respect of the environment, is it in the location in an area of lowest ecological risk etc?
95. **Studying the key drivers of infrastructure / Modelling and analysis:** We see merit in the approach that the Commission proposes to determine infrastructure needs and priorities, especially consideration of interdependencies and feedback loops. However, we consider that the Commission should go further with its modelling work to ensure it sufficiently takes into account the ecological impact of infrastructure (please see Energy section for further detail on how this can be done for energy infrastructure). The assessment of how identified infrastructure needs can be met most cost-effectively and in line with the Commission’s governing objectives must also include the environmental and social benefits of each option. Impacts on consumers should be considered in a broad sense (i.e. should include the cost of biodiversity loss etc if certain options are not progressed) to avoid artificially limiting ambition in the UK to improve the quality of life for all citizens.
96. **Sector and geographical evidence reviews:** We are pleased that the Commission will speak to industry and central and local government. This should include discussions with combined authorities involved with devolution deals, as necessary. Sub-national analysis will be essential to refine the recommendations and outputs of the NIA. Combined authorities will have a good understanding of the opportunities, challenges and barriers around energy deployment and efficiency or flood risk management and could assist with the sub-national analysis. For example, in order to capitalise on its renewable energy potential, Cornwall has highlighted that electricity grid constraints and the lack of local control over how energy is produced and distributed as issues that will need to be addressed.
97. **Prioritisation:** In prioritising infrastructure investments, decisions should balance value for money and the delivery of broader benefits that support other Government objectives, including those not explicitly within the remit of the Commission and the NIA. Natural capital investments often bring about multiple societal benefits, that when considered show excellent value for money.
98. The Natural Capital Committee states that “*carefully planned investments in natural capital, targeted at the best locations, will deliver significant value for money and generate large economic returns. These are competitive with the returns generated by more traditional infrastructure investments*” (State of Natural Capital Report, 2015). The Natural Capital Committee provides the following examples of investments in natural capital infrastructure that delivers a wide suite of societal benefits. The NIA methodology should ensure these types of infrastructure investments can be fairly evaluated against more traditional man-made infrastructure investments:
- Peatland restoration on around 140,000 hectares in upland areas. This would deliver net benefits of £570 million over 40 years in carbon values alone. Further work is needed to determine water quality, recreation and wildlife values. Including these will significantly increase the net benefits of such investments;
  - Wetland creation of around 100,000 hectares, particularly in areas of suitable hydrology, upstream of major towns and cities, and avoiding areas of high grade agricultural land. Benefits cost ratios of 3:1 would be typical, with to 9:1 possible in some cases;



- Intertidal habitat creation to meet objectives set out in Shoreline Management Plans. These areas provide a wide range of benefits including coastal flood protection (and can reduce costs of maintaining concrete defences), carbon storage, areas for wildlife and the provision of nursery grounds for important commercial fish stocks.

#### **OTHER POINTS:**

99. A potential way to consider the sustainability credentials of critical infrastructure would be to set sustainability criteria, which could be used to appraise infrastructure (this could be part of the formal assessment of infrastructure through SEA). Sustainability 'topics' could be linked to the overarching UK Sustainable Development Goals.
100. The Way Ahead project in Scotland provides a useful model for identifying low carbon infrastructure at a high level<sup>11</sup>. This work was commissioned by The Low Carbon Infrastructure Taskforce bringing together representatives from the public and private sectors, construction and finance industries, trade unions and academia and NGOs. The use of a cross-representative task force(s), including independent environmental experts, to review different infrastructure needs and priorities will be essential to ensure the NIA represents a balanced view. As stated earlier, we recommend that the Commission is subject to a duty to engage with Non-Departmental Public Bodies such as the Natural Capital Committee and Climate Change Committee.
101. We are pleased that all results and conclusions will be tested in public and with key stakeholders. The public and those communities particularly impacted by infrastructure decisions must be involved as early as possible.

#### **Q9 Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

##### **Energy**

102. The RSPB can only provide comment on the DECC 2050 Pathways Calculator which was used during development of the RSPB 2050 Energy Vision Report. The scenarios produced for the RSPB 2050 Energy Vision report were created using the DECC 2050 Pathways Calculator – an online tool which enables users to generate energy scenarios for 2050 and test whether they meet the 80% emissions reduction target, considering both energy supply and demand options. We found several limitations to the model such as its ability to model the security of supply of different scenarios; we also noted that in certain instances the model artificially limits ambition by making pessimistic assumptions about technology development (particularly for solar). We recommend that the Commission uses a modelling tool that makes optimistic assumptions about renewable energy development, therefore creating a positive vision for the future and avoiding artificially limiting ambition.

##### **Water**

103. The water industry recognises the need for its business to be resilient in the face of future changes in water availability and spatial and temporal distribution alongside predicted increases in population growth. Examples include the Water Resources East and Water Resources South East work programmes.

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<sup>11</sup> <https://scotlands-way-ahead.s3.amazonaws.com/sites/55816da1126f04bc0100002/assets/560e644b126f0480e300003f/ForgingScotlandsWayAhead.pdf>

104. The NIA should take a TOTEX (total expenditure) approach to producing the NIA, ensuring that the lifetime cost of operating an asset is considered as well as the capital cost of building it. This should help to avoid a bias towards big capital schemes and hard engineering solutions when softer approaches, including catchment management solutions might offer better value in the long term.

### **Natural Capital Approaches**

105. The NIA should consider the results of the Natural Capital Committee's risk register analysis. The results will provide important information on the state of England's natural capital and that which is at risk. The risk based approach could be applied more generally to other infrastructure providing a useful evidence base upon which to base prioritisation decisions.

### **Q10 Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

106. The proposed list of infrastructure drivers seems sensible.

107. **Technology:** We are pleased with the reference to new technologies. As already mentioned in our recommendations in respect of Energy, the modelling tools adopted by the Commission for the Vision Report should make optimistic assumptions about technology development, therefore creating a positive vision for the future.

108. **Climate change and environment:** We are pleased that 'Climate Change' and the 'Environment' form two of the key drivers of infrastructure. It will be important that the 'environment' is defined and that the wider aspects of sustainability are considered (e.g. quality of life, health and wellbeing etc). The concept of the 'environment' must include the protection and enhancement of biodiversity.

109. The 'Climate change and environment' box should include a specific requirement to safeguard as well as to enhance the environment. There should be plenty of opportunities to enhance habitats through infrastructure projects but there are irreplaceable habitats that should be protected in situ and whose loss cannot be replaced in the short term, such as ancient woodland and species-rich grassland.

110. In respect of climate change:

- Responding / adapting to climate change is not just about building resilience but also to be pro-active in doing things differently to accommodate change (rather than just trying to resist it).
- As well as being 'resilient' to extreme events, climate change also requires ongoing changes to infrastructure (both incremental and step-change responses) to adapt to changing climatic conditions across the UK.

111. The top three priorities requiring further action (identified in the Committee on Climate Change's UK Climate Change Risk Assessment 2017 report (published 12<sup>th</sup> July) highlights are:

- Flooding and coastal risks to communities, businesses and infrastructure.
- Risks to health, well-being and productivity from high temperatures.

- Risks from shortages of water supply shortages to public / businesses.

**Q11 The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

112. The points set out in each of the earlier questions remain relevant here. It is also worth nothing that future needs will not only be met by large-scale infrastructure. Opportunities for community financed and community owned infrastructure should be considered.

**Q12 In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

113. The need to safeguard biodiversity is touched upon in the Consultation document, recognising that infrastructure must be delivered in a manner that is '*compatible with the UK's environmental commitments*' – however the potential impact from new infrastructure on biodiversity must be viewed in the context of existing challenges such as climate change, land use changes etc.

**Q13 How best do you believe the commission can engage with different parts of society to help build its evidence base and test its conclusions?**

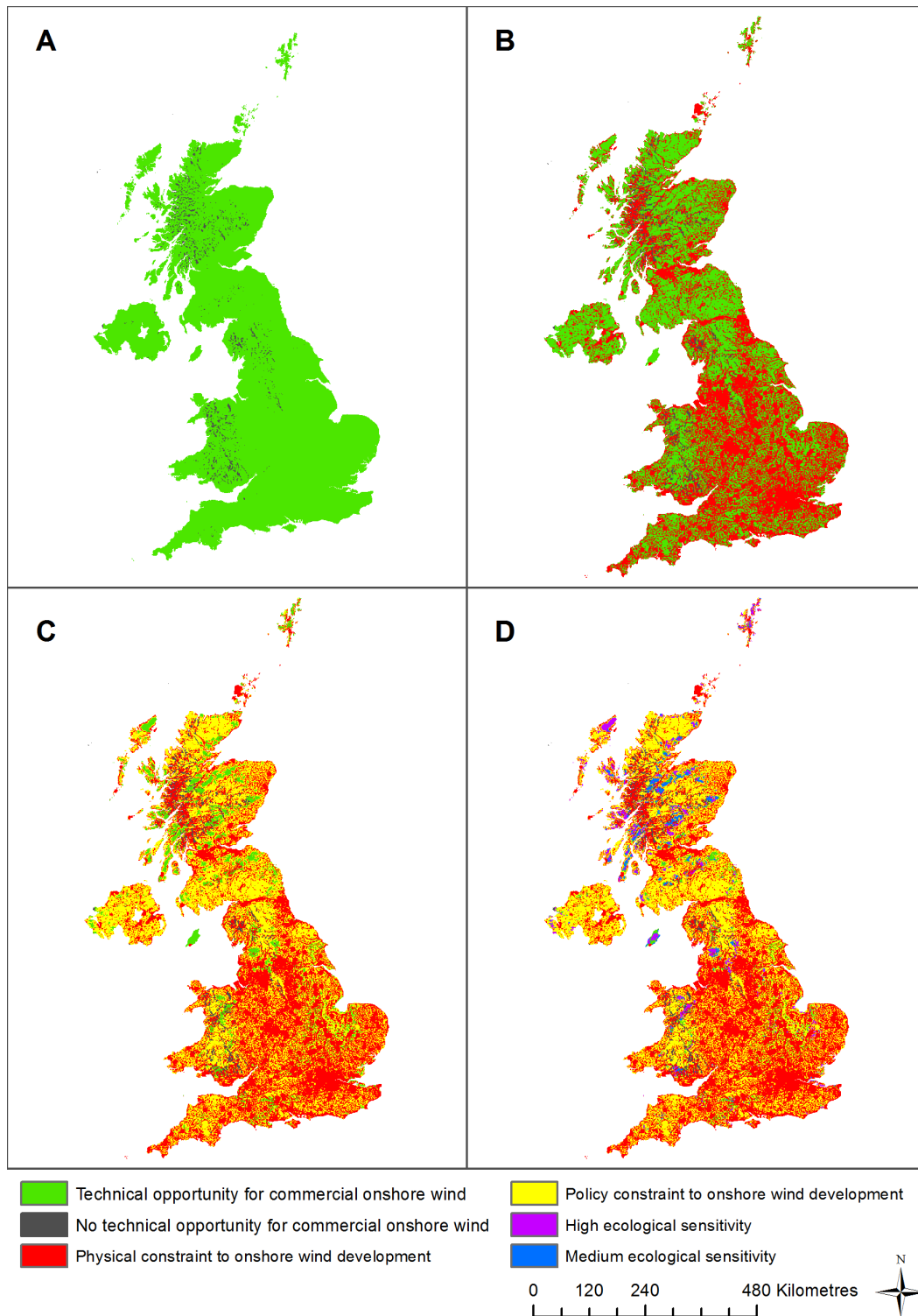
114. We are pleased that the Commission's work will be open, transparent and consultative and that a range of engagement mechanisms are proposed. In order to fully engage civil society and the communities impacted by infrastructure decisions we strongly recommend that the Commission considers novel forms of engagement and involves the public prior to coming to initial conclusions and in addition to formal consultation events. This might include a Working Group with the public represented.

115. Scotland's Way Ahead Project had a strong public engagement component asking the public to vote on their favourite infrastructure projects. This sort of online tool could provide an example for wider public engagement.

116. As already stated we have a number of technical experts at the RSPB who can provide further advice and support on a number of the sectors highlighted by the Commission. We would be pleased to assist the Commission informally or as part of Expert Roundtables or Panels of Experts.

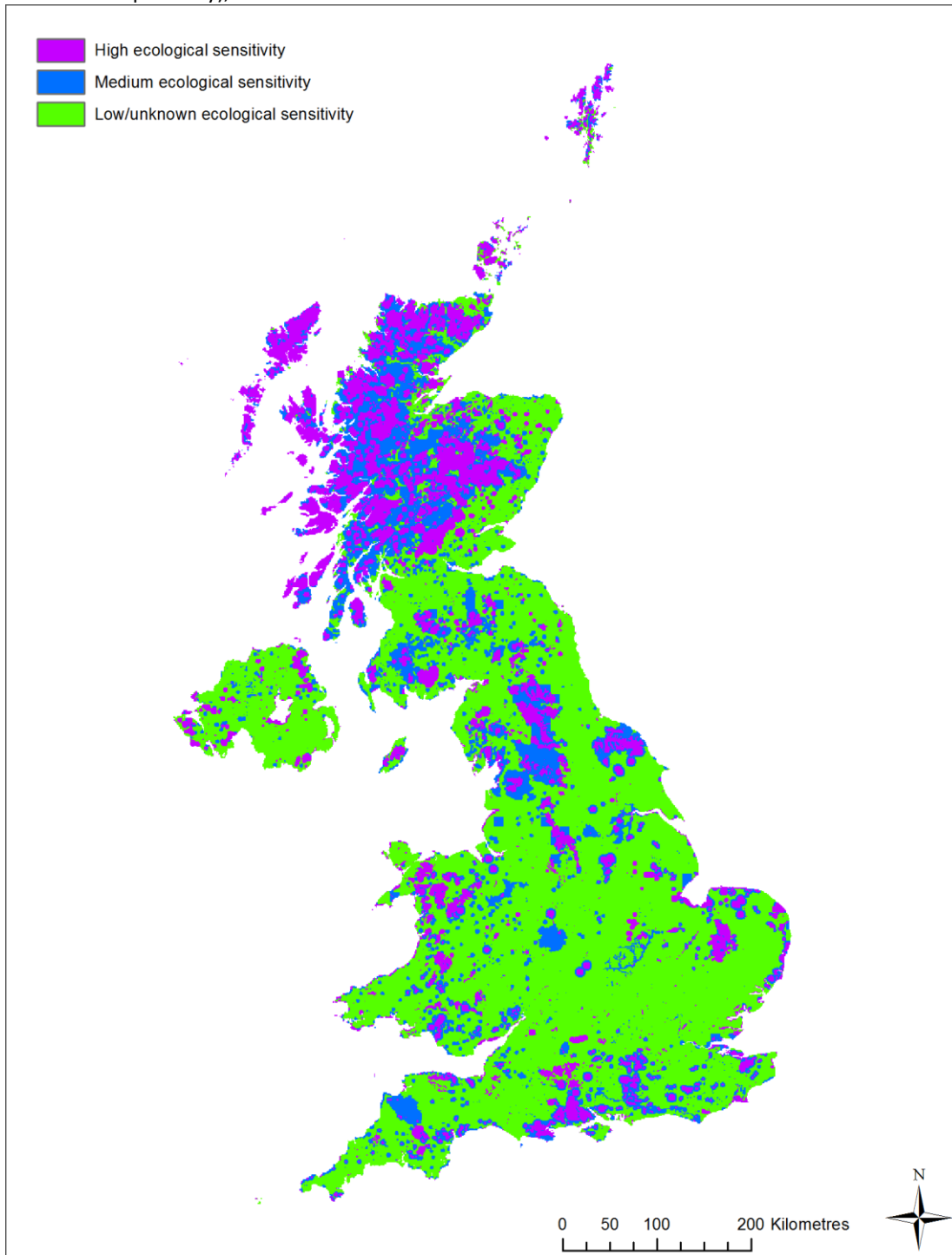
## Annex 1. Maps from the RSPB's 2050 Energy Vision report

(NB. High resolution maps and GIS shape files can be provided on request)

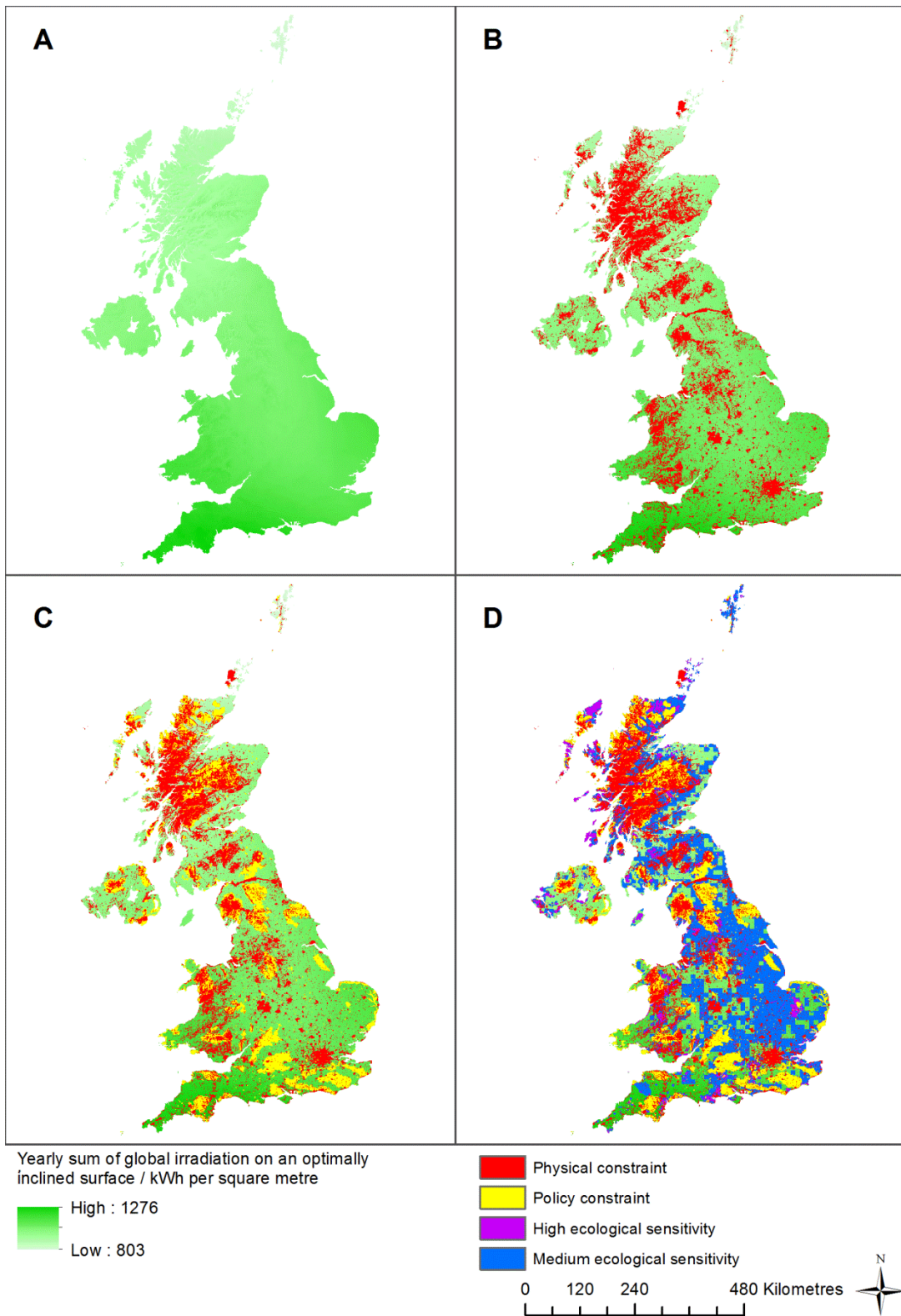


**Figure A1. Opportunity and constraint mapping for onshore wind energy.** A) Opportunity map for commercial-scale onshore wind development (green areas), B) opportunity map for onshore wind development overlaid with physical constraints (red areas) to exploiting the resource, C) opportunity map for onshore wind development overlaid with physical and policy constraints (yellow areas) to exploiting the

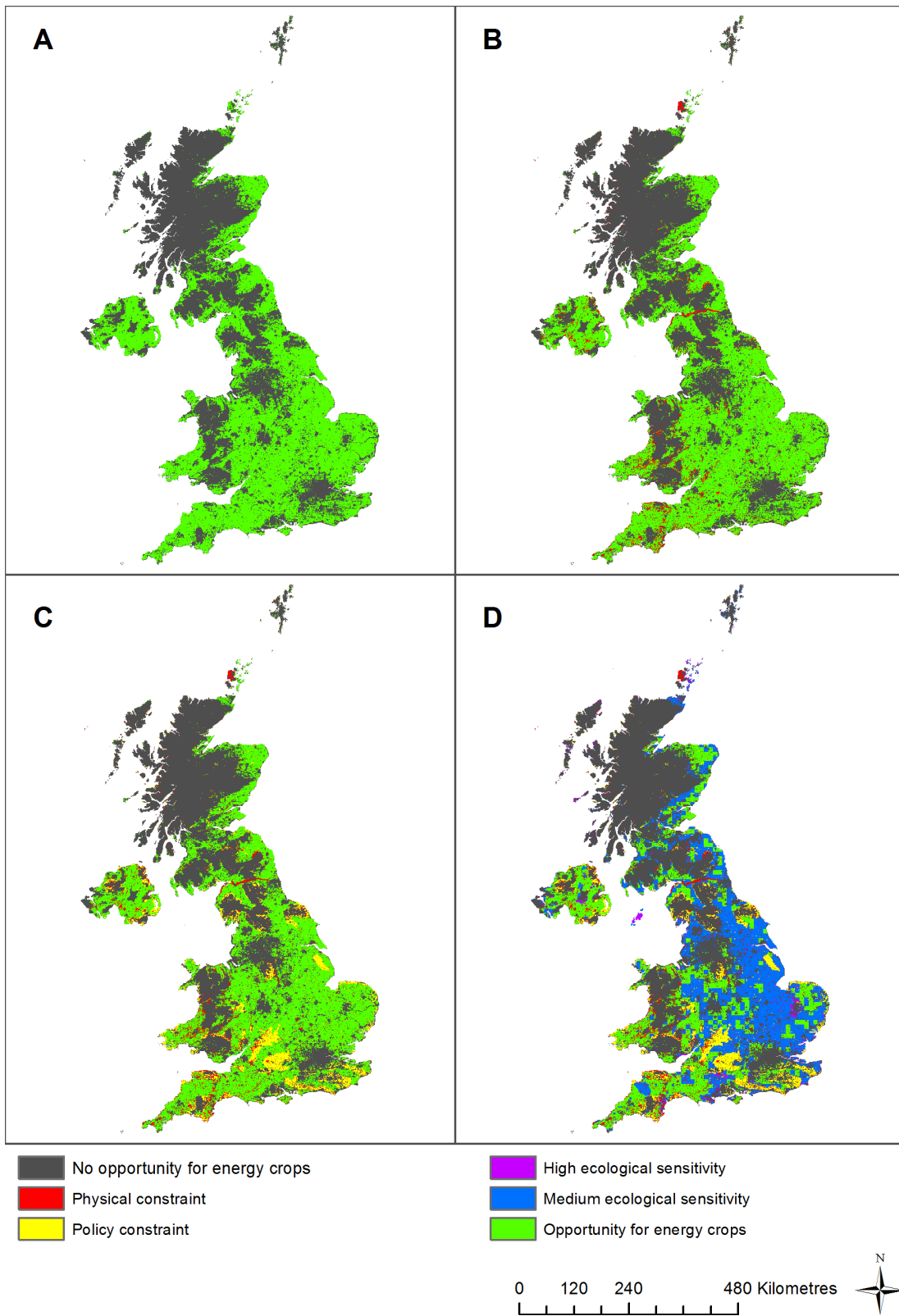
resource, D) opportunity map for onshore wind development overlaid with physical and policy constraints to exploiting the resource, remaining areas of opportunity with high or medium ecological sensitivity (purple and blue areas respectively), to onshore wind are also marked.



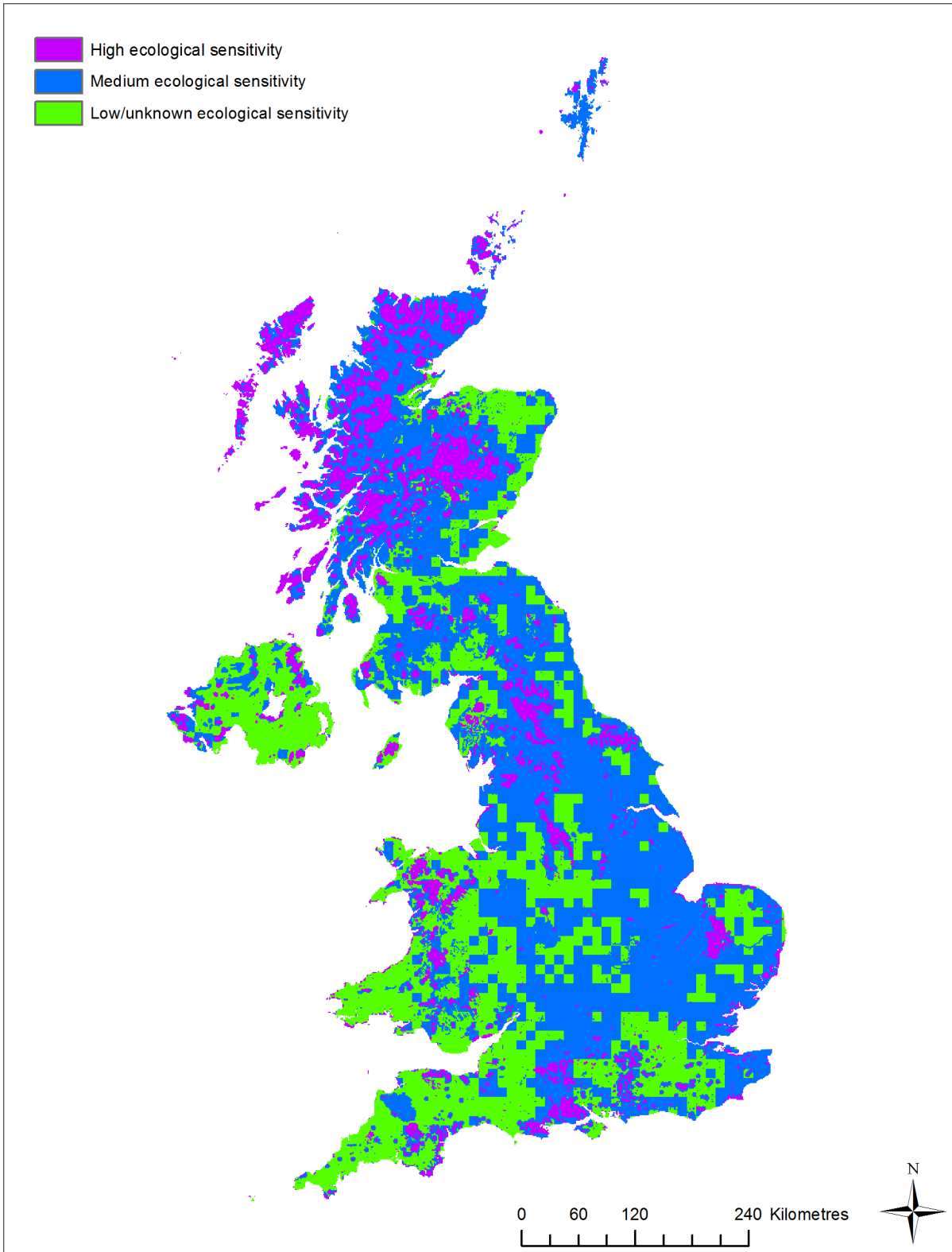
**Figure A2. Ecological sensitivity map for commercial scale onshore wind development.** Showing areas of high sensitivity (purple), medium sensitivity (blue) and low/unknown sensitivity (green).



**Figure A3. Opportunity and constraint mapping for field-scale solar energy.** A) Opportunity map for the deployment of solar farms in the UK (green areas); B) opportunity map for solar farms overlaid with physical constraints (red areas) to exploiting the resource; C) opportunity map for solar farms overlaid with physical and policy constraints (yellow areas) to exploiting the resource; D) opportunity map solar farms overlaid with physical and policy constraints to exploiting the resource, remaining areas of opportunity with high or medium ecological sensitivity (purple and blue areas respectively) are also marked.

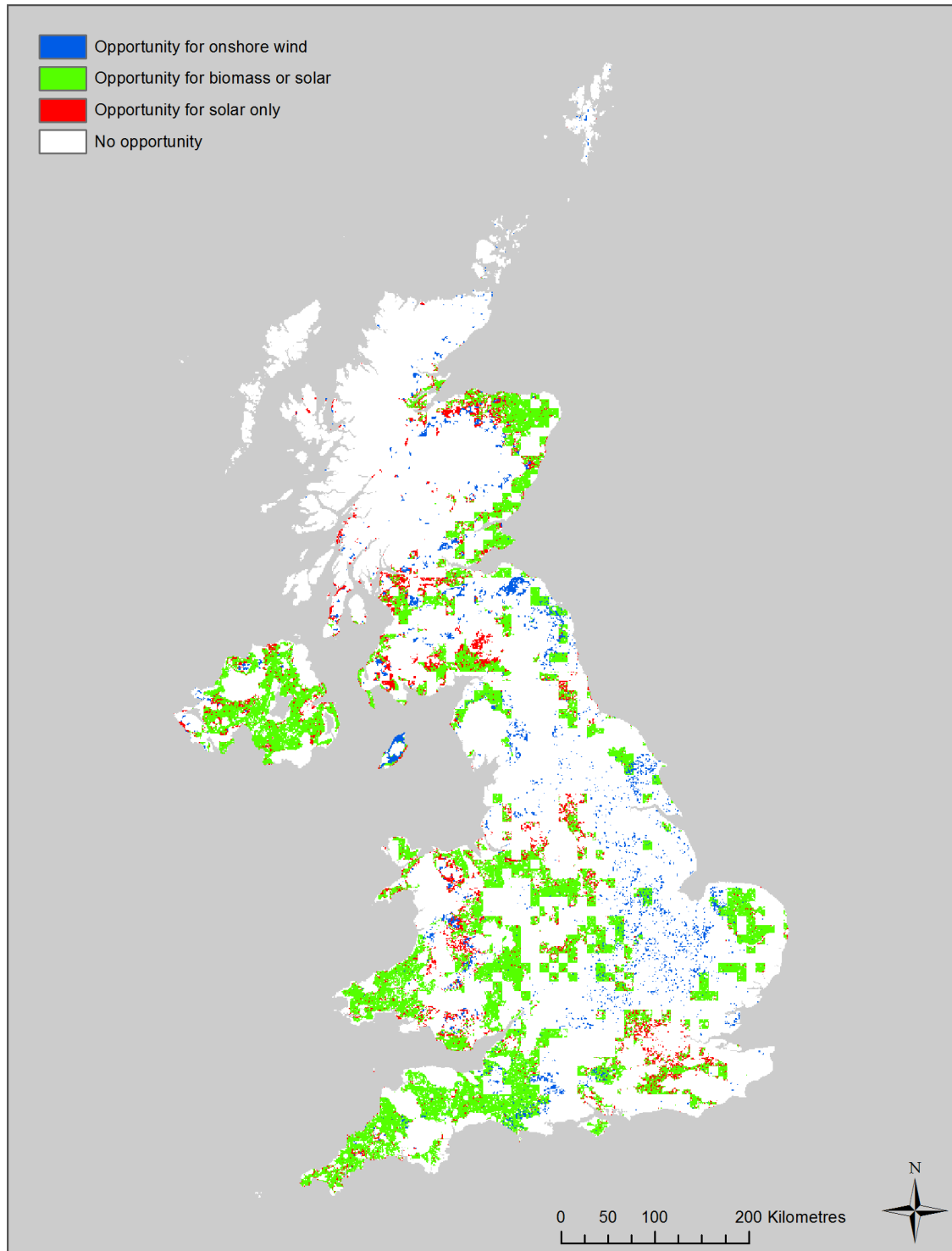


**Figure A4. Opportunity and constraint mapping for bioenergy crops.** A) Opportunity map for the large-scale cultivation of energy crops (green areas); B) opportunity map for energy crops overlaid with physical constraints (red areas) to exploiting the resource; C) opportunity map for energy crops overlaid with physical and policy constraints (yellow areas) to exploiting the resource; D) opportunity map for energy crops overlaid with physical and policy constraints to exploiting the resource, remaining areas of opportunity with high or medium ecological sensitivity (purple and blue areas respectively) are also marked.

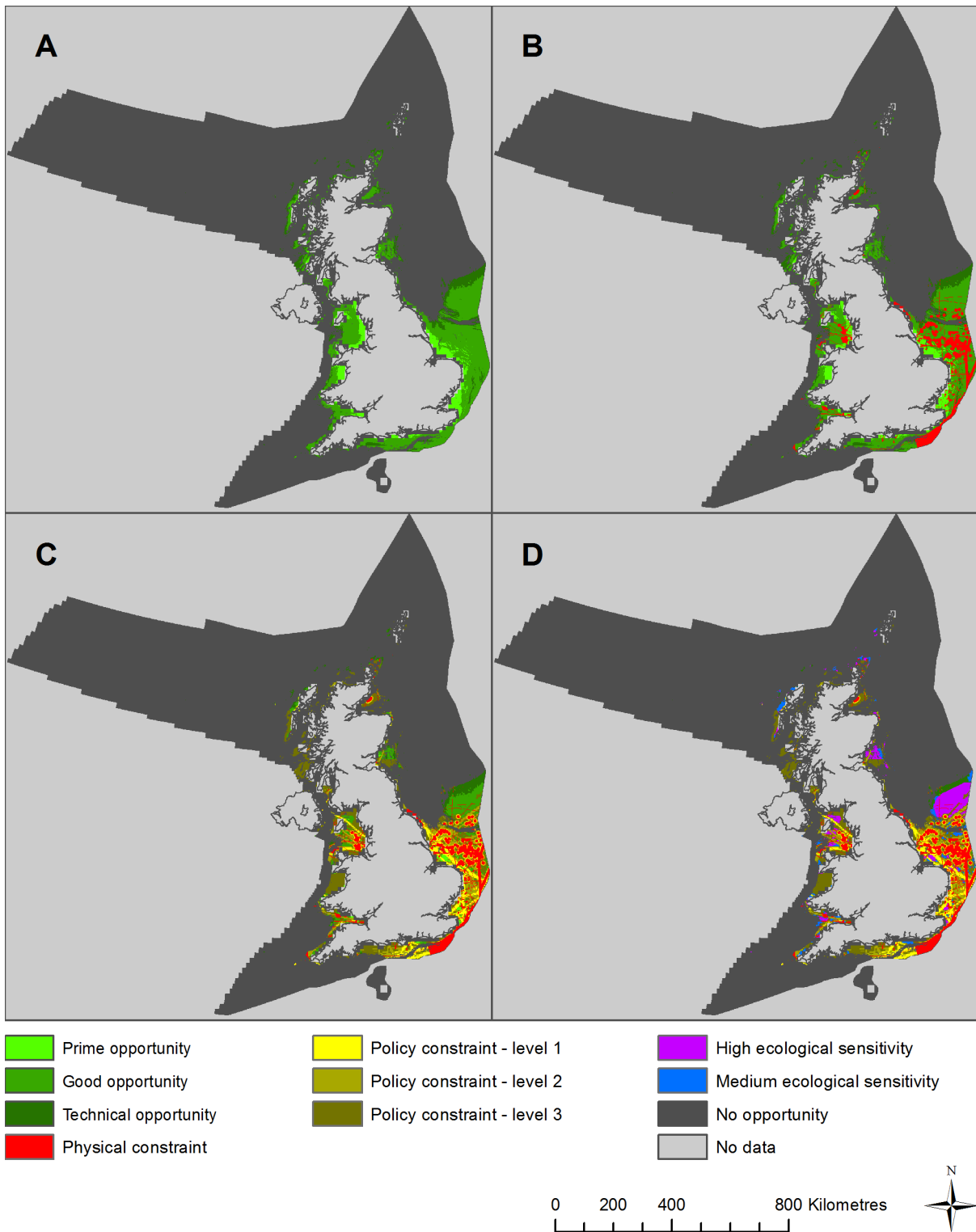


**Figure A5. Ecological sensitivity map for energy crops and the deployment of field-scale solar energy.** Showing areas of high sensitivity (purple), medium sensitivity (blue) and low/unknown sensitivity (green).

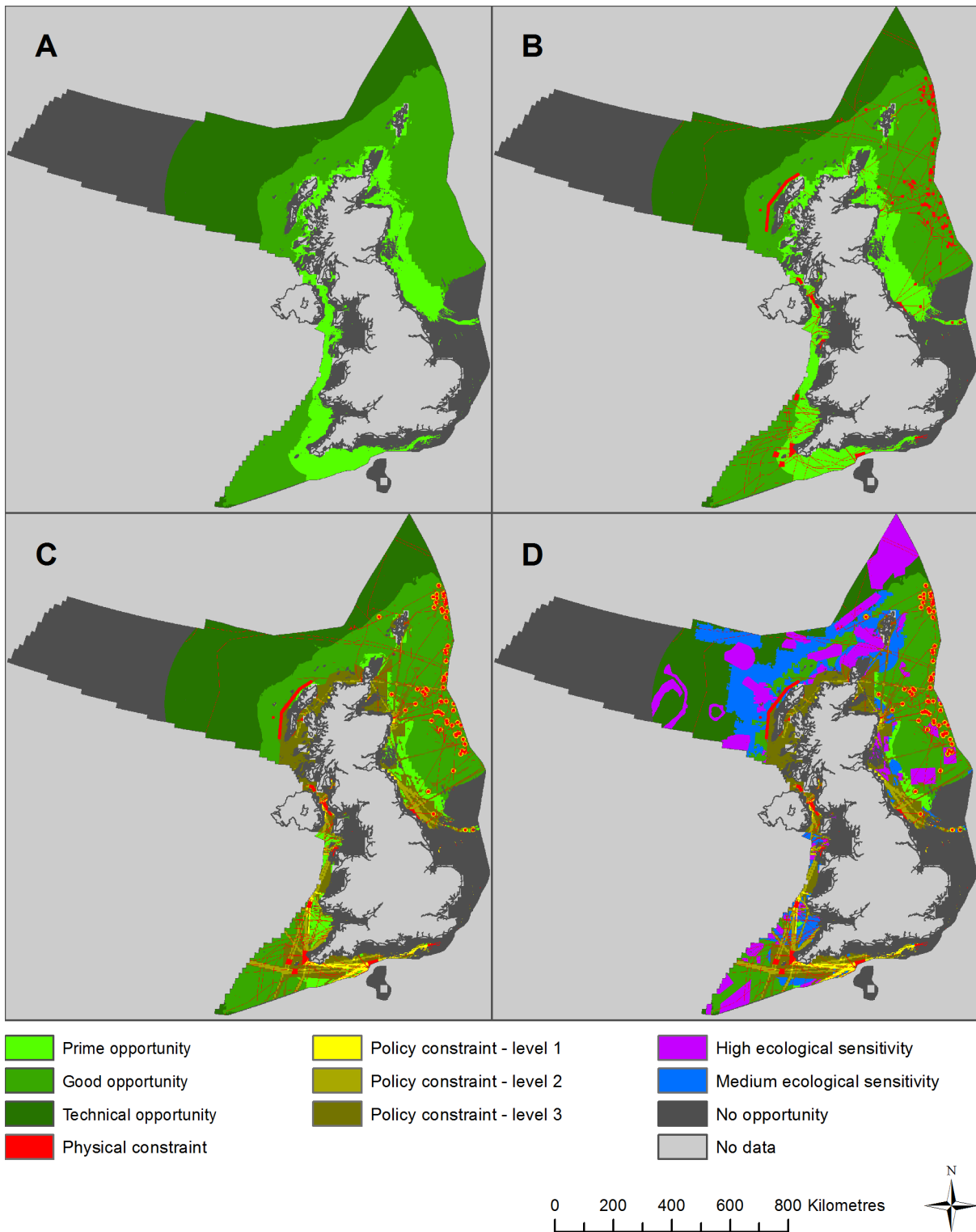




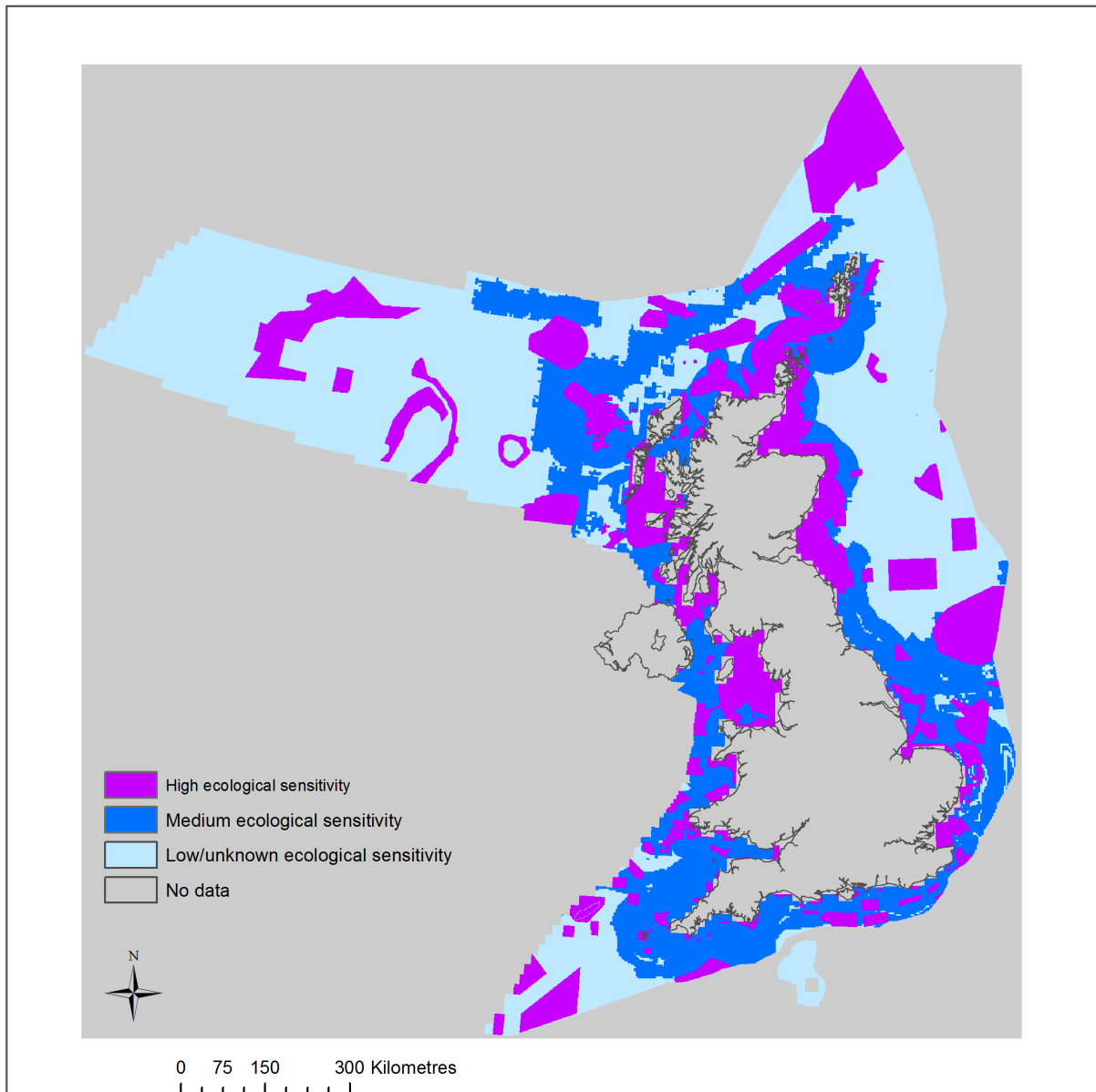
**Figure A6.** Combined map of areas of remaining opportunity for onshore technologies after all areas of constraints and ecological sensitivity have been removed. Areas available for onshore wind energy areas shown in blue, bioenergy or solar in green and solar only in red.



**Figure A7. Opportunity and constraint mapping for fixed-base offshore wind energy.** A) Opportunity map for fixed-base offshore wind developments (light green is prime opportunity, midgreen is good opportunity and dark green is technical opportunity); B) opportunity map for fixedbase offshore wind developments overlaid with physical constraints (red) to exploiting the resource; C) opportunity map for fixed-base offshore wind developments overlaid with physical and policy constraints (from level 1, least constrained, in light yellow, to level 3, most constrained, in brown) to exploiting the resource; D) opportunity map for fixed-base offshore wind developments with physical and policy constraints to exploiting the resource applied, remaining areas of opportunity are overlaid with areas of high (purple) and medium (blue) ecological sensitivity to offshore wind.



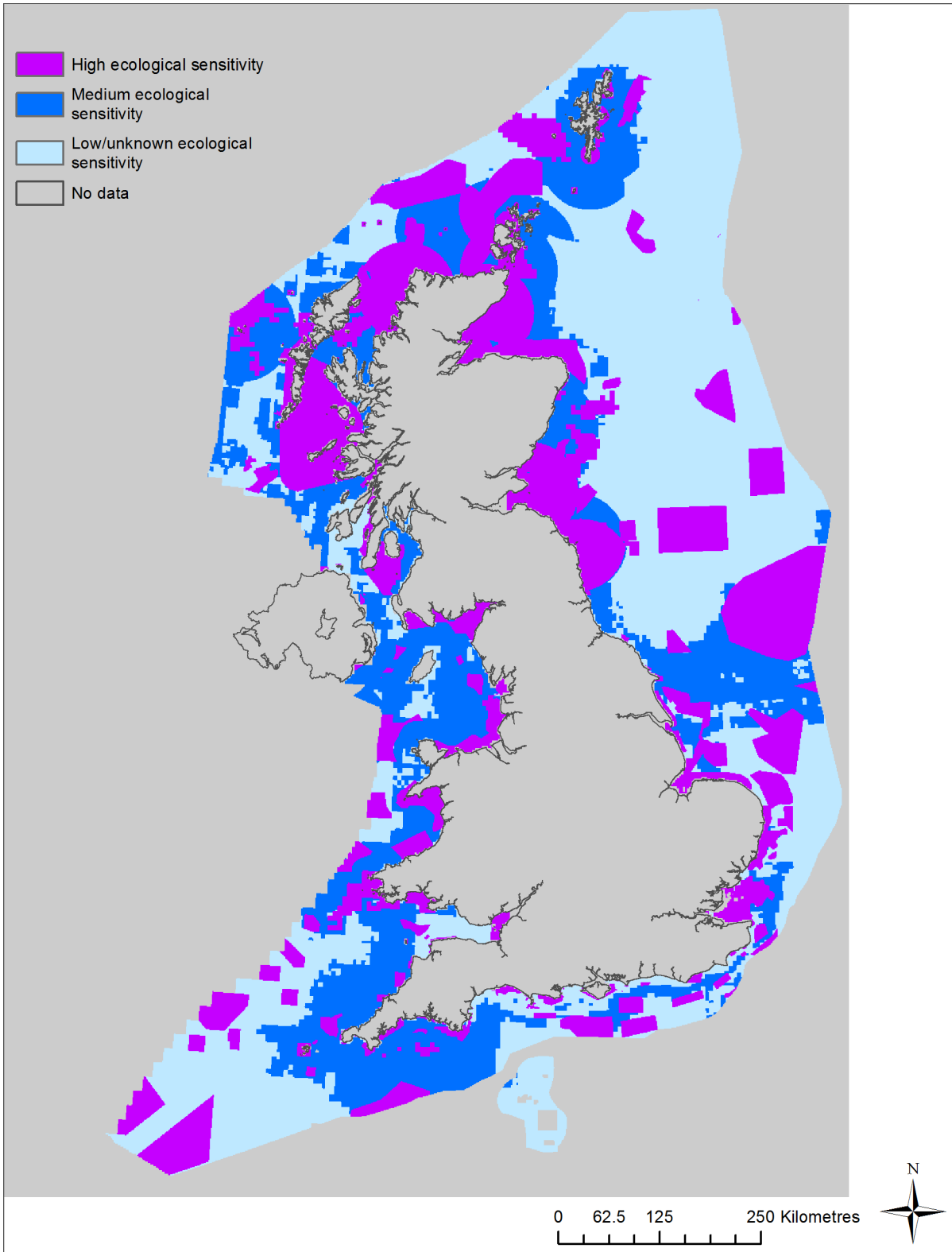
**Figure A8. Opportunity and constraint mapping for floating offshore wind energy.** A) Opportunity map for floating offshore wind developments (light green is prime opportunity, mid-green is good opportunity and dark green is technical opportunity); B) opportunity map for floating offshore wind developments overlaid with physical constraints (red) to exploiting the resource; C) opportunity map for floating offshore wind developments overlaid with physical and policy constraints (from level 1, least constrained, in light yellow, to level 3, most constrained, in brown) to exploiting the resource; D) opportunity map for floating offshore wind developments with physical and policy constraints to exploiting the resource applied, remaining areas of opportunity are overlaid with areas of high (purple) and medium (blue) ecological sensitivity to offshore wind.



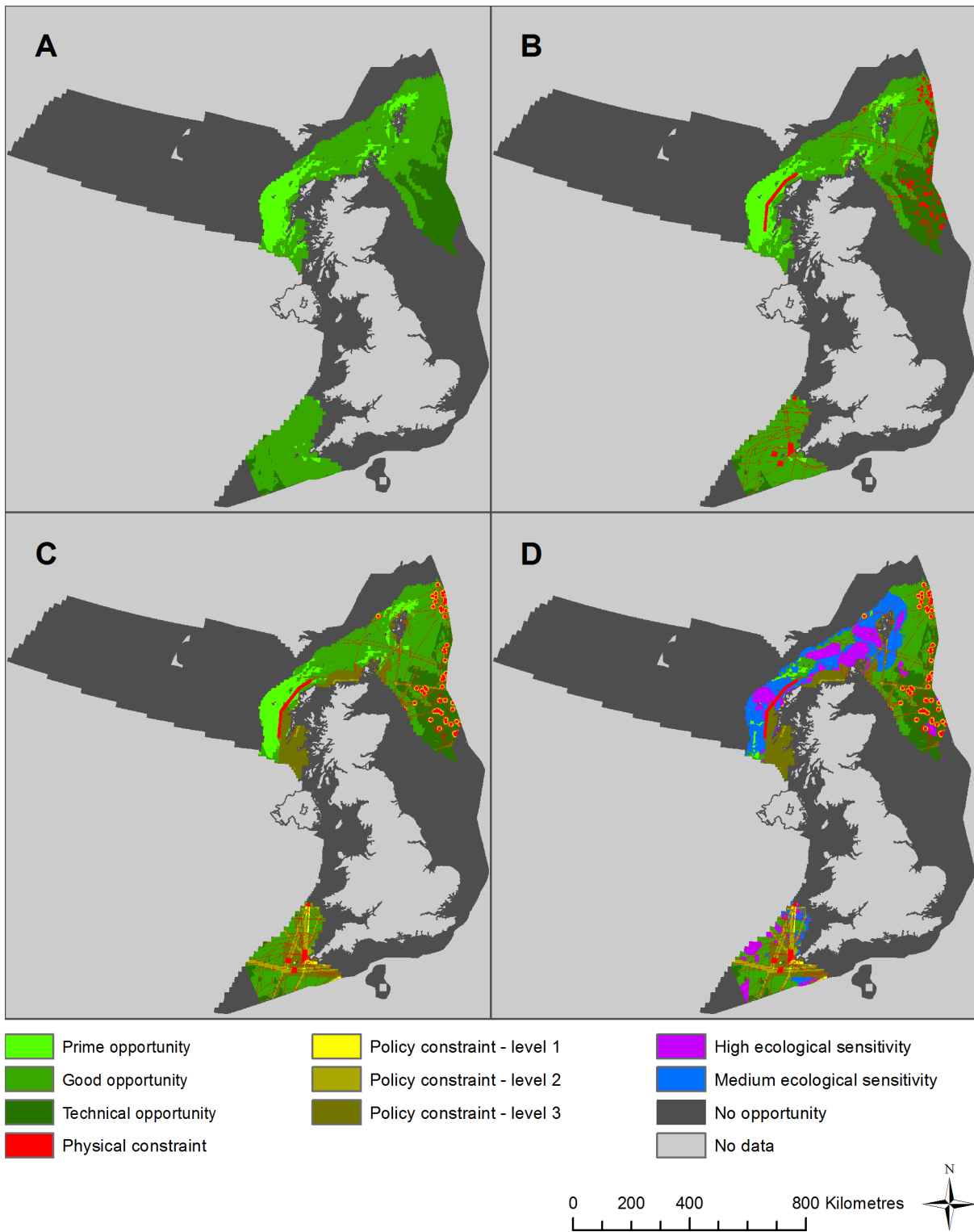
**Figure A9. Ecological sensitivity map for the deployment of offshore wind energy.** Showing sea areas of high sensitivity (purple), medium sensitivity (dark blue) and low/unknown sensitivity (pale blue).



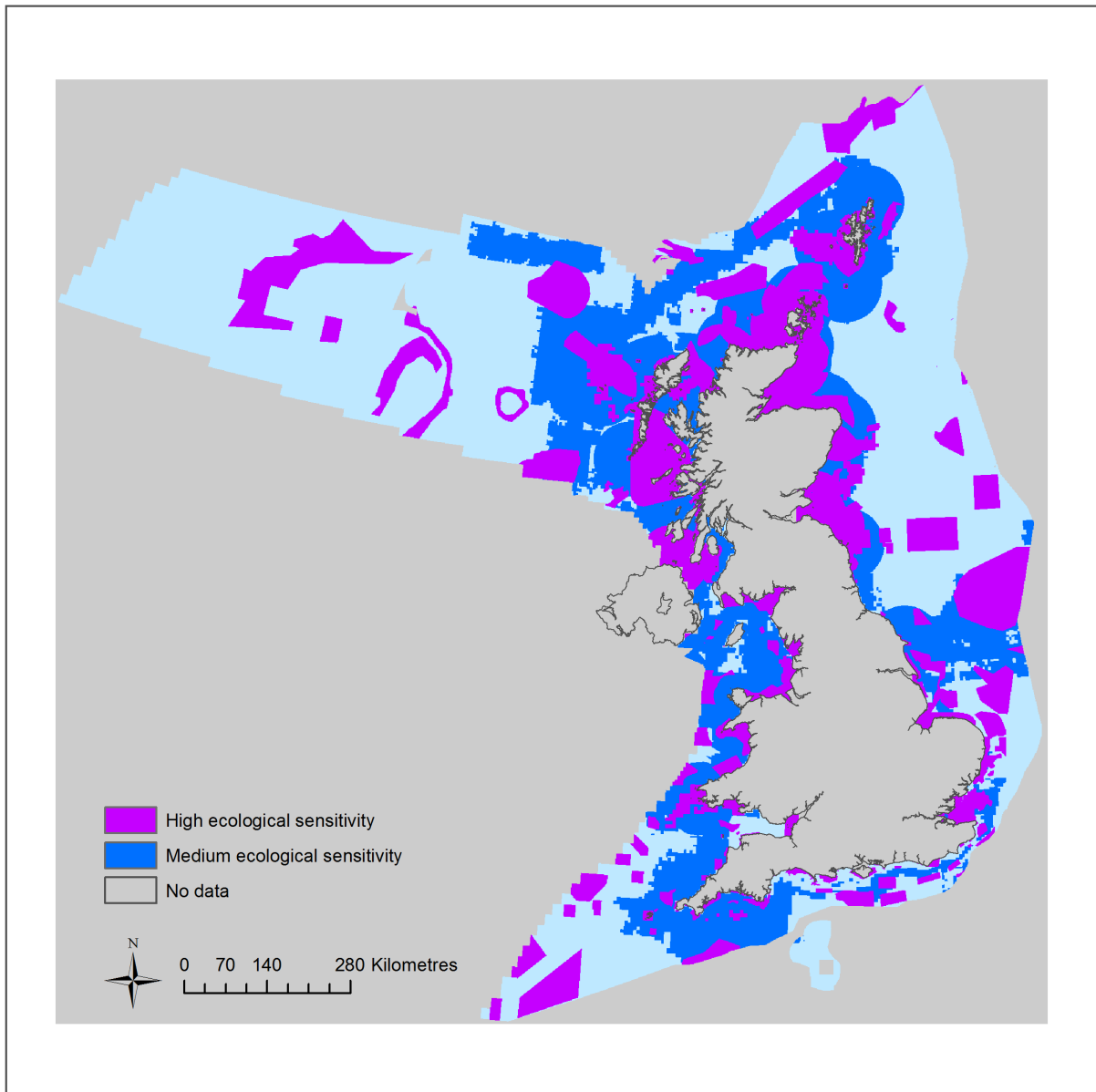
**Figure A10. Opportunity and constraint mapping for offshore tidal stream energy.** A) Opportunity map for tidal stream developments (light green is prime opportunity, mid-green is good opportunity and dark green is technical opportunity); B) opportunity map for tidal stream developments overlaid with physical constraints (red) to exploiting the resource; C) opportunity map for tidal stream developments overlaid with physical and policy constraints (from level 1, least constrained, in light yellow, to level 3, most constrained, in brown) to exploiting the resource; D) opportunity map for tidal stream developments with physical and policy constraints to exploiting the resource applied, remaining areas of opportunity are overlaid with areas of high (purple) and medium (blue) ecological sensitivity to offshore wind.



**Figure A11. Ecological sensitivity map for the deployment of tidal stream technologies.** Showing sea areas of high sensitivity (purple), medium sensitivity (dark blue) and low/unknown sensitivity (pale blue).

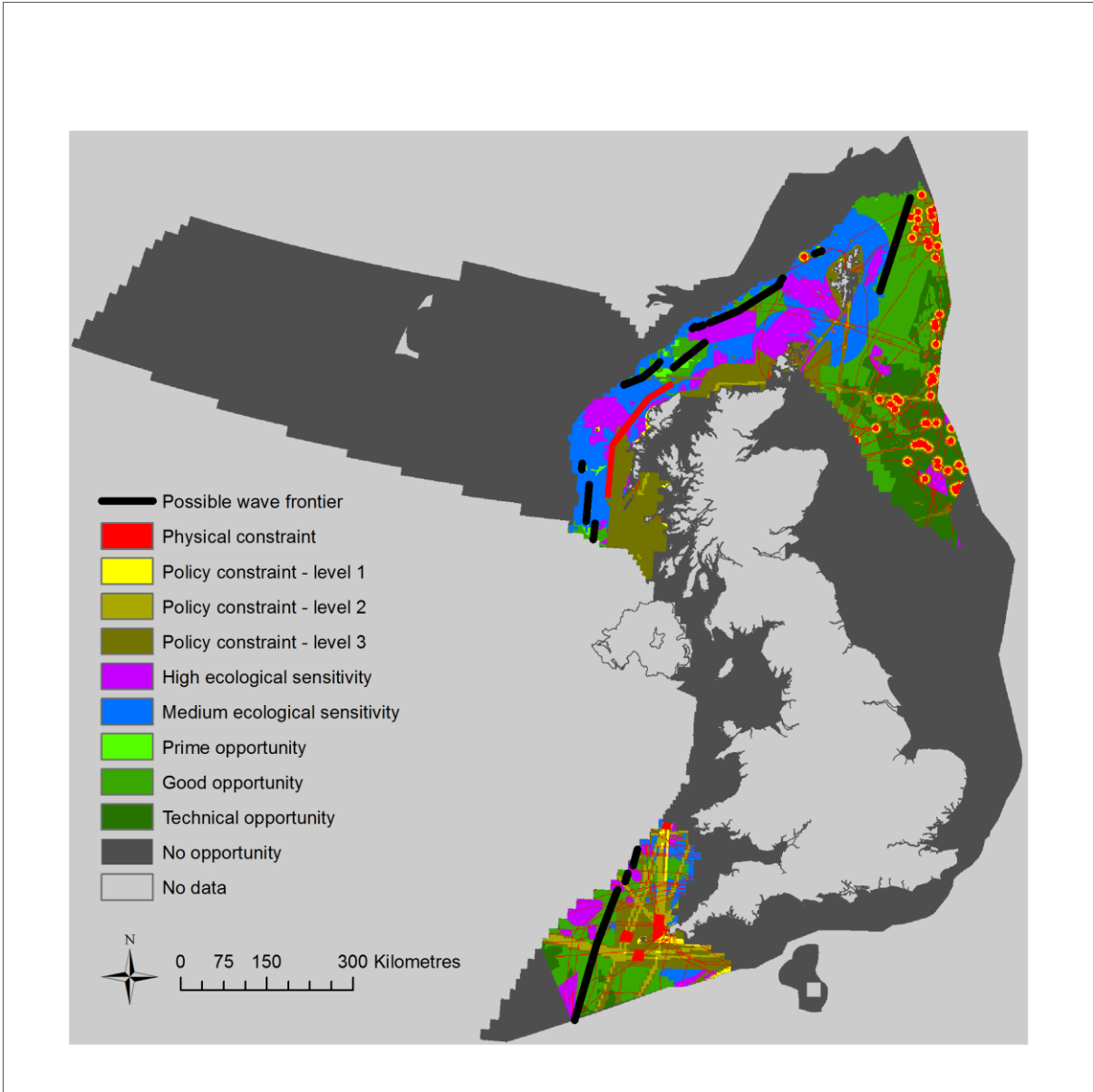


**Figure A12. Opportunity and constraint mapping for wave energy.** A) Opportunity map for wave energy developments (light green is prime opportunity, mid-green is good opportunity and dark green is technical opportunity); B) opportunity map for wave energy developments overlaid with physical constraints (red) to exploiting the resource; C) opportunity map for wave energy developments overlaid with physical and policy constraints (from level 1, least constrained, in light yellow, to level 3, most constrained, in brown) to exploiting the resource; D) opportunity map for wave energy developments with physical and policy constraints to exploiting the resource applied, remaining areas of opportunity are overlaid with areas of high (purple) and medium (blue) ecological sensitivity to offshore wind.

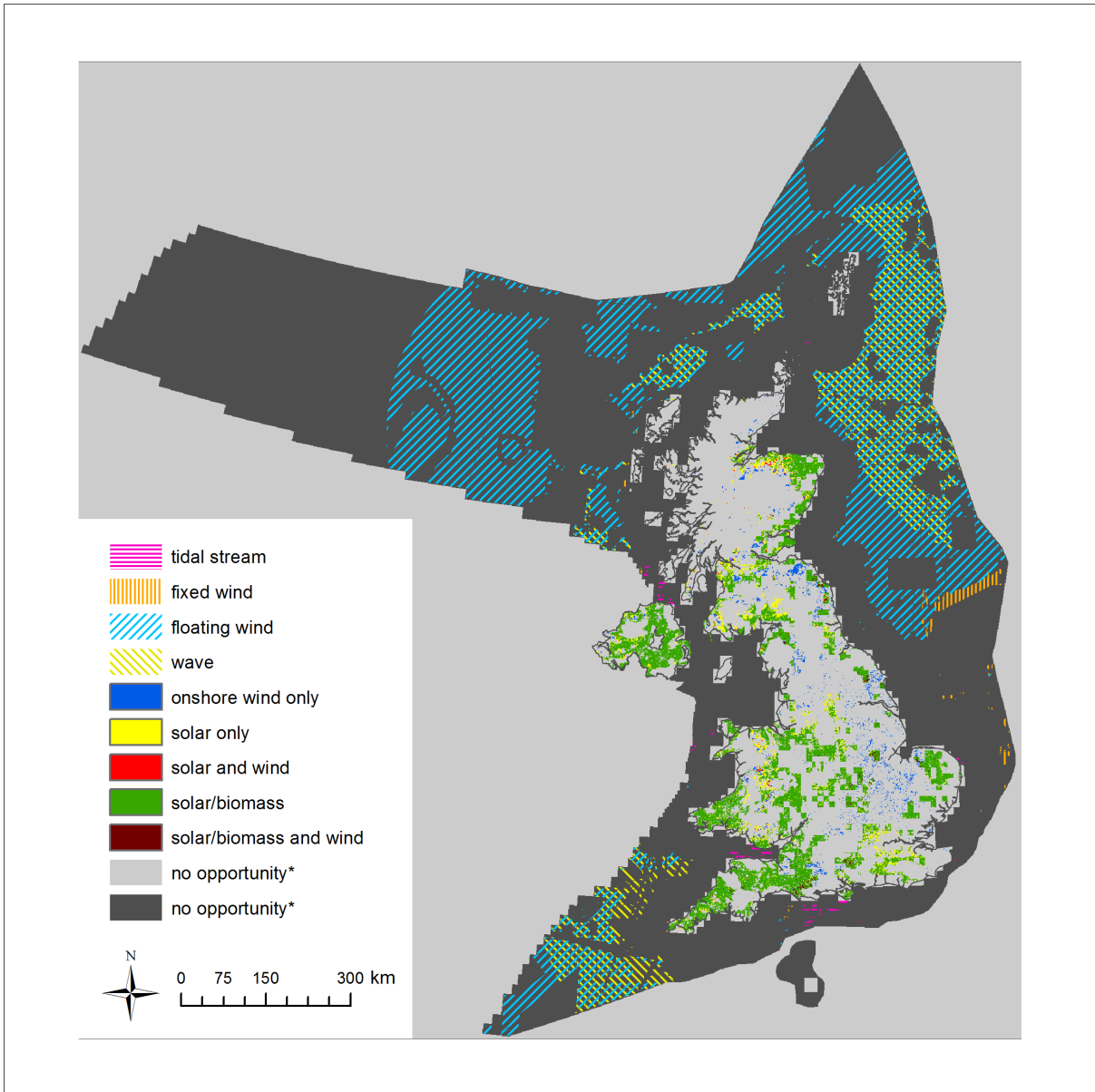


**Figure A13. Ecological sensitivity map for the deployment of wave energy technologies.** Showing sea areas of high sensitivity (purple), medium sensitivity (dark blue) and low/unknown sensitivity (pale blue).





**Figure A14. Opportunity and constraint mapping for wave energy.** Showing potential frontiers across areas of low/unknown ecological sensitivity in areas of opportunity where there are no physical or policy constraints.



**Figure A15. Opportunity mapping for tidal stream, fixed wind, floating wind, wave, onshore wind, solar and bioenergy crops.** Showing areas of opportunity with low/unknown ecological sensitivity, with physical and policy constraints to exploiting the resource applied. \*Areas of no opportunity show areas excluded due to a lack of resource opportunity, the presence of physical constraints, policy constraints and/or high or medium ecological sensitivity.

## Annex 2. Detailed information on the Low Ecological Risk scenarios in the RSPB's 2050 Energy Vision

Table 2. Deployment figures for renewable technologies that were spatially analysed in the RSPB's 2050 Energy Vision (showing the full detail of the ranges provided in Table 1)

Renewable technology		2030 deployment level			2050 deployment level			Maximum deployment level with low ecological risk (the upper limit in any scenario)
		Mixed renewables scenario	High marine renewables scenario	High onshore renewables scenario	Mixed renewables scenario	High marine renewables scenario	High onshore renewables scenario	
<b>Onshore wind</b>	Potential installed capacity (GW)	31.2	37.2	38.4	32	41	42.8	53
	Annual energy output (TWh/yr)	82.1	97.8	100.9	84.2	107.9	112.6	140
<b>Solar farms*</b>	Potential installed capacity (GW)	16.1	69.3	69.3	94.7	122.7	122.7	312
	Annual energy output (TWh/yr)	13.7	58.9	58.9	80.5	104.3	104.3	246
<b>Fixed offshore wind</b>	Potential installed capacity (GW)	26	26	22.1	26	26	24	26
	Annual energy output (TWh/yr)	115	115	83.1	115	115	94.7	115

<b>Floating offshore wind**</b>	Potential installed capacity (GW)	33.4	63.4	0	58	155.3	0	1,268
	Annual energy output (TWh/yr)	108.9	222	0	216.4	600.2	0	5,558
<b>Wave</b>	Potential installed capacity (GW)	0.3	1.3	0.3	5.8	21	2.9	Not calculated**
	Annual energy output (TWh/yr)	0.6	2.6	0.5	11.4	41.3	5.7	64
<b>Tidal stream</b>	Potential installed capacity (GW)	0.3	2	0.1	5.7	20.4	1.9	50
	Annual energy output (TWh/yr)	1	6.3	0.3	18	64.2	6	176

\*Figures take into account the potential for ILUC and impacts on food production as a result of deployment on agricultural land; they assume the maximum available agricultural land that could sustainably used for energy generation is 350,000 ha (see Technical Report for references)

\*\* The approach taken to calculating the roll-out of floating wind is based on certain key assumptions: in the DECC 2050 Calculator, only Level 4 assumes the deployment of floating wind rather than fixed wind as the model is not constrained by ecological sensitivity. In our scenarios, we assume that beyond 26GW of (generating an assumed 115TWh), offshore wind is delivered using floating wind turbines, as 26GW is the maximum amount we estimate to be possible to generate with fixed turbines at low ecological risk. Therefore, we are making different assumptions in our scenarios to the assumptions made by the model, limiting the applicability of the 2030 deployment figures in this case.

\*\*\* Installed capacity of wave energy was not calculated as part of this study; a 'frontier approach' was used which enabled estimation of the potential annual energy output at low ecological risk (64TWh)

Table 3. 2050 deployment figures for all energy supply technologies in the LER scenarios in the RSPB's 2050 Energy Vision

Energy supply categories in the DECC 2050 Calculator	Scenario 1. Mixed Renewables			Scenario 2. High Marine Renewables			Scenario 3. High Onshore Renewables		
	Installed capacity (GW)	Annual energy output (TWh/yr)	Indicative number of installations in 2050*	Installed capacity (GW)	Annual energy output (TWh/yr)	Indicative number of installations in 2050*	Installed capacity (GW)	Annual energy output (TWh/yr)	Indicative number of installations in 2050*
Offshore wind	84	331.4	~14,500 5.8MW turbines	181.3	715.2	~31,300 5.8MW turbines	24	94.7	~4,100 5.8MW turbines
Onshore wind	32	84.2	~12,800 2.5MW turbines	41	107.9	~16,400 2.5MW turbines	42.8	112.6	~17,100 2.5MW turbines
Solar panels for electricity	94.7	80.5	~50% of South-facing domestic roofs, or ~417km <sup>2</sup> solar farms (if 20% efficient)	122.7	104.3	~75% of South-facing domestic roofs, or ~541km <sup>2</sup> solar farms (if 20% efficient)	122.7	104.3	~75% of South-facing domestic roofs, or ~541km <sup>2</sup> solar farms (if 20% efficient)
Wave	5.8	11.4	~145km of wave devices, ~3900 machines	21	41.3	~524km of wave devices, ~14,000 machines	2.9	5.7	~72km of wave devices, ~1930 machines
Tidal stream	5.7	18	~2850 2MW tidal stream devices	20.4	64.2	~10,200 2MW tidal stream devices	1.9	6	~950 2MW tidal stream devices
Tidal range	1.7	3.4	3 small schemes	1.7	3.4	3 small schemes	1.7	3.4	3 small schemes
CCS power stations	20.9	140	17 1.2GW CCS power stations (85% load factor)	1.7	11	1 demo CCS plant	32.4	217	27 1.2GW CCS power stations (85% load factor)

Hydroelectric power stations	2.1	7	Existing large-scale schemes refurbished, ~500MW new small-scale schemes**	2.1	7	Existing large-scale schemes refurbished, ~500MW new small-scale schemes**	2.1	7	Existing large-scale schemes refurbished, ~500MW new small-scale schemes**
Solar panels for hot water	6.6	57.8 (inc. 4.1 electricity)	Suitable buildings have ~30% annual hot water demand met by solar thermal, ~1.6m <sup>2</sup> panels per person	6.6	57.8 (inc. 4.1 electricity)	Suitable buildings have ~30% annual hot water demand met by solar thermal, ~1.6m <sup>2</sup> panels per person	4.4	38.5 (inc. 2.8 electricity)	65% of suitable buildings have ~30% annual hot water demand met by solar thermal, ~1m <sup>2</sup> per person
Biomass power stations	0.6	4.7	Only plants built/under construction in 2007	0.6	4.7	Only plants built/under construction in 2007	0.6	4.7	Only plants built/under construction in 2007
Bioenergy crops	n/a	55	~3500km <sup>2</sup> used for energy crops, around 1.4% of total UK land area (similar to 2007)	n/a	55	~3500km <sup>2</sup> used for energy crops, around 1.4% of total UK land area (similar to 2007)	n/a	55	~3500km <sup>2</sup> used for energy crops, around 1.4% of total UK land area (similar to 2007)
Bioenergy imports	n/a	70	~13,000km <sup>2</sup> production land in other countries	n/a	70	~13,000km <sup>2</sup> production land in other countries	n/a	70	~13,000km <sup>2</sup> production land in other countries
Energy from waste	n/a	30	Waste decreases by 33%, only 3% of waste sent to	n/a	30	Waste decreases by 33%, only 3% of waste sent to	n/a	30	Waste decreases by 33%, only 3% of waste sent to

			landfill, recycling increases by 70%, energy from waste increases by 7% (on 2007 levels)			landfill, recycling increases by 70%, energy from waste increases by 7% (on 2007 levels)			landfill, recycling increases by 70%, energy from waste increases by 7% (on 2007 levels)
Small-scale wind	0.6	1.3	~127,000 5kW turbines	0.6	1.3	~127,000 5kW turbines	0.6	1.3	~127,000 5kW turbines
Electricity imports	n/a	140	Equivalent to ~1250km <sup>2</sup> solar PV in countries exporting to the UK	n/a	140	Equivalent to ~1250km <sup>2</sup> solar PV in countries exporting to the UK	n/a	91	Equivalent to 810km <sup>2</sup> solar PV in countries exporting to the UK
Geothermal electricity	0	0	None	0	0	None	1	7	~100 10MW plants
<p>*Figures are indicative as technology may improve or average installation size may change throughout the period up to 2050</p> <p>**In line with precautionary estimates for levels of small-scale hydropower deployment that can be achieved with low ecological risk</p> <p>See the RSPB 2050 Energy Vision Technical Report for more details of our approach to and the assumptions underpinning the LER scenarios</p>									



**RTPI**

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5 August 2016

To whom it may concern,

**RESPONSE TO THE CONSULTATION INTO THE PROCESS AND METHODOLOGY OF  
THE NATIONAL INFRASTRUCTURE ASSESSMENT**

The RTPI welcomes the opportunity to provide evidence to the Commission's consultation on the methodology for the National Infrastructure Assessment.

Please see our submission to the consultation below.

Yours faithfully,

[name redacted]

[job title redacted]

Royal Town Planning Institute

41 Botolph Lane, London EC3R 8DL

[phone number redacted] | [e-mail address redacted]

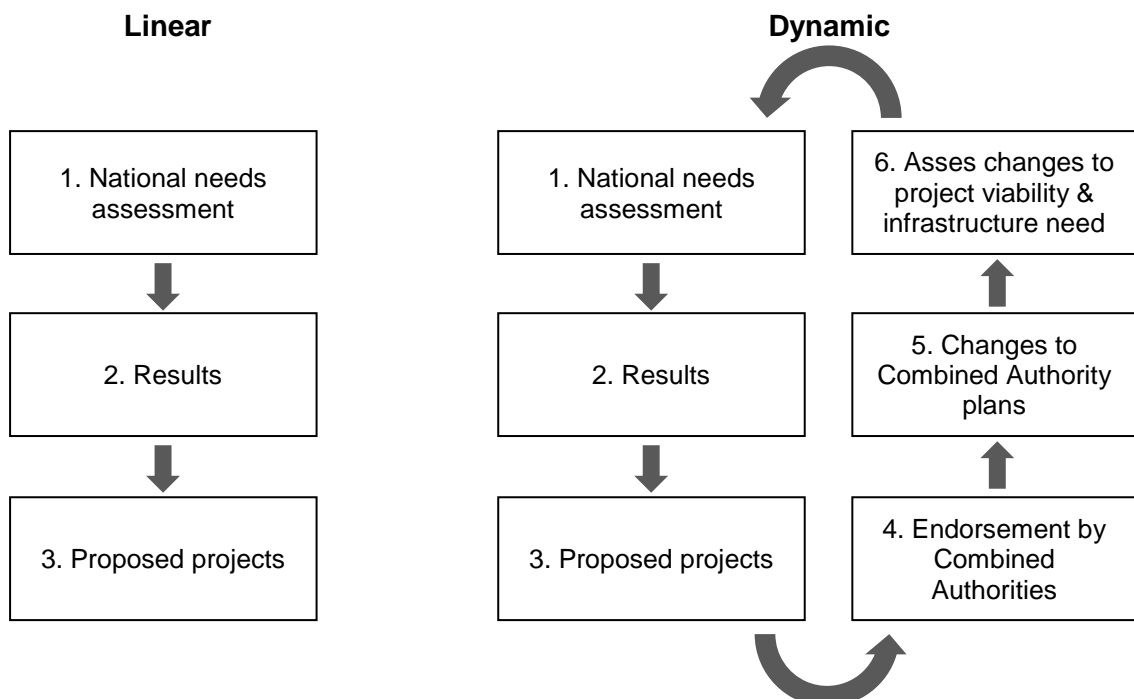


# RTPI Response to consultation on national infrastructure assessment methodology

## Overarching issues

1. The RTPI welcomes this opportunity to respond to the consultation from the National Infrastructure Commission. The UK approach to national infrastructure planning has for too long been characterised by uncertainty, delays and a lack of joined-up thinking. This assessment offers a valuable opportunity to overcome these challenges and develop a visionary, long-term and strategic infrastructure plan for the UK.
2. The Commission has been given a remit from Government to “...analyse the UK’s long-term economic infrastructure needs, outline a strategic vision over a 30-year time horizon and set out recommendations for how identified needs should begin to be met.” The RTPI believes that the assessment should take a proactive approach in setting out a number of scenarios which explore the transformative potential of infrastructure to benefit the environment, drive economic productivity, and improve quality of life. In doing so, the Commission will need to develop a methodology capable of taking a dynamic approach to the identification of ‘infrastructure need’.
3. We therefore agree with the proposal from the Commission to take “...a whole system approach, understanding and studying interdependencies and feedbacks” by incorporating a range of cross-cutting issues and infrastructure drivers. We note that the Commission is fully cognisant of the need to take account of feedback loops in its approach (see box on 24) which is particularly important in considering the links between infrastructure and housing. We suggest that these would need to be addressed through a **dynamic methodology** for understanding infrastructure need in relation to land use planning, which accounts for the role of infrastructure in unlocking and enabling sustainable growth. The alternative would be a linear approach to assessing infrastructure need based on current patterns of demand, a process which would tend to reinforce prevailing patterns of growth and would limit the ability of the Commission to consider the transformative potential of infrastructure investment. The difference between the two methodologies is illustrated below.

**Figure 1: Linear versus dynamic methodology**



4. As shown in Figure 1, a linear methodology would assess infrastructure need based on existing patterns of growth and demand, and propose a range of infrastructure to meet that need. However this would not account for the impact that the provision of this infrastructure would then have on land use planning and the shape of the built environment, which would in turn impact upon the use, viability, efficiency and resilience of the infrastructure. A linear approach would also risk simply reinforcing the provision of infrastructure in the south east of England, where current demand is greatest, but at the expense of areas where infrastructure investment could make a greater difference to sustainable growth and the quality of life of its inhabitants.
5. A dynamic methodology would similarly propose a range of projects based on the initial assessment of need, but would then provide a mechanism for planning stakeholders (such as combined authorities) to endorse the proposals by offering plans for associated housing growth and regeneration. These plans would in turn affect the viability and demand profile of the initial infrastructure proposal, for example through an uplift in the value of land, increased private sector contributions, increased capacity requirements etc. These changes can then be fed back into the initial assessment to produce new results and adjust proposals before making recommendations to Parliament.
6. This process would be complex, as decisions over the prioritisation of major infrastructure will almost inevitably favour some people, places and sectors of the economy over others. It would also require the Commission to be firmly spatial in its approach to assessing need and proposing projects, in order to enable engagement from stakeholders at the regional/sub-regional level.
7. By taking a proactive approach and considering these feedback loops, the Commission's visioning, assessment and recommendation process can act as a vehicle for addressing a series of long-standing and often politicised topics which otherwise risk being deferred to successive governments. The cross-cutting themes and infrastructure drivers identified in the consultation document suggest that the Commission could play a much-needed impartial role in these discussions, looking at the role of infrastructure in addressing the housing crisis, bridging the divide between the South-East of England and the rest of the UK, changing patterns of travel and energy consumption, and shaping our response to climate change. These are explored in more detail throughout our response.
8. In order to fulfil this role, the Commission will need to adopt a transparent approach to scenario modelling which recognises and makes explicit the trade-offs, risks and uncertainties inherent in the planning and delivery of infrastructure.

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

9. In our introductory section we set out how the objective of long-term sustainable economic growth requires that the Commission's methodology is able to generate the confidence required to enable growth, and can factor in the impacts of land use planning changes in response to endorsement from other public and private stakeholders. In particular we commend a **dynamic methodology** which incorporates feedback loops.
10. The objectives should also relate to all regions *and nations* of the UK, and should aim to reduce the disparities in economic performance between them. There is a need to map the spatial incidence of expenditure proposals. The RTPI recommended this in its [Map for England proposal](#).
11. The RTPI has had sight of the consultation response from the National Infrastructure Planning Association (NIPA), and agree that climate change will be a key issue for the Commission to consider in relation to these objectives, particularly the emission reduction targets for 2032 and 2050. These are covered in more detail in our response to Q3, Q4 and Q10

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

12. The RTPI broadly agrees with these principles. Under the proposal for the Commission to be comprehensive and take a whole systems approach, we point to the need to develop a methodology that can account for the feedback loops between the assessment of infrastructure need and the impact that proposed and actual infrastructure projects have on that need, including project viability. These are set out in paragraphs 2 - 7 above.
13. We understand that the NIC is not in a position to reopen closed agreements on price control settlements for regulated utility industries. However, such agreements are medium term only. After they expire there would seem to be ample opportunity to get regulators to place much greater emphasis on the support of housing supply growth. The current approach heavily limits the ability of utility companies to make infrastructure investments ahead of demand. Regulators exhibit undue risk-averse behaviour requiring high levels of commitment at the start of control period (e.g. full planning applications) which is simply not a realistic proposition.
14. The Commission should include clear spatial principles in its approach. Few of the existing National Policy Statements (NPSs) are spatially specific, and this assessment presents a valuable opportunity to examine how different policies relate to each other spatially. Furthermore, the four infrastructure drivers identified by the Commission have a clear spatial dimension which needs to be addressed.

15. The assessment is likely to deal much more comprehensively with infrastructure in England than it does with Wales or Scotland, and is assumed to have no remit in Northern Ireland. In being consultative, the Commission will therefore need to ensure the interests of the regions and nations of the UK are represented, especially cross-boundary infrastructure issues. For Wales, the Commission will need to clarify how the assessment will relate to the existing Nationally Significant Infrastructure Projects (NSIPs) and the National Development Framework, Developments of National Significance and emerging Strategic Development Plans. In Scotland, the same clarity will be needed in relation to the revised National Planning Framework. In England, the existing infrastructure plans of combined authorities, other local government, Local Enterprise Partnerships (LEPs) and private companies will need to be connected to the assessment. To manage this process there is a strong case for the appointment of commissioners with explicit responsibilities for the interests of each of the regions and nations.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

16. The RTPi generally agrees with the choice of sectors as described in the consultation document, but suggests a greater consideration of the relationship between each sector and the built environment.

#### The built environment

17. In setting out the remit of the interim Commission, the consultation document states on page 18 that it should not include housing supply directly, but rather “consider the potential interactions between its infrastructure recommendation and housing supply”. The Commission proposes to coordinate the timing and delivery of infrastructure and housing by using information about the potential locations of strategically important housing allocations as part of its evidence base.

18. In our policy papers on [Strategic Planning](#) and [Delivering Large-Scale Housing](#), the RTPi argued that social well-being, employment growth and economic competitiveness were being put at risk by a failure to fully integrate the provision of housing and infrastructure across local authority boundaries. This integration needs to occur at a range of scales, and the devolution of powers and responsibilities to combined authorities is a positive step forward. However there is also a need for decision-making on national infrastructure to actively enable and shape sustainable housing growth, rather than simply respond to existing demand.

19. In not directly addressing housing supply, the Commission risks missing an important opportunity to transform the relationship between policies, planning and expenditure for

national infrastructure with policies and planning for housing. We therefore recommend that the Commission is able to take a more proactive approach to using infrastructure to unlock potential housing sites, and that this is reflected in the methodology as suggested in paragraphs 2-9 of our response. This would reflect the explicit connections between housing and infrastructure which have already been made by the Commission in the *Transport for a World City* report, and in the studies for the Milton Keynes – Cambridge Growth Corridor.

20. As we indicated in Figure 1, this would provide an opportunity for stakeholders (such as combined authorities) to respond to infrastructure projects proposed by the Commission with integrated plans for sustainable housing growth. The impacts of this growth, for example, on land values or commuting patterns, would then need to be fed back into the needs assessment with adjusted calculations for viability, capacity etc.
21. As a further point, the conflation of ‘the built environment’ with ‘housing supply’ on page 18 does not capture the wider and more complex relationship between infrastructure and the built environment. These are usefully set out in [Urban form and infrastructure: a morphological review](#) from Foresight/Government Office for Science. This report examines the characteristics of the following urban typologies against a range of economic, social and environmental criteria:
  - Compact contained towns and cities
  - Edge of town retail and commercial developments
  - Peripheral housing estates and urban extensions
  - New settlements
  - Dispersed developments
22. Choices around national infrastructure are in part determined by our existing urban form, and the infrastructure projects envisaged by the Commission will in turn shape the sustainability of how our settlements grow and expand, for example by encouraging higher density developments, decentralised energy networks, public transport systems. These relationships are included in our comments on the transport and energy sectors below. Describing infrastructure as “enabling people to get work” (para 39 of the consultation) runs the risk of supposing that commuting demand is a dependent variable and is not in itself the consequence of policy decisions around transport and land use.

### Transport

23. The latest carbon budget report from the Committee on Climate Change (CCC) states that the government does not have sufficient policies in place to reduce emissions from the transport sector. An overreliance on vehicle electrification and fuel efficiency to reduce transport emissions may also place additional pressures on the energy sector – a critical interdependency which we welcome the Commission’s focus on.
24. The RTPi would also recommend that the Commission examine the relationship between the built environment and transport behaviour, especially given the proposal under the cross-cutting themes to determine infrastructure needs based on “...where people live and how they will travel”. Land use planning can play a significant role in promoting sustainable modal shift and reducing the substantial negative externalities associated with road traffic by influencing both the location of new development in

relation to infrastructure, jobs and services, and patterns of churn within the existing housing stock. Current problems associated with road traffic, including congestion and air pollution, are impacting on economic productivity and health, and we would wish to see land use planning recognised as part of the solution.

### Energy

25. As with transport, there are several interdependencies between the energy sector and the built environment, which should be examined by the Commission. The first is the relationship between the energy sector and energy efficiency in new and existing buildings. The CCC again state that new policies are needed to boost energy efficiency in order to meet our emission reduction targets in a cost-effective manner. Improving energy efficiency also has important quality of life benefits by reducing fuel poverty and tackling health conditions associated with poorly insulated housing, especially under conditions of climate change.
26. The Commission's *Smart Power* report also considered the future role of a more distributed approach to energy generation, where a greater proportion of low and zero-carbon electricity is generated closer to areas of demand. In addition to the need for more active network management described in the report, this would also have implications for the built environment and land use planning which should be considered by the Commission. A scenario in which distributed low-carbon energy plays a greater role may also be one which; a) energy infrastructure competes for land with housing, employment and other forms of infrastructure; and b) favours relatively compact settlement patterns which can be connected to decentralised heat networks.

### Digital and communications

27. In relation to the transport sector, the Commission could consider the impact of technological change on remote working and the need to commute by car.

### Water and drainage

28. In relation to this point, the Commission may be interested in the RTPI [Map for England](#) study and [Thinking Spatially](#) paper, which noted that the areas of the country with the highest household growth projections display overlap with areas that already have serious levels of water stress, including Greater London, the South East and the East of England. We support the consideration by the Commission of the relationship between population growth, infrastructure need and environmental capacity at a national level.

### Flood risk management

29. In relation to the cross-cutting theme of governance and decision-making, the Commission may wish to consider a scenario in which flood risk management spending is devolved, with responsibility aligned along catchment boundaries.
30. The RTPI also agrees with the suggestion from NIPA that the Commission consider flood risk over a 80-100 year time period, which aligns more closely to the life-span of major flood defence infrastructure and the impacts of climate change.

31. In addressing flood risk management, options around changes to upland management of land to reduce the speed and volume of run-off need to be able to be evaluated against the building of new flood defences. This issue is of particular significance as a cross-boundary issue between Wales and adjoining regions of England.

#### Green infrastructure / natural resources

32. The role of green (and blue) infrastructure, while not a traditional national infrastructure sector, should also be considered by the Committee. There is a clear economic case for greater investment in green infrastructure as a means to address many of the infrastructure needs identified above, especially in relation to climate change, and provides additional benefits for quality of life, biodiversity and resilience. In carrying out its assessment, we recommend the Commission should be alert to whether the extent to which identified needs could be met by green infrastructure at a different spatial scale.

33. The Commission may also wish to consider whether to conduct a high level assessment of natural resources as a separate sector, adopting an ecosystems approach, and recognising the constraints and opportunities presented by natural resources (including the supply of minerals required to meet infrastructure and growth needs, and the impacts of infrastructure provision on natural capital/landscape quality). In doing so, the Commission could seek to engage with bodies such as the Natural Capital Committee and DEFRA as they prepare their 25-year Plan for Nature.

#### **Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

#### **Q7. Are there any other cross-cutting issues that you think are particularly important?**

34. The RTPI generally agrees with these cross-cutting issues. As we set out in our introduction, the challenge of understanding these issues, particularly in relation to geography and local growth, and issues of cost, funding and financing, will need to be considered through a dynamic form of assessment which can respond and adapt to the initial recommendations made by the Commission.

35. On sustainability, we would recommend that the Commission takes account of the embodied carbon of infrastructure, including decommissioning, in order to fully consider the costs and benefits of proposed projects.

#### **Q8. Do you agree with this methodological approach to determine the needs and priorities?**

36. The RTPI agrees with the principle of a dynamic approach to determining needs and priorities as suggested in Figure 1. This will not produce a single 'right answer' but will rather lead to a range of identified options which can then be widely reviewed and critiqued. The value of the assessment will be to provide pragmatic recommendations to government which have a strong degree of buy-in and where the costs, benefits and risks are transparent. This will help to provide the long-term certainty which is needed to support sustainable growth.

#### **Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

37. As we state in our introduction, these four infrastructure drivers have a clear spatial dimension and a dynamic relationship to land use planning. We therefore welcome the Commission's proposal to consider the various feedback loops that these drivers entail. Our proposal for a dynamic assessment methodology in Figure 1 will help to capture these complex interdependencies, such as between the provision of infrastructure and the question of where people live and how they travel.
38. One of the most important considerations that the Commission will need to consider the need to meet legally binding emission reduction targets of 57% by 2032, and 80% by 2050. The 2016 Progress Report from the Committee on Climate Change (CCC) notes that most of the UK's emissions reductions have come from decarbonisation in the power sector, with almost no progress in the rest of the economy. As we stated in our response to Q3-5, the Commission should examine the role of infrastructure in the built environment as a means to mitigate and adapt to climate change and try to identify infrastructure solutions which deliver mitigation and adaptation benefits simultaneously.
39. Under the population and demography driver, the Commission may wish to consider the impact of infrastructure proposals on the rural economy and environment.

**Q11. The NIA will aim to set out a portfolio of interventions that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

40. In the response to Q11 and Q12 we propose that the dynamic methodology set out in the introduction and Figure 1 would be appropriate to determining a portfolio of interventions that meets the objectives proposed by the Commission in Q1.
41. In considering the supply of infrastructure services, there is a need to recognise the importance of an adequate pool of individuals with the necessary skills. The supply of spatial planners and of engineers could helpfully be included within the scope of the NIA.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

42. In considering stakeholder engagement on the NIA, there is a strong case for consultations to include a cross-professional dimension. Given the differing contexts in devolved nations, it will be important for there to be engagement which focusses on those locations.



<e-mail address redacted>

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**From:** <e-mail address redacted>  
**Sent:** 27 May 2016 13:35  
**To:** NIA Evidence  
**Subject:** consultation evidence

Dear Lord Adonis,

Could you please explain to me, why cycling is not considered a national priority. This country has ever increasing obesity and ill health issues, which result in a greater financial strain on the NHS. Additionally, the country has terrible pollution levels in part caused by particulates from some motorised vehicles.

It would seem to me, and indeed, many others as evidence is clearly available on this, that increasing active transport would help both of these issues (i.e., increasing people's fitness and reducing the strain on the NHS, as well as reducing particulates/pollution).

See [https://www.britishcycling.org.uk/zuvvi/media/bc\\_files/campaigning/BENEFITS\\_OF\\_INVESTING\\_IN\\_CYCLING\\_DIGI\\_FINAL.pdf](https://www.britishcycling.org.uk/zuvvi/media/bc_files/campaigning/BENEFITS_OF_INVESTING_IN_CYCLING_DIGI_FINAL.pdf) for an overview surrounding these issues.

I look forward to hearing from you in the very near future,

Sincerely,  
<e-mail address redacted>

<name redacted>  
<title redacted>  
<phone number redacted>  
RST Sport Ltd  
[www.rstsport.com](http://www.rstsport.com)



## RWE Response

### “The National Infrastructure Assessment: Process and Methodology”

5<sup>th</sup> August 2016

#### Introduction

This document is submitted on behalf of RWE's UK Generation and Retail businesses, RWE Generation UK Plc and RWE npower Group Plc and RWE Innogy UK, in response to the National Infrastructure Commission's consultation “The National Infrastructure Assessment: Process and Methodology”.

RWE npower Group Plc is the retail energy supplier for around 4.8 million residential accounts and around 210,000 Small and Medium Enterprise business and Industrial and Commercial customers in the UK.

RWE Generation UK PLC owns, operates and maintains a portfolio of gas, coal, oil and biomass stations together with a portfolio of smaller open cycle gas turbine and combined heat and power generation assets.

RWE Innogy UK has an operational renewable power portfolio, including wind farms, hydro plant of over 1.3 GW and a potential development portfolio of over 3 GW.

The following are our responses to the specific questions asked within the consultation document.

#### **Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all**
- **regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

#### **What issues do you think are particularly important to consider as the Commission works to this objective?**

As the energy sector undergoes a transformation from large centralised generators serving pure demand, towards decarbonised and smarter networks with significant distributed and renewable generation as well as the evolution of many consumers to prosumers, we welcome the role of the NIC to, once per Parliament, review the long term infrastructure requirements of the UK and set out clear recommendations to Government, which, if accepted will become Government policy.

In working towards a National Infrastructure Assessment with investment from both the public and private sectors, it is important that the NIC considers mechanisms for cost recovery of the identified infrastructure requirements.

Where private investment and / or operation is identified, the NIC should propose a requirement for a clear framework to be in place to enable private investors to calculate their risks and returns. In addition, the NIC need to consider how the market can remain attractive to current major infrastructure operators and future investors whilst considering the impacts of its recommendations on them.

Where public investment or support is identified, the NIC should consider how this cost may be recovered such that the broader objectives (fostering long term and sustainable economic growth, improve the UK's international competitiveness and improve the quality of life for those living in the UK) can be delivered. Amongst the options under consideration, the NIC should consider the role of general taxation.

Regardless of investor type, the issue of affordability needs to be considered.

We welcome the NIC taking a cross-sectorial view of key services such as Energy which meets all three specified objectives. Energy (with its direct impacts on transport and heat in the future) is and will be an essential infrastructure with long planning and investment requirements. We further welcome the NICs commitment not to re-open previous decisions and agreements and well as ongoing work streams. Within and related to the energy sector, we believe the following to be particularly important issues for consideration by the NIC:

1. Electricity storage;
2. Interconnectors;
3. Low carbon heat;
4. Decarbonisation of heat and transport;
5. Embedded / distributed generation.

Detailed comments on these aspects can be found in Appendix 1.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

Yes, we agree with the 4 highlighted principles.

In being forward looking and challenging established thinking, it is important that when reviewing the energy sector, the NIC is not constrained by existing institutional frameworks and delivery mechanisms. Existing institutional frameworks have delivered today's infrastructure but, as evidenced by the Energy and Climate Change Select Committee of 17<sup>th</sup> June 2016, are already in need of significant review, reflecting the continuing evolution of the energy sector.

It is also worth noting that the existing frameworks have failed to deliver the levels of decarbonisation of the heat and transport sectors set out within 2020 targets, let alone the levels of decarbonisation required to deliver binding 2050 targets. The NIA should consider the institutional frameworks appropriate to deliver these objectives as well as identifying physical and digital infrastructure requirements.

In being "comprehensive, taking a whole system approach , understanding and studying interdependencies and feedbacks" the NIC should address the principles of cost recovery. In some areas the "polluter pays" principle may be more appropriate, but where the benefits are societal a progressive cost recovery approach may be appropriate. One example is the recovery of environmental levies, recovered through electricity bills, which is regressive despite the benefits being societal. This has created second order incentives to avoid paying those levies but only for those that can afford it. An example being solar PV, which then exacerbates the problem. A further issue to be considered relates to delivery time frames. Some areas (such as battery storage) will likely undergo transformative change in the time frame between successive NIAs. If there is a clear market incentive then we could easily see mass adoption of a new technology with long-term implications for international competitiveness and quality of life that wasn't foreseen by the NIC at the time of the relevant NIA. The NIC's recommendations must therefore provide flexibility to accommodate such change. This needs to be countered with the need to provide sufficient notice to change Pricing and Billing systems as well as the associated costs, that would ultimately be borne by the end consumer. The NIA is an ideal opportunity to address the previous lack of a holistic strategic direction in this area and an opportunity to address the longer term uncertainty surrounding in network costs.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

Yes - We agree with the proposed cross traditional sector approach.

However in developing its thinking, the NIC should not be constrained existing sector divisions which may become less relevant within the time frame of the NIA.

In addition, the sectors of the future may have very different or fuzzy or fluid boundaries, and we note the NIC has already recognised the future interaction between the energy and digital communications sectors. This is likely to continue to grow in importance.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

Within the broader energy sector (in addition to the cross sector issues identified within the consultation document) Energy Efficiency and the role of Digital business models maximising the potential of smart meters and smart networks should be considered as those technologies have potential to transform the way that energy is consumed and the infrastructure required.

In addition, it is important that the NIC considers delivery of the identified infrastructure requirements, particularly mechanisms for the cost recovery where the Government and private sector is to invest.

When considering delivery mechanisms, the NIC should consider Market Design as well as the broader Institutional Frameworks.

In particular, the NIC should consider the potentially distorting effects of cost recovery mechanisms which have the potential to lock in long term inefficiencies, negatively impact international industrial competitiveness and negatively impact the quality of life of those living in the UK. This becomes particularly relevant as consumption patterns emerge that are fundamentally different to those originally anticipated.

A current example is the Ofgem review into cost recovery of the Transmission network, an issue highlighted through alleged excessive embedded benefits available to embedded generators. Whilst this review is beyond the scope of the NIC, the wider issue of long term cost recovery structures for both gas and electricity networks are likely to remain.

Detailed comments on these aspects can be found in Appendix 2

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

As well as the identified interdependencies between transport and energy, digital and communications and water (from both a requirement for thermal generation as well as the movement of water driving demand), there are intra-sectorial issues that need to be considered.

Within segments of the energy sector, the NIC should consider the electricity generation as providing 3 key services: namely (i) wholesale markets and renewable energy production (including relevant support mechanisms) (ii) Capacity to provide Security of Supplies and (iii) as providers of ancillary network services (alongside demand side measures).

In assessing infrastructure needs, all 3 services needs to be considered, as well as setting frameworks for the market to optimise across these 3 markets.

RWE and other energy businesses are presently working with Imperial College to identify the integration costs of renewables. This will be published by October 2016 and will provide an independent view of costs, enabling broader review and a factual base upon which an assessment of infrastructure needs and costs can be made.

When exploring the broader issue of sustainability, the NIA should include a review of;

- the future role of Carbon Capture and Storage as a technology deployed within the industrial sector as well as the energy sector; and
- extending the capability of the existing gas infrastructure to accommodate greater proportions of alternative gases such as hydrogen and / or biogas.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

Yes - We agree.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

The NIC should consider the role of private and public investment in future infrastructure.

Where private investment and / or operation is identified, the NIC should propose a requirement for a clear framework to be in place to enable private investors to calculate their risks and returns. In addition, the NIC need to consider how the market can remain attractive to current major infrastructure operators and future investors whilst considering the impacts of its recommendations on them.

Where public investment or support is identified, the NIC should consider how this cost may be recovered such that the broader objectives (fostering long term and sustainable economic growth, improve the UK's international competitiveness and improve the quality of life for those living in the UK) can be delivered. Amongst the options under consideration, the NIC should consider the role of general taxation.

Regardless of investor type, the issues of affordability needs to be considered.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

We agree. We would strongly encourage that in addition to the identification of infrastructure need, deliverability and the ability to fund the identified infrastructure is taken into consideration at the prioritisation stage.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

Specifically within the energy sector, there are particularly relevant examples within New York and California.

The New York Reforming the Energy Vision "REV" appears particularly relevant. Part of the NY REV seeks to meet existing grid objectives of low cost, reliability, universal access and enabling new technology. The efficient management of peak demand is a key part of this programme, and has been delivered by aligning demand with distributed generation, and demand side response.

Remuneration for services is based on the system value, as discovered through market mechanisms, potentially dependent upon location within the network. This transparency has been crucial to determine the value of energy efficiency, demand response, solar and storage and enables comprehensive cost-benefit analysis.

As a practical example, Con Edison's Brooklyn Queens Demand Management Programme initiative highlights the potential of such an holistic approach where an original \$1.1bn investment requirement was ultimately reduced to c\$0.5bn through the use of the above mechanisms and targeting investment (by providing investment signals to market participants) in embedded solutions to mitigate the need for such an extensive investment in copper.

In addition, the California model provides an example of an effective Distributed System Operator which is a technically neutral market place coordinator. The DSO is itself limited to managing real and reactive power flows. Such a mechanism enables the full range of services to be developed in a transparent way. It is reported that up to 30 different services could be envisaged.

Both examples are particularly driven by a strong focus on cost & value and security of supply.

Common denominators are unbundling of services to enable efficient markets and a distribution service platform provider concept.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

We agree. In addition it is important to assess the impact of these drivers on existing infrastructure as well as driving demand for new infrastructure in a post BREXIT framework.

In addition to other considerations, income distributions (from the perspective of ability to pay the cost recovery of infrastructure) should be included as part of population and demographics.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

The approach set out appears sensible.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

We believe that the principles set out within the consultation document are a sound basis for ongoing engagement.

We would particularly welcome the opportunity to contribute towards the development of the evidence base as well as contributing in expert round tables.

## Appendix 1 – Detailed comments to Question 1

### Detailed considerations for the storage of electricity

In order to drive innovation and to minimise costs of electricity, it is important that storage is treated such that a competitive market emerges that can drive innovation, has the flexibility to access all markets and costs are minimised for the electricity consumer.

***As part of the Infrastructure Assessment, we would welcome an assessment of the potential for storage at all levels (transmission, distribution and behind the meter) within the UK as part of an optimised energy system.***

In doing so, it must be recognised that storage assets located at different locations within the distribution system, the transmission system, behind the meter or linked with generation assets will provide different services and derive revenues from different markets including energy price volatility, ancillary service provisions and avoidance of network reinforcement costs.

In considering the potential, we propose that the following should be considered:

- Energy prices should reflect scarcity without distortions;
- The regulatory treatment of storage assets beyond the current BEIS / Ofgem review. The present treatment of storage as both demand and generation is appropriate as this clearly reflects the operation of a storage asset and can be made cost effective and transparent. The payment of system costs (and receipt of benefits) relevant to the storage asset's location within the system and the time of charging or discharge are entirely appropriate; and
- Appropriate ownership of storage assets. Existing structures that prevent direct ownership by Transmission and Distribution licence holders would appear appropriate provided such entities are able to procure services from the market, taking on the role of market coordinator – not market participant. Should such entities become market participants, this would likely result in increased bills as not all of the benefits of storage could be realised, at the same time as there being no competitive pressures to reduce costs.

### Interconnectors

RWE is supportive of efforts to improve interconnection between GB and the continent which will improve market liquidity, competition and security of supply. We expect interconnectors to play a growing role in the integrated European electricity market by enabling balancing of supply and demand as the impact of renewable generation increases.

Whilst interconnectors can provide clear solutions in addressing the energy trilemma, we are aware of an increasing body of evidence (<https://auroraer.com/files/reports/Dash%20for%20interconnection%20-%20Aurora%20Energy%20Research%20-%20February%202016.pdf>) that suggests that a large proportion of interconnectors provide no advantages with regard to carbon intensity, security of supply or affordability over and above domestic generation.

The NICs Infrastructure Assessment provides an ideal opportunity to review the scope of previous cost benefit analysis as well as revisiting the CBA to identify optimal levels of interconnection in the context of longer term energy, flexibility and decarbonisation needs.

In reviewing the requirement for interconnectors, consideration should be given as to whether interconnectors should be considered part of the transmission system or generation capacity.

## **Decarbonisation of heat and transport**

Whilst the Heat Network Investment Project and the RHI have initiated the decarbonisation of heat, the cross cutting nature of decarbonisation requires broad consideration of likely pathways and the associated long term infrastructure requirements. Whilst we note that the NIC's scope does not extend to housing supply directly, the Infrastructure Assessment must consider the interactions of planned infrastructure for low carbon heat and ensure any recommendations (including impacts on planning, building regulations etc) take into account the impacts (costs and benefits) of increased decentralised heat (and local generation) on wider networks as well as future carbon budgets.

We would welcome an assessment into:

1. The potential for electrification of heat and associated timescales, particularly given the natural application of heat pumps in new build properties as opposed to retrofitting applications which require high temperature heat as well as:
  - a. the impact on the electricity infrastructure;
  - b. the potential to manage demand shape as part of a "smart" system;
  - c. the impact on generation requirements.
2. The potential for renewable heat and CHP as well as infrastructure to supply appropriate fuels;
3. The potential for decarbonisation of the gas network through the introduction of biogas;
4. The potential for decarbonisation of the gas network through the introduction of Hydrogen and the implications for the gas network itself; and
5. The long term role of the gas network.

In reviewing the decarbonisation of transport, the NIC should consider the role of hydrogen gas (as well as infrastructure associated with the production and possible transportation of hydrogen) as well as the system impacts of electrification of transport (including the future roll out of charging facilities as part of future road infrastructure development), the requirements placed on transmission and distribution systems and the potential impact of Big Data and smart networks as well as other methodologies to manage the shape of demand.

## **Embedded Generation and Demand Side Response**

Changes to the GB electricity balancing arrangements and implementation of the Energy Union will provide new opportunities for electricity market participants including demand side management and embedded generation.

The extent to which demand side management measures and embedded generation can be used to increase the flexibility of the electricity system now, and in the future cannot be easily stated; although it is likely that its potential will be significantly constrained if policy continues to focus investment on the delivery of more generation capacity and network reinforcement before demand reduction and demand side response measures have been consistently and effectively supported and communicated to customers.

The recent DECC paper "Towards a Smart Energy System" contains a range estimates of the differing potential for DSR (for different customer segments) of between 1.2 – 4.4GW. However, despite the lack of agreement on the likely scale of the DSR potential, it is clear that DSR and embedded generation; if appropriately supported can provide essential sources of flexibility within a smarter energy system, with benefits for all consumers across the value chain.

***We propose that the NIC should, in its infrastructure assessment, consider***

- (i) the cost effective levels of distributed vs large scale generation,***
- (ii) an appropriate mix between base load and intermittent technologies***
- (iii) the realistic time frame for deployment of asset, and***
- (iv) appropriate mechanisms for the recharging of network (demand and transmission) as networks move to providing services as opposed to only the provision of energy flows.***



***In reviewing optimal levels of distributed generation and DSR, flexibility to accommodate the deployment of disruptive technologies needs to be considered such as to minimize the potential for stranded assets.***

In arriving at solutions, the critical issue will be to ensure that the policy and regulatory frameworks are developed that provide sufficient clarity and incentives for all stakeholders to invest in these solutions. A key component to facilitate this development (and also for storage) will be to ensure greater exposure of the whole system costs (for both consumers and generators).

### **Decarbonisation**

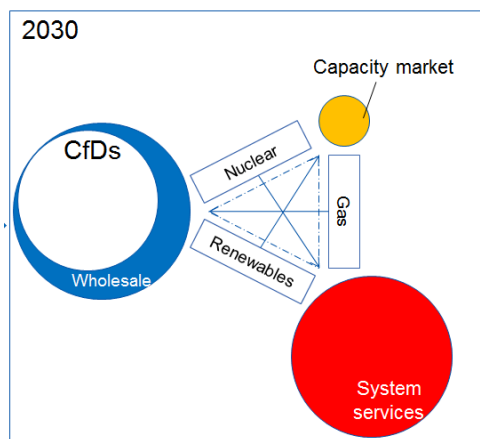
***In meeting the 5<sup>th</sup>, and future Carbon budgets cost effectively, the broad remit of the NIC presents an ideal opportunity to review the potential for Carbon Capture and Storage across the wider economy as well as the need for associated infrastructure.***

In reviewing options for the decarbonisation of heat and transport, solutions requiring the production of hydrogen create opportunities within the electricity sector as well as reforming natural gas with the use of CCS. The long term perspective of the Infrastructure Assessment also provides an opportunity to review the need for deployment of renewable technologies (such as on-shore wind and solar PV), which although eligible for the CfD are currently excluded by targeted government restrictions on budget allocation, in meeting carbon budgets, delivering security of supply as well as creating conditions to enable economic deployment.

## Appendix 2 – Detailed comments on question 4

### Detailed Market Design considerations:

Whilst the Electricity Market Reform focused on the establishment of the CfD to bring forward low carbon generation and the Capacity Mechanism to ensure security of supply, it has failed to fully address the need for ancillary system services.



The Electricity Market design delivered:

- A mechanism to support investment in low-carbon generation: the Feed-in Tariffs with Contracts for Difference (CfD);
- A mechanism to support security of supply, if needed, in the form of a Capacity Market;
- The Carbon Price Floor – a tax to underpin the carbon price in the EU Emissions Trading System;
- An Emissions Performance Standard – a regulatory measure which provides a backstop to limit emissions from new fossil fuel power stations; and
- The institutional arrangements to support these reforms.

This reform was supported by:

- Electricity Demand Reduction;
- Measures to support market liquidity and access to market for independent generators; and
- Effective transitional arrangements.

Whilst we believe there is no case for further reform of those aspects addressed by the EMR, there is a need to address the monetisation of ancillary system services from all generators.

Without visibility and the ability to secure long term cash flows from system services:

1. The CfD, being an energy subsidy assigns no value to the capability for low carbon, flexible assets to provide system services. The CfD is therefore unable to prioritise assets capable of offering flexible generation;
2. The lack of long term contracts for ancillary system services limits the ability for flexible generators to reliably include the full value of these services within CfD contracts, thus reducing the value to money of the CfD mechanism to consumers; and
3. It is not possible to optimise across all 3 markets (CfD, CM and Services).

In addition, recent changes to the CfD, restricting the ability for the most economic technologies to participate should be reviewed in the context of delivering the 5<sup>th</sup> (any subsequent) carbon budget at minimum cost.

***We propose that the NIC should consider mechanisms to procure flexible generation and the ability for the system operator to offer long term contracts for ancillary system services, whilst not triggering a full review of the measures introduced through the EMR. Should any changes be implemented, these should be subject to a thorough Cost Benefit Analysis.***

### **Institutional Frameworks**

National Grid as Transmission Owner, System Operator, EMR Delivery Body, Interconnector owner and Capacity Market Delivery Body plays a central role on the GB electricity system. During the development of the EMR package the potential for conflicts of interest between the differing roles undertaken by National Grid was acknowledged and safeguards in the form of special licence conditions were introduced to the Transmission Licence.

National Grid continues to play a pivotal role in the electricity industry and this will be enhanced with the implementation of the Energy Union, the integrated European energy market. We welcome the commitment of the Secretary of State to work alongside the National Infrastructure Commission with National Grid, Ofgem and others to consider how to reform the current system operator model to make it more flexible and independent. In considering how to reform the system operator model, the scope of this review must include a review of how the Distribution Network Operators operate and how they integrate with the System Operator and the Transmission Owner.

## Response to the National Infrastructure Assessment Consultation 2016

[name redacted]

[job title redacted]

School of the Built Environment

Oxford Brookes University

August 2016

*Q1. The Government has given the National Infrastructure Commission objectives to:*

- *foster long-term and sustainable economic growth across all regions of the UK*
- *improve the UK's international competitiveness*
- *improve the quality of life for those living in the UK*

*What issues do you think are particularly important to consider as the Commission works to this objective?*

I think it may help if, as here, the above aims are described as one overall objective, a related set. The balancing of the economic, social and quality of life components of a desirable future for the UK cannot be an exact art or process of judgement, but however the judging of the balancing is done, it comes as a package. Many decades of academic work on the ingredients of economic growth and competitiveness have not found even non-quantifiable elements with any confidence, let alone quantifiable ones. The broad phrasing of these objectives doubtless assumes that the first two contribute to the third, which is presumably the desired final goal, which makes the achievement of the first two necessary. Neither growth of abstract economic magnitudes nor international competitiveness, however defined, are goods wanted by the population of countries for themselves.

The “de-growth” (or steady state) movement challenges the linking of growth and quality of life, but beyond referring to this highly cogent and increasingly impressive area of social and economic thinking, I do not pursue these arguments here. However, if they have any validity, they press towards weighting the third part of the package especially heavily, as this remains an unambiguous good, as against the seriously challenged concept of long term growth of GDP by all countries (or possibly by just the country concerned, if growth is seen as a zero sum game).

Here, I suspect like many commenting on this document, I would stress the issue which is not referred to here, the UK's international responsibilities, particularly in relation to climate change. Whilst any state will give strong emphasis to goals directly affecting its own territory and population, most states also give some attention to international

responsibilities – mainly because of an appreciation of the value of reciprocity. Climate change has been very clearly recognised in this way, as an international, ideally global, challenge, as the Paris declarations of 2015 showed. The NIA prepared by the UK state should give serious attention to this, addressing the low carbon objectives implied by the 2008 Climate Change Act. I appreciate that this is included in the next section, but there might be a risk that the seriousness of this as a goal is weakened by not having the same status as a top level objective. There are plausible arguments that it should in fact be the overriding objective for the NIA, which should constrain the achievement of the three given in this document. It may well be difficult to convince political leaders in Britain to do this, but to place it at least alongside the other three would be very desirable.

As recent academic work is showing, there are many dimensions to the interweaving of national economic activity systems and global ecological processes, so that inclusion of a climate change objective is only the beginning of an analytical process. Such a process should be aware of the realities of importing high carbon practices, as well as being able prepared to push “internal” shifts in the carbon calculus of production and consumption. This may seem far too demanding for a first iteration of an NIA, which will be carried through in very challenging political circumstances. But it can be argued that at least an awareness of the importance of the UK’s insertion into global economic-ecological processes will provide arguments for pressing for an ambitious long term scenario. I realise that, as in the Davies Airports Review, there is likely to be, at best, a strong reliance on the analysis of the Committee on Climate Change, which is certainly a most valuable institutional support. But it will be helpful for the Commission itself to engage critically with the issue of the international effects of the UK economy, given its location within the Treasury, thinking through climate change dimensions, perhaps with some degree of independence of the CCC’s framework.

*Q2. Do you agree that, in undertaking the NIA, the Commission should be:*

- *Open, transparent and consultative*
- *Independent, objective and rigorous*
- *Forward looking, challenging established thinking*
- *Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?*

*Are there any principles that should inform the way that the Commission produces the NIA that are missing?*

These are sound principles. I would only emphasise a dimension that I and others have stressed in the past, that the final principle, the whole systems approach should, if it is to have any purchase on steering long term futures, engage with the spatial nature of the UK (and especially England) explicitly. Interdependencies and feedbacks are spatial, not just within “economic infrastructure” systems but between those and the complex systems

which constitute localities, regions and whole countries. The Committee on Climate Change Risk Assessment published in July 2016 went some way to spatialise risks (pages 45-46 in the Synthesis, and the Infrastructure Chapter). This attention to multi-scalar analysis and action is accepted to some degree in countries like the Netherlands which have national physical planning or at least guidance systems. These systems give that country the advantage of far sighted and more efficient frameworks for decisions on infrastructure, saving potentially enormous quantities of money, over decades. The UK is a country challenged in the long run by serious threats posed by climate changes, as well as by very immediate decisions to be made on the locations of any new urban development, and on how such locations will be served by infrastructure systems of all kinds. Whilst again it can be argued that this is all going to come out in the next section under the four critical drivers, I think it would be valuable to have a high level principle that the NIA will take an explicitly spatialised approach to its analytical work: this is not the same as asking for the NIA to turn into a National Spatial Strategy, which is unlikely given the Commission's present remit, among other things. It is simply to say that a whole system approach has to understand the geography of the country now, and the possible long term changes affecting that geography.

At any rate, I very much support the way the work is laid out for the work to 2017 and to 2018, taking a series of steps (vision, priorities and then package of measures), as in paragraphs 32 to 38.

*Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?*

Yes, as a broad prospectus this is valuable.

*Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?*

I have argued above and more fully in the past for the importance of linking up demand trajectories and infrastructure management and investment, and so I very much support the consideration of the interactions with housing and other development sectors, even though I think excluding them from the content of the NIA makes perfect sense (it would overburden the exercise and lose its core focus). But it is clearly precisely these interactions which are critical for really long term decision making on infrastructure systems (as the ITRC and other research projects have been exposing to good effect). These understandings then need to be carried across to the relevant departments of government, especially DCLG, hence the importance of some formal linking up with that department during both the preparation of the NIA and its translation into initiatives, strategies and policies.

An example of such interactions is in the field of the retrofitting of existing cities, towns and to some degree rural areas (Dixon T, Eames, M., Hunt, M. and Lannon, S., eds. 2014 *Urban*

*retrofitting for sustainability: mapping the transition to 2050*, Routledge). Such retrofitting has not become a prime area of policy innovation in Britain, but international experience can help to inspire practice in this field, which is just as important as the investment in big new systems of infrastructure – or is thoroughly intertwined in some fields of infrastructure with those big systems (electrification of transport, urban heat systems, digital control systems and so on). Whether in the first NIA (ideally) or later, the retrofitting challenges should be a core part of the Assessment.

The NIA will nevertheless be most likely, at its core, about decisions on the big energy and transport systems for coming decades. It is essential that the best academic work is drawn on in these areas: this has not occurred under recent governments, which have tended to adopt approaches remote from evidence, in these two fields in particular. Unless the NIA can build a new consensus here, based on evidence and arguments which would be convincing to autonomous reviewers, it will struggle to impact across a broader spectrum on long term government agendas.

*Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?*

There are a great many important areas, as the above reference to retrofitting of urban areas would imply, but I will leave this to other experts to detail. I simply mention again that planning, at all scales, is essentially a sophisticated way to understand and take into account interdependencies and steer their management towards efficient responses. Good spatial planning of an integrated kind has been doing this for decades, across many countries. A reinvigorated planning would be far the most efficient instrument to take forward implementation of many steps coming out of the NIA. This is not the same as the issuing of Endorsed Recommendations and assuming that the planning system is capable of implementing them. (I have argued in the past that I am unconvinced of the need for Endorsed Recommendations as a new instrument. At any rate, whatever value they may have, they will not make up for the weakening of the planning system as a whole since 2010).

*Q6. Do you agree that the NIA should focus on these cross-cutting issues?*

Broadly, yes, a good set. I like the critical approach, prepared to think through the foundational issues in infrastructure policy. This could bring large dividends, well beyond the typical micro assessment at project levels, where perhaps a few millions may be saved, as against the massive inefficiency of some funding regimes, or the dramatic non-sustainability of many investment pathways of recent years.

Financing is an obvious field for such radical re-evaluation, where much academic analysis has been critical of some of the methods used to manage investment in recent decades (PFI or other sorts of PPP, the current regimes of regulators).

Governance and decision making is another field where, in spite of various reforms in the last decade or so, there is great scope for smarter approaches. The planning system has been greatly weakened by a succession of reforms since the early 2000s, leaving it unable to contribute effectively to the infrastructure challenges at all levels, whether because of the weakening of plan making at all levels (except for at neighbourhood level, of limited use for most infrastructure sectors) or the loss of financial capacity (poor management of systems of taxation, ill designed levies and so on). The “devolution” initiatives of the last three years or so have only scratched the surface of options and what may be needed, and only in a few parts of England. This planning dimension sits alongside the more general challenge of the economic regulatory regimes, which would benefit from a full review, across sectors, although it is perhaps not likely that the Commission could devote resources to that itself.

*Q7. Are there any other cross-cutting issues that you think are particularly important?*

This should be enough, already a demanding set.

*Q8. Do you agree with this methodological approach to determine the needs and priorities?*

Yes, very good overall. There will I imagine be challenges in deciding what to do with the sub-national components. These decisions about scalar analysis are difficult, especially in the absence of time and resources and competent partners at regional and sub-regional level. For example, when thinking about London’s role it will be relatively easy to discuss with mayor and GLA about scenarios, evidence bases and so on, but this will hardly be possible in the rest of England where there are no resourced interlocutors. It is to be hoped that the big research programmes completed or underway will be able to feed in much of this analysis from their existing work, so that the implications for different parts of the UK (or at least England) can be described and visualised: this can then facilitate regional conversations on reasonably evidence based futures.

*Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?*

I am not sure this is so much a technical challenge, as it is made to sound here, as one which will be quite difficult from a values and political point of view. This is therefore also part of the issue of engagement, under the question below. The technical side has been quite fully explored by the big research programmes, but I would be surprised if they have found any magic way to resolve such complex prioritisation challenges.



*Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?*

There are many issues under each of these headings, and of course they are deeply interrelated, especially over the longer term. Unless one attempts to start discussing changes in value systems (which is perhaps even more difficult) I think these four are good ones to concentrate on. I am not confident that the Commission will find clear answers on the economic growth heading, given the struggles to cohere and the contradictory messages which have emerged from “spatial economics” or related fields. There is little to suggest any general rules on what creates “successful” economies – they have emerged in all sorts of contexts, in the UK and internationally. I would suggest adopting a sceptical stance on claims about this driver, however important it may appear to be, and putting analytical efforts into understanding the other three. Clearer messages for prioritisation should emerge from studying these three, which may well in themselves help economically in any case.

*Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?*

I imagine that a very broad approach will become necessary at this stage, as it emerges that there are potentially dramatically different pathways that could be taken in the UK in the medium and longer term. This will not be easy to manage – how the Commission and the consultees will make judgements between say a “high carbon UK”, an “unbalanced – support the winning localities – UK”, or a “Green and equitable UK”, to offer some sloganised options. The portfolios will presumably need to emerge from such high level packages of value orientations, they are not especially likely to emerge from the technical prioritisation – unless there is some magic convergence across objectives towards a highest scoring package.

*Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?*

Nothing further to add here.

*Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?*

This is a serious and thoughtful approach to public engagement, which I broadly support. I have made comments in previous consultations and do not need to repeat most of what I discussed there. There I said that I thought there are some things we can learn from international practice, particularly the use of “macro deliberation” in France, by the use of national or regional scale public debates on major issues such as responding to climate

change or energy transitions. As I said then and have explained in articles (2016 “Learning from France: using public deliberation to tackle infrastructure planning issues”, *International Planning Studies*, 2014, “Infrastructure futures and spatial planning; Lessons from France, the Netherlands, Spain and the UK”, *Progress in Planning*, 89, April 2014, 1-38.), these are not easy paths, and a clear articulation with mainstream politics is critical. In this case this could be partly via the Commission itself, and partly via the Chancellor or other leading politicians, depending on the overall political steer. If that sort of framing is possible, then I think that there is considerable scope for exposing the first priorities stage in 2017 and some sort of final draft in 2018 to public scrutiny, via a large scale debate or dialogue phase. It might be appropriate to pick out some especially difficult or challenging elements within the wider publicity, where input might be explored more fully, perhaps by using one of the micro deliberation formulas – citizens juries type exercises, for example. All this would be demanding, and it would need to be done not so much in the hope of reaping legitimacy, but more to bring in complementary perspectives, from those with direct interests in the fields, those who are experts, and those from the broader public. In all of this area, it should be remembered that there are very competent British academics who can advise on both macro and micro deliberation approaches, drawing on studies around the world (especially in Australia and Canada) of how particular exercises have worked.

Alongside these dimensions of involving the wider public, the proposed use of expert knowledge throughout is certainly to be encouraged (paragraphs 80 and 82). Of course marshalling and taking advantage of this process (in fact of any external engagement) will require staff resources within the NIC and it is to be hoped that a strong case can be made for appropriate resourcing. Delegating or outsourcing responsibility for public engagement is likely to reduce the effectiveness of this element, as against integrating it within the core NIC functions. As many have argued in the past, the massive cost of infrastructure failures and investment errors can dwarf intelligent investment in such exercises as the NIA, by several orders of magnitude, so this would (I would have thought) be funds very well spent, if assessed by normal Treasury assessment methods.



**SCOTTISHPOWER**

[Redacted]

[name redacted]

[Job title redacted]

National Infrastructure Commission  
2 Orange  
HM Treasury  
1 Horse Guards Road  
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SW1A 2HQ

5 August 2016

Dear Commission,

**NATIONAL INFRASTRUCTURE ASSESSMENT: PROCESS AND METHODOLOGY**

We welcome the opportunity to respond to the above Consultation. We have chosen to do so with a general response relating to how the first NIA should be taken forward, though we have taken account of your specific questions in drafting this letter.

We support the high level objectives of the National Infrastructure Commission (NIC). As previously highlighted, we agree that an independent NIC could help to promote a better quality of discussion on the development of future infrastructure projects, and, in turn, help to ensure that decisions are made in a timely fashion and on the basis of robust analysis and evidence. A key aspect of this will be helping to promote a political consensus around long-term infrastructure plans.

The development of the National Infrastructure Assessment is clearly a key part of the NIC's forward workstream. However, it is also (as is recognised by the NIC) a very challenging and difficult enterprise, especially given the 30 year time horizon. Accordingly, we believe that it will be important to see the exercise as an iterative one and to think in terms of insights gained along the way as helping to inform the wider public policy debate as appropriate. Consistent with this approach, we support the proposal to develop and then publish a 'Vision and Priorities' document for consultation next summer as a stepping stone towards the publication of the first NIA in 2018.

We outline below our perspective on a number of specific issues raised in the Consultation document.

**Objectives of the NIA**

We agree that, in undertaking the NIA, the Commission should be open, transparent and consultative in their engagement. Whilst it will be important that the NIA is independent, objective and rigorous, it will also be important for the NIC to work closely and collaboratively with other public bodies in this spirit of openness and transparency. This will be important to avoid any unnecessary duplication of work. In the energy field, for example, the NIC should aim to draw on the work of Government departments, regulators and other public bodies (including the Committee on Climate Change). This should also facilitate a whole system approach which is particularly important in the energy sector.

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## **Sectors covered**

The sectors that the NIC has selected seem appropriate. In particular, we agree that the energy sector must be centre-stage (alongside other key sectors such as transport) given the huge investment challenge in the energy sector as part of the transition to the low carbon system needed to meet carbon targets. Moreover, we consider that it will be important for the NIC to consider matters holistically (as is suggested) so as to ensure a joined-up cross-sectoral analysis. For example, it will be important to assess the impact of the potential electrification of transport under different scenarios on energy infrastructure.

## **Cross-cutting Issues**

### **(i) Sustainability**

In considering the cross-cutting issues, we fully support the focus on sustainability, including whether the approach to infrastructure is compatible with the UK's decarbonisation ambition (taking into account the recent secondary legislation under the Climate Change Act 2008, committing to the 5<sup>th</sup> carbon budget (2028-32) as advised by the Committee on Climate Change). In this context, however, we would note a particular timing issue: it would be beneficial if the ongoing work of the NIC could inform the work of the Government in developing its emissions reduction plan – however, we understand that this is currently planned for publication towards the end of this year.

### **(ii) Funding and financing models**

Further, we agree that it will be useful to assess whether the existing funding and financing models in place for large scale infrastructure are appropriate. For example, in the energy sector (as we outlined in our earlier response to the Call for Evidence that informed the 'Smart Power' report) we are broadly supportive of the framework for encouraging investment in low carbon electricity generation (Contracts for Difference) and reliable capacity (the Capacity Market). We do, however, consider that there is scope for considering the development of a risk mitigation mechanism for additional large-scale storage, which could make a significant and cost-effective contribution to managing the future energy system. Such a mechanism, in the form of a Cap and Floor instrument, is currently being used to incentivise investment in additional interconnection; we believe that a similar approach could be considered for supporting the future development of large-scale storage projects such as additional pumped storage.

As regards funding and financing models, we also support the current workstream in government considering a possible market stabilisation mechanism (building on the existing Contract for Difference) that might facilitate the continuing development of established renewable technologies such as onshore wind. Of course, any such further development of onshore wind projects needs to go forward in suitable locations with the requisite public support. However, in terms of delivering progress on decarbonisation cost-effectively, it is vital that this option remains a viable one (especially in Scotland where wind yields support project economics and there is public support for suitably located developments or re-developments by way of repowering).

### **(iii) Governance and decision making framework for regulated utilities**

With respect to the governance and decision making framework for regulated utilities, it will be critical that the NIC does not in any way undermine the independence of existing economic regulators in the energy sector. In this regard, we note that the proposed

legislation to establish the NIC only places an obligation on regulators (such as Ofgem) to 'have regard' to those recommendations from the NIC that become 'Endorsed Recommendations' (by virtue of being accepted by government). These 'Endorsed Recommendations' would not, therefore, be an overriding duty on economic regulators and would have to be balanced against regulators' other statutory duties and interests. It is vital that this position is taken forward so as not to conflict with the existing framework of statutory obligations placed on regulators.

### Methodology

Clearly, there are significant methodological challenges to the proposed development of the NIA. Accordingly, we agree that it is appropriate to consider and assess the likelihood of a range of possible scenarios. In the energy sector, this work might be helpfully informed by that undertaken by National Grid on its Future Energy Scenarios and by the Committee on Climate Change on delivery of carbon budgets.

Moreover, we fully support the suggestion that 'prioritisation' must be at the heart of this assessment work. It is vital that the NIC considers how infrastructure needs can best be delivered cost-effectively given the overall affordability constraints.

### Engagement


We support the proposed approach on engagement with its emphasis on continuing consultative exercises with industry and other key stakeholders to ensure that the work is properly informed by those with the relevant expertise and experience. We look forward to contributing to this engagement process as it develops.

More specifically, we support the suggestion that there might be a useful role for expert panels in key areas that would help the Commission to assess, interpret and scrutinise the evidence base. Indeed, we believe that further considering the future role of storage in supporting a low carbon energy system and how it might be better promoted (as highlighted in the NIC's Smart Power report) is one key technical area that might benefit from such a panel being set up.

Lastly, we would highlight the importance of the NIC taking into account any implications for its work of the UK Government's plans for exiting from the European Union. We are currently considering these issues ourselves as the Government's thinking in this area develops, and so we would be happy to engage further on such matters as appropriate in due course.

If you have any questions regarding any aspect of this response, please do not hesitate to contact me.

Yours sincerely,

  
[name redacted]

[job title redacted]

Question	Response
Q1....What issues do you think are particularly important to consider as the Commission works to this objective?	We think the remit of the commission is appropriate in this area as it is important to take a long term and holistic view.
Q2 ....Are there any principles that should inform the way that the Commission produces the NIA that are missing?	We think the remit of the commission is appropriate in this area. However there should also be a clear link to funding / price setting mechanisms where appropriate.
Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?	Yes. We believe an integrated multi-sector approach is essential.
Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?	<p>Water resource planning is well established and moves are being made to extend the analysis timeframe and scope to include other sectors and develop a national picture.</p> <p>In contrast long term planning for drainage and flood management is spread across multiple organisations with different standards, drivers, governance and financing arrangements. Whilst attempts are being made to improve this situation, for example the 21<sup>st</sup> Century Drainage programme, NIA focus here would be beneficial.</p> <p>It is also important to build on existing work completed on resilience in the water and sewerage sector as set out in the <i>Ofwat Resilience Task and Finish Group final report</i>.</p>
Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?	<p>The commission should consider the water-cycle as a whole to maximise synergies, for example;</p> <ul style="list-style-type: none"> <li>• Taking the opportunity to utilise water and drainage assets to mitigate the impact of flooding</li> <li>• Developing catchment based approaches to utilise opportunities from natural capital to address water resource and flooding aspects</li> </ul>
Q6. Do you agree that the NIA should focus on these cross-cutting issues?	Yes
Q7. Are there any other cross-cutting issues that you think are particularly important?	We think the remit of the commission is appropriate in this area.
Q8. Do you agree with this methodological approach to determine the needs and priorities?	Yes
Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?	Yes. The recent <i>Water Resources Long Term Planning Framework</i> project has developed a good method to test portfolios of solutions against long term, complex and uncertain needs.

Question	Response
<p>Q10. Do you believe the Commission has identified the most important infrastructure drivers?</p> <p>Are there further areas the Commission should seek to examine within each of these drivers?</p>	<p>Yes we think the drivers are appropriate. Consideration should be given to security aspects</p>
<p>Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?</p>	<p>We believe an adaptive pathways type approach is appropriate to deal with both complexity and uncertainty.</p> <p>We believe that any plan developed needs to be action oriented and therefore needs to consider a link to funding mechanisms.</p>
<p>Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?</p>	<p>No.</p>
<p>Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?</p>	<p>We think the activities set out by the commission are comprehensive.</p> <p>However you should also consider how best to work with relevant regulators to make justified change happen.</p>



Solent LEP Office  
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PO6 3EZ

**Emailed to:** [NIAEvidence@nic.gsi.gov.uk](mailto:NIAEvidence@nic.gsi.gov.uk)

5<sup>th</sup> August 2016

Dear Sir / Madam,

**Re: Solent Local Enterprise Partnership Response National Infrastructure Commission consultation on National Infrastructure Assessment**

The Solent Local Enterprise Partnership (LEP) is pleased to submit this letter as its response to the National Infrastructure Commission (NIC) National Infrastructure Assessment Consultation, published on 26th May 2016 by the NIC.

The Solent LEP is the key interface and lead for economic development in the Solent. It is a partnership organisation between the business community, the Further Education and Higher Education sector, three unitary authorities, eight district councils and one county council, all of whom are actively working together to secure a more prosperous and sustainable future for the Solent area. In the period to 2020 the LEP are seeking to secure minimum GVA growth of 3% p.a. Meeting these growth aspirations requires the area to create the conditions that support growth in the business base and create jobs, whilst improving productivity, through facilitating the conditions for innovation and commercialisation, and making the Solent a destination for inward investment.

The Solent economy has a population of over 1.3 million, 50,000 businesses, local GVA of £25 billion, and is part of wider South East economy valued at £190 billion GVA. It has a range of assets that are globally renowned, a strong SME and skills base, and a thriving research community through its universities and research institutions. The area is strategically positioned in relation to London, mainland Europe, and just 20 nautical miles from the key Shanghai to Rotterdam shipping superhighway. Currently the Port of Southampton alone handles exports worth more than £40 billion, making it the number one port for exports in the UK. The mainland Solent LEP area is also the most urbanised area in the South of England, outside London. It has a complex geography, which, whilst giving the area its unique character, provides both opportunities and challenges with regard to local economic growth.

Ultimately, our aim is to create jobs and growth for the Solent. To achieve this we must make best use of the resources at disposal, to maximise the impact for our local economy and secure the process of rebalancing. We have therefore focused very firmly on those activities that will make the greatest impact and create the best conditions for growth, including;

- Unlocking sites for housing and employment
- Improving our connectivity within the Solent and beyond
- Stimulating and supporting innovation
- Improving the skills and talent of our current and future workforce
- Supporting business growth through access to resources and advice
- Supporting our key strategic sectors.



Connectivity is a key challenge for our area which has a complex geography of islands and peninsulas and a long standing infrastructure deficit compared with other city regions; overlaid with ambitious growth aspirations and three key international gateways which are vital to not only the Solent economy, but also the National economy.

In response to this, the Solent LEP has established a Solent Strategic Transport Investment Plan ([http://solentlep.org.uk/uploads/documents/TIP\\_Final\\_-\\_Web\\_Version.pdf](http://solentlep.org.uk/uploads/documents/TIP_Final_-_Web_Version.pdf)) that considers the role of infrastructure in underpinning economic growth and sets out a vision for transport infrastructure in the area with strong support from key private, public and academic stakeholders.

Strategic Local Investment Plans like that of the Solent will be critical to understanding key initiatives in a national context and, as a result, we believe that direct engagement of the National Infrastructure Commission with key local stakeholders through Local Enterprise Partnerships will be critical in developing the National Infrastructure Assessment.

The LEP support the general approach of the NIA (and indeed of the NIC as a whole) and this consultation is welcomed. We are pleased to see that the commission will assess the key drivers of demand and supply for infrastructure services such as economic growth and identified that Infrastructure is critical to the success of a strong, productive and competitive economy. The Solent LEP believes that it is important to recognise the interdependence of infrastructure provision on the ability for areas to bring forward strategic development sites which provide new employment space and housing; both of which are critically important to the future of our economy. In this regard, infrastructure should be seen as an enabler for growth and the prioritisation of projects should take account of the wider opportunities which have the potential to be unlocked through infrastructure investment.

In response to the specific questions raised within the National Infrastructure Assessment consultation responses are provided in the Annex to this letter to those questions where the LEP believes input would be valuable. In summary, the Solent LEP welcomes the development of a long-term strategy for infrastructure in the UK, and believes that this should be guided by three key principals:

1. Take into account the priorities and strategies of **local areas**; where national growth will be delivered
2. Be responsive to the needs of business and engage business in the prioritisation of infrastructure investments through **engagement with LEPs** as key stakeholders
3. Prioritise investments which support the UKs **international gateways** in order to ensure the nation remains internationally competitive

We hope the Solent LEP response to the NIA consultation is helpful to the National Infrastructure Commission in developing the National Infrastructure Assessment. Should you have any questions regarding the detail of this response, please contact [name redacted] on [\[email address redacted\]](#) or [telephone number redacted].

Yours sincerely,

[signature redacted]

[name redacted]

[job title redacted]

Solent Local Enterprise Partnership

**TOGETHER.STRONGER**

*NIA Q1 - The Government has given the National Infrastructure Commission objectives to:*

- *foster long-term and sustainable economic growth across all regions of the UK*
- *improve the UK's international competitiveness*
- *improve the quality of life for those living in the UK*

*What issues do you think are particularly important to consider as the Commission works to this objective?*

The objectives align with LEP objectives but consideration should be given on how the NIA identifies the linkages between the various Infrastructure sectors and how collectively they are managed and become more efficient. Skills should also be recognised as critical to achieving these objectives and we would expect to see recognition to address the skills gap.

There needs to be more focus on increasing the volume of infrastructure improvements and the political will in the development of long term infrastructure investment in the UK. Developing a broad cross-party commitment to these projects is clearly an essential component of their long term success. Ensuring that priorities meet the needs of business in this regard will be critical.

Striving for modal integration in public passenger transport is important, and achieving a transfer from private to public transport should be an clear underlying theme of the NIA. This is based on the need not only to minimise carbon dependency and be more sustainable, but also to optimise infrastructure use in highly populated areas areas such as our cities. It should be noted that investment in infrastructure which supports local public transport can be helpful in persuading car users to transfer to public transport modes.

*NIA Q3 Do you agree that the NIA should cover these sectors in the way in which they are each described?*

The LEP supports all the sectors that are covered within the NIA. All these factors have a key part to play in delivering economic growth. As a coastal economy, we are pleased to see specific identification of flood defences as an economic infrastructure. Investment in flood defences will have a positive economic impact through the safeguarding of existing assets and also, critically, through unlocking future development opportunities.

With particular reference to transport it is important that local road networks form an important part on the analysis of transport need. Smart Infrastructure and the provision of adequate Broadband provision are also crucial and needs to be considered in addition to all the equally important sectors outlined in the NIA consultation.

The Solent LEP is also strongly supportive of Lord Mountevans Maritime Growth Study. This identified that 95% of the UK's goods trade by weight and 75% of its value is handled by Ports. International trade will be critical to the future of our economy and, as a Maritime Nation whose shipping industries are vital to many sectors across the UK, the Solent LEP would welcome strong recognition of international gateways within the sectors to be covered and, specifically, the importance of UK Ports.

*NIA Q7 Are there any other cross-cutting issues that you think are particularly important?*

There needs to be recognition of the skills gap. This is a particularly important issue that needs addressing. Consideration should also be given to cross boundaries of LEPs and the Infrastructure that sits outside a particular LEP area but still has an impact to that particular LEP area. Partnership working across LEP geographies in this regard should be encouraged and supported.

*NIA Q8 Do you agree with this methodological approach to determine the needs and priorities?*

The LEP agree with the ambitious approach as outline in the NIA consultation. We recognise that this will be challenging based on the various local approaches of infrastructure asset management and growth objectives within different regions of the UK.

*NIA Q9 Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?*

The business led approach to developing a Strategic Transport Investment Plan for the area has worked well at a Strategic level in the Solent. Funding will clearly be critical to delivering this and the model used within LEPs through the Local Growth Deal has had a positive impact on project prioritisation. Since its inception there has been significant public and private investment into local projects. However the challenge is multi year large value projects, the certainty of future years funding and the issues to address such as planning and the processes involved and environmental constraints.

*NIA Q10 Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?*

- *Population and Growth*
- *Economic Growth and Productivity*
- *Technology*
- *Climate change and environment*

Yes, the LEP believe the NIC has identified most of the important infrastructure drivers and these align with our LEP objectives. However skills also need to be considered to ensure we can support growth and the supply chain to delivery growth.

Within the context of economic Growth and Productivity, international trade should be recognised as a key factor and, as a result, the importance of Nations international gateways should be recognised.

*NIA Q11 the NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?*

The principals of the approach used to determine infrastructure projects under the Local Growth Deal could be used as an appropriate methodology to determine the NIA portfolio of investments with allocation to projects on a competitive basis to ensure those that will have most significant positive

impact on our impact are prioritised. Within this context, the priorities of local areas also need to be recognised and strategic transport priorities identified by the business community through LEPs taken into account.

*NIA Q12 In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?*

It is important that the work of the NIC and the NIA take into account and properly align with local plans. There is also a need to recognise that infrastructure for 'transport' isn't always the same thing for freight and passengers.

*NIA Q13 How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?*

The Solent LEP strongly believes that the Business community is a critical stakeholder with regards to strategic infrastructure investment and that Government should work with Local Enterprise Partnerships to ensure that these priorities are considered within the prioritisation process.

**‘The National Infrastructure Assessment, Process and Methodology, A Consultation’, The National Infrastructure Commission, May 2016  
Representations made on behalf of Solum Developments Limited Partnership**

Question No.	Question	Representation
1	<p>The Government has given the National Infrastructure Commission objectives to:</p> <ul style="list-style-type: none"> <li>• foster long-term and sustainable economic growth across all regions of the UK</li> <li>• improve the UK’s international competitiveness</li> <li>• improve the quality of life for those living in the UK</li> </ul> <p>What issues do you think are particularly important to consider as the Commission works to this objective?</p>	<ul style="list-style-type: none"> <li>• The realisation of the Commission’s objectives are directly related to the successful delivery and funding of infrastructure. Issues associated with deliverability and funding need to be fully explored and analysed as part of the National Infrastructure Assessment.</li> <li>• The relationship between economic growth and infrastructure delivery must be considered fully. No doubt, infrastructure has a key role to play in enabling growth and economic output, but the reverse must be explored. In considering the deliverability and funding arrangements/models for infrastructure, the Commission must recognise that growth itself is key in enabling infrastructure to be delivered.</li> <li>• More upfront certainty regarding the deliverability of infrastructure projects needs to be created to encourage funding and investment. Particularly key in this respect is the need for forward funding, especially where the funding of infrastructure is based on contributions from various different sources and linked to different enabling developments.</li> <li>• To assist with competitiveness and the upfront/early certainty mentioned about, the Commission should consider options and recommendations for more favourable and simplified planning regimes - such as delivery and planning frameworks geared e.g Opportunity Area Planning</li> </ul>

		<p>Frameworks in London, or Development Corporations e.g. that associated with the regeneration of Old Oak Common.</p> <ul style="list-style-type: none"> <li>• One of the Commission’s objectives is stated as improving quality of life. It would be helpful for the Commission to provide more clarity on what this means. Given this is a Government objective it would be helpful to understand how the Commission interprets this. In particular, what are the indicators and does ‘improve’ mean to make progress relative to today’s quality of life or relative to a future baseline? 2050 or interim years?</li> </ul>
2	<p>Do you agree that, in undertaking the NIA, the Commission should be:</p> <ul style="list-style-type: none"> <li>• Open, transparent and consultative</li> <li>• Independent, objective and rigorous</li> <li>• Forward looking, challenging established thinking</li> <li>• Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?</li> </ul> <p>Are there any principles that should inform the way that the Commission produces the NIA that are missing?</p>	<ul style="list-style-type: none"> <li>• We fully agree with all these points, although we would flag-up the need for transparency to be approached carefully where confidential commercially sensitive information is being considered.</li> <li>• It would be beneficial for the reference to ‘whole system approach’ to be clarified. Paragraph 31 refers to the National Infrastructure Assessment assessing the UK’s infrastructure system as a whole, but there is also a need to assess the infrastructure system in relation to future land use planning – especially when considering ‘the potential interactions between its infrastructure recommendations and housing supply’ (paragraph 8).</li> <li>• We fully agree and support the need for the Commission to take a consultative approach to the preparation of the National Infrastructure Commission. As part of this, it is inevitable and necessary that the Commission will need to act as mediator and collaborator between competing interests, especially the balancing of national and local priorities and needs.</li> </ul>

3	Do you agree that the NIA should cover these sectors in the way in which they are each described?	<ul style="list-style-type: none"> <li>• We fully agree that the NIA should cover the sectors as described, although the relationship with the built environment should be more comprehensively recognised, assessed and prioritised. This is particularly because of the criticality of the built environment to issues of funding and financing of infrastructure (i.e. enabling development).</li> <li>• The built environment needs to be more holistically considered including other development sectors – not just housing, but also commercial development. The interplay with other Government initiatives should also be recognised e.g. town centre regeneration and renewal, optimising housing delivery on surplus public sector land.</li> <li>• The transport sector (paragraph 42) refers to ‘the impact of future transport provision on the energy sector’ as a ‘critical interdependency’, but the impact of future transport provision on regeneration and the housing crisis is also a critical interdependency which should be highlighted.</li> </ul>
4	Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?	<ul style="list-style-type: none"> <li>• Paragraph 42 refers to the ‘analysis of transport need’, and we consider that ‘need’ should be clarified – does this refer only to the need for capacity, or should it be made clear that there are also needs in terms of journey time reliability, connectivity and quality of the passenger experience? These aspects should be addressed and included in paragraph 55.</li> </ul>
5	The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?	<ul style="list-style-type: none"> <li>• The UK’s cities are particular areas where interdependencies are important, due to the density of population and infrastructure provision. London is especially relevant in this respect, noting the findings of the Commission’s report on ‘Transport for a World City’ (March, 2016).</li> </ul>

6	Do you agree that the NIA should focus on these cross-cutting issues?	<ul style="list-style-type: none"> <li>• We agree that the National Infrastructure Assessment should focus on the stated cross-cutting issues. However, particular priority should be afforded to issues of funding, financing, planning, governance and decision-making as these currently tend to be the key problem areas and blockages to delivery.</li> <li>• Paragraph 50 rightly refers to the delivery of infrastructure in a more affordable way. However, this should be expanded to include the affordability of future maintenance requirements, and potentially this will require consideration of future ownership structures.</li> <li>• The National Infrastructure Assessment should be promoting mechanisms for joined up infrastructure and land use planning. Collaborative working with Local Planning Authorities should be further encouraged but the importance of integrated planning is so significant that the NIC will also need to consider very closely its role as part of a process of joint working, particularly with larger, devolved authorities. Legislative changes should also be considered, to enable further cross boundary land use and infrastructure development, for example transport corridors.</li> </ul>
7	Are there any other cross-cutting issues that you think are particularly important?	<ul style="list-style-type: none"> <li>• There is currently no reference made to land and the availability of it. Clearly, the delivery of infrastructure requires delivery/funding strategies to be formed, land acquisitions made and consents obtained. The issue of land acquisition, and the problem areas this throws up (especially in terms of Compulsory Purchase Orders (CPO)) is not mentioned in the Commission's consultation document. This appears to be a significant oversight and we would urge the Commission to consider issues associated with land</li> </ul>



		<p>availability and acquisition as part of the National Infrastructure Assessment.</p> <ul style="list-style-type: none"> <li>• In terms of CPO we recognise the Government’s recent efforts to streamline the process and acknowledge further change is likely. The CPO regime and its interplay with the deliverability and funding of infrastructure should be considered by the Commission. We urge the Commission to be bold in considering options and recommendations for CPO reform.</li> <li>• Government policy since 1994 has aimed to ‘improve the integration of land use planning and transport in order to achieve more sustainable patterns of development’. This principle remains in the National Planning Policy Framework and has permeated through all levels of planning policy. This objective should be stated more explicitly by the Commission</li> </ul>
8	Do you agree with this methodological approach to determine the needs and priorities?	<ul style="list-style-type: none"> <li>• The principle of a methodological approach is agreed, subject to an appropriate approach being taken so that the methodological approach does not lead to overly-extended analysis and decision-making timescales (which would conflict with the need to expedite decision-making).</li> <li>• The current methodology enables priorities to be determined within sectors, but it is unclear how priorities would be determined across sectors – between rail and energy for example. Further clarity should be provided in this regard.</li> </ul>
9	Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?	<p><b><u>DELTA:</u></b></p> <ul style="list-style-type: none"> <li>• The DELTA package has been developed by David Simmons Consultancy since 1995. DELTA is designed to interact with</li> </ul>

		<p>any appropriate transport model in order to create a full model of interactions between land-use, economy and transport. Land uses and economic activities take time to change, so these interactions are modelled over time. DELTA provides land-use or economic inputs to the transport model, which generate demands for transport. The transport model provides measurements of accessibility and environment to DELTA, which influence the location of households, production and jobs. The models can focus on change within one city, across a region or group of regions, or on a combination of both levels.</p> <p><b><u>MEPLAN:</u></b></p> <ul style="list-style-type: none"> <li>• MEPLAN is a software package for analysing and evaluating land-use and transport policies. It can be used in planning cities, counties, regions or larger areas.</li> <li>• MEPLAN is based on the concept that at any level land use and transport affect one another. The spatial pattern of land use and economic activity creates the demand for transport to move people and goods between places. The availability and efficiency of transport influences the choices people make about where they live and work, where employers locate their businesses and where developers choose to build. MEPLAN analyses these relationships, and predicts and evaluates the many impacts that planning decisions will have on land-use and transport.</li> <li>• MEPLAN looks at market demand and supply for both land and transport. On the land-use side, activities such as industry, retailing, and residential create demand for industrial land, retail floorspace, and housing. The relationship of supply to demand influences prices for space</li> </ul>
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		<p>in each location, and the resulting pattern of prices influences where people choose to live and work. As demand increases, property prices rise. If the supply of land exceeds demand, then prices will fall. Such decisions are also influenced by the state of the transport system for travel: from home to work, from home to shop, from factory to purchaser, and so on. This depends on the supply of and demand for transport.</p>
10	<p>Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?</p>	<ul style="list-style-type: none"> <li>• There are additional important infrastructure drivers which need to be considered in relation to key Government policies and objectives. For example, the housing crisis, UK's competitiveness in light of 'Brexit', the release of surplus public sector land for development, and town centre regeneration.</li> <li>• We note the pertinent references to agglomeration benefits under the 'Economic Growth and Productivity' heading on page 25. We think agglomeration benefit is a key indicator in respect of the Government's priorities to 'foster long-term and sustainable economic growth across all regions of the UK' and 'improve the UK's international competitiveness'. Accordingly, agglomeration benefits should be weighted in the assessment methods in order to prioritise projects based on their agglomeration.</li> </ul>
11	<p>The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?</p>	<ul style="list-style-type: none"> <li>• Paragraph 68 refers to prioritisation, including a comment that 'The Commission will establish how different options requiring public expenditure stack up within its fiscal remit'. We propose that the methodology for prioritisation and assembling the portfolio of investments should include consideration beyond public expenditure to identify which projects can leverage private sector investment.</li> </ul>

12	In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?	<ul style="list-style-type: none"> <li>• Deliverability and programme issues should be addressed. A particular issue is related to the capacity of the decision-making process to handle an increase throughput of infrastructure project proposals. The Hybrid Bill process is clearly limited in terms of Parliamentary time being available. Furthermore, the DCO and TWAO process can also be time-consuming – so assembling a portfolio of investments to be delivered over a realistic programme needs to have regard to the decision-making timescales.</li> <li>• As a related and consequential point, it is possible that the decision-making process may require further review or increased resourcing to avoid it becoming a bottleneck to delivery.</li> </ul>
13	How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?	<ul style="list-style-type: none"> <li>• In order to engage with different parts of society to help build an evidence base and test its conclusions we would recommend identifying and critiquing key project case studies and engagement with stakeholders involved (considering both successful and unsuccessful projects).</li> </ul>

End.

**Solum Developments Limited Partnership**  
**Date: 5<sup>th</sup> August 2016**

**[email address redacted]**

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**From:** [name redacted] [email address redacted]  
**Sent:** 03 June 2016 10:43  
**To:** NIA Evidence  
**Subject:** National Infrastructure Assessment response [OFFICIAL]  
**Attachments:** Major Infrastructure Projects in Chiltern and South Bucks.docx

**Categories:** Red category

I would like to give you the experience of a small district council which is heavily impacted by national infrastructure proposals which is a considerable drain on our resources and is frustrating dealing with multiple proposals – mainly promoted by DFT for which there is no coordination between projects – and no recognition of the cumulative impacts on the quality of life for local businesses and residents who are faced with continuous construction impacts for well over a decade.

As you can see from the attached table Iver in the south east corner of the District is affected by 5 nationally significant infrastructure projects.

In addition to these it is likely to be the focus of significant volumes of new house building to deliver housing need in the District due to environmental constraints elsewhere in the District. There are proposals supported by Highways England for a new motorway service area between junctions 15 and 16 on the M25 which runs through the middle of Iver, together with early stage proposals to increase capacity of the M25 between junctions 10 and 16 as part of the M25 SW Quadrant Study. The third runway proposal preferred option for Heathrow is located on the south side of the M4 to Iver adjacent to the District (and County boundary). This is also the location for the recent SIFE proposal for a strategic rail freight interchange – this was considered by a recent public inquiry for which a Secretary of State decision is awaited.

Kind regards

[name redacted]

**[name redacted]**  
[job title redacted]  
South Bucks District Council  
[\[email address redacted\]](#)  
[phone number redacted]

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Lord Adonis  
Interim Chair of the National Infrastructure Commission  
Sent by email to [NIAEvidence@nic.gsi.gov.uk](mailto:NIAEvidence@nic.gsi.gov.uk)

3 August 2016

Dear Lord Adonis

## Response to National Infrastructure Assessment consultation

### Introduction / Summary

South East England Councils (SEEC) brings together local authorities from all tiers and parties to address shared concerns. **We are clear that supporting the South East's high-performing economy is essential to maintain growth in jobs, productivity and GVA post Brexit across the whole UK.** The South East is the most profitable part of the nation, but suffers from major infrastructure deficits which if not addressed urgently will undermine future economic success. Our response to the National Infrastructure Assessment (NIA) consultation identifies how it, and associated National Infrastructure Commission actions, can help unlock the South East's economic potential for the whole UK:

- **In broadly welcoming the approach proposed for the NIA, our response emphasises the importance of developing a balanced infrastructure investment portfolio across the UK to ensure all areas grow. We recognise the need to include regeneration projects with lower returns, but the portfolio must also include investment to support high-return projects in the South East which can support growth across the whole UK.**
- **The South East is one of only three areas with a track record in generating enough income to help the Treasury help other areas: a net profit of £80bn returned to the Treasury between 2002-12, some £6bn more than 2<sup>nd</sup> place London. But to continue to do this, we need more investment and freedom to deliver in the South East, which will lead to direct benefits with growth in jobs, economic output (GVA) and quality of life.**
- **Emerging results from newly-commissioned research provisionally estimate the South East has a £14bn infrastructure funding gap over the next 15 years.** Better infrastructure will help us encourage businesses to stay in the South East rather than relocate to EU member states. First class businesses won't stay put for third class infrastructure. Road and rail routes through the South East are congested, overcrowded and inefficient, damaging business profitability and making the UK less attractive globally as an investment option.
- **The impact of South East infrastructure is national, not just local.** Companies from across the UK rely on our transport gateways to reach international markets. However those transport links are increasingly congested, creating problems for businesses, commuters, residents and the environment. All tiers of council leaders are keen to help Government and the Commission understand and support the South East's key strategic transport projects - for example as set out in SEEC's recent [Missing Links](#) report, which highlights vital strategic investments needed to secure the South East's ongoing success as the UK's economic engine room
- **With the largest population in England, infrastructure including transport and public services is also vital to ensure a sustainable future for the South East's growing communities.** At 9m people the South East already has the UK's largest population and achieves the largest growth in homes – some 28,360 extra homes in 2014-15, more than any other part of the nation – but without infrastructure up-front for development we cannot be certain of sustaining this level of growth.

- **In the South East there is great interest among councillors in helping to develop innovative approaches to fund the infrastructure needed to ensure continued economic success of the South East engine room.** At £8.5bn pa the South East has the UK's 2<sup>nd</sup> highest total of business property rateable values but councils see little of this to spend in their areas. We would welcome the Commission's support in persuading the Treasury to work with us and allow councils a share of locally generated taxes to help invest in economic growth and infrastructure.

## RESPONSES TO CONSULTATION QUESTIONS

### **OBJECTIVES**

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK.**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

The South East is the engine room of the UK economy. It is one of only three areas with a track record in generating enough income to help the Treasury fund growth projects in other areas: a net profit of £80bn returned to the Treasury between 2002-12, some £6bn more than 2<sup>nd</sup> place London. But to continue to do this, we need more investment and freedom to deliver. **In considering the NIA objectives, it will be important for the Commission to address the following issues:**

#### **Objective 1 - Fostering long-term and sustainable growth across all parts of the UK**

- The NIA should make clear how it will help secure a balanced investment portfolio across the whole UK. Investment in high-return projects that are vital in the South East will also offer high return on investment which can support growth across the UK.
- Given existing pressure on - and deficits in - South East infrastructure, it must not be assumed that the South East can continue to be successful without investment, or that investment is primarily required in regeneration areas where results are unproven. By investing in the South East's proven track record of direct impact from investment (eg jobs, GVA), not only can South East success be sustained, but also growth across the whole UK.
- In defining growth, it will be important for the NIA to include infrastructure to support locally-approved housing plans. With 9 million residents the South East already has England's largest population, as well as the biggest home growth (28,360 in 2014-15). Infrastructure up-front before development takes place is vital to ensure South East growth is sustainable.

#### **Objective 2 - Improve UK's competitiveness**

- As the UK moves towards Brexit, particular attention should be given to investment in areas such as the South East which have a track-record of securing high return on investment - money that can then be re-invested in infrastructure to support competitiveness across the UK.
- Emerging findings from recently commissioned research by Local Government Futures provisionally show a £14bn South East infrastructure funding gap over the next 15 years. Tackling this will be vital to improving South East economic success for the whole UK - by attracting, retaining or growing businesses; but also improving potential for increasing South East productivity, which at £27,000 per head (2014, workplace-based GVA) lags considerably behind first place London's £43k, and only just above the national average.

#### **Objective 3 - Improve quality of life**

- In defining 'quality of life' the NIA should make clear that it includes a range of issues including tackling transport congestion and overcrowding, and access to services – particularly important given the South East's 9 million population, the largest in the UK. It should also include consideration of how Green Infrastructure, including the South East's approx. 1 million acres of statutory protected green space, including AONB, National Parks, SSSI, as well as Green Belt, can be sustained in the face of significant growth pressures – the environmental quality of the South East is important not only to our residents, but also to businesses who value the quality of life it supports.



**The NIA should also include criteria for measuring outcomes to steer priorities for infrastructure investment.** These should include:

- Economic growth – jobs and GVA
- Return on investment
- Housing growth supported
- Journey reliability
- Social benefits/number of people benefitting
- Environmental benefits.

#### **PRINCIPLES**

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- ***Open, transparent and consultative***
- ***Independent, objective and rigorous***
- ***Forward looking, challenging established thinking***
- ***Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedback?***

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

We agree with these principles for the Commission to undertake the NIA. **In being open, transparent and consultative, the Commission should ensure opportunities for all tiers of South East council leaders to inform its approach, priorities and criteria for selecting schemes, given councils' local and strategic understanding of issues.** Leaders are keen to help Government and the Commission understand and support the South East's key strategic transport projects - for example as set out in [SEEC's recent Missing Links report](#), which highlights vital strategic investments needed to secure the South East's ongoing success as the UK's economic engine room (see response to questions 11-12 for examples).

#### **NIA SECTORS**

**Q3. Do you agree that the NIA should cover these sectors (transport; digital & communications; energy; water & drainage; flood defences; waste) in the way in which they are each described?**

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

**In addition to those sectors already identified, the following should be considered in the NIA:**

- **Strategic-scale public services** which are vital to the sustainability of our growing communities, in particular relating to strategic health provision eg hospitals.
- **Green Infrastructure** and how the South East's approximately 1 million acres of statutory protected green space, including AONB, National Parks, SSSI, as well as Green Belt, is maintained and sustained given our high levels of growth. This is important not only for South East residents' quality of life but also as a factor in global businesses choosing to locate here.

**In considering flood defences as a sector,** a key aspect for the NIA should be ensuring support for schemes that protect areas facing significant economic risks from flooding, as well as the personal cost to people and their homes. For example major floods in 2014 had a great impact on the South East's businesses and economy eg costing Surrey's economy £300m and Oxfordshire's approximately £50m a week; and at £63m the long-term capital costs of repairing damaged roads and flood defences in Hampshire amounted to nearly half the county council's total budget for highways, transport, planning and waste.

We understand the 'built environment' (eg housing) will not form a key sector for the NIA. However we emphasise it is vital that the NIA recognises the role infrastructure plays in opening up and supporting housing and employment developments. This is particularly important for the South East given our large growth in homes – 28,360 in 2014-15, the highest in England – but also our existing infrastructure deficits.

#### **NIA CROSS-CUTTING ISSUES**

**Q6. Do you agree that the NIA should focus on these cross-cutting issues (ie Geography and local growth; Funding and finances; Cost delivery and resilience; Governance and decision making; Evaluation and appraisal methodology; Performance measures)?**

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

**In progressing these cross-cutting issues, the NIA should reflect the following amendments and particular points of importance:**

- **Geography and local growth** – a key aspect will also be to look at what contribution each local area's growth can make to UK growth as a whole.
- **Funding and finances** – SEEC would welcome support through the NIA for freedoms/powers for councils to help fund infrastructure. We are currently working with Local Government Futures on innovative proposals and will be pleased to share results with the Commission later this year. At £8.5bn p.a. the South East has the 2<sup>nd</sup> highest total of business property rateable values in the UK but councils see little of this to spend in their areas. **We would welcome the Commission's support in persuading the Treasury to work with us and allow councils a share of locally generated business rates and other taxes to help invest in economic growth and infrastructure.**

Previous work by SEEC for example showed across the South East, business rates (once the national multiplier was applied) were forecast to raise £3.41bn in 2015-16, compared to ring-fenced grants of £2.7bn. If allowed to keep business rates in lieu of ring-fenced grants this would allow South East councils to invest an additional £700m in infrastructure to support business growth in one year alone. For 2015-16 if South East councils kept 100% of collected business rates, Stamp Duty and Annual Tax on Enveloped Dwellings they would generate income of £5.8bn. This is £3.1bn higher than the amount received in non-ring-fenced grants from central Government which could contribute to better infrastructure.

- **Governance and decision making** – this must include a role for all tiers of councils to influence and shape large strategic transport infrastructure which is currently not under their control eg Highways England, Network Rail etc.

**A further cross-cutting issue should be added: 'Impact on UK economic performance and international competitiveness'.** This reflects the importance of sustaining and growing the UK's economic success post-Brexit.

#### **METHODOLOGY**

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (Population & demography; Economic growth & productivity; Technology; Climate change & environment)? Are there further areas the Commission should seek to examine within each of these drivers?**

**In determining infrastructure needs and priorities, outcomes/benefits should be central to the NIA/Commission's decision making.** As set out in our response to Q1, measures should include:

- Economic growth – jobs and GVA
- Return on investment
- Housing growth supported

- Journey reliability
- Social benefits/number of people benefitting
- Environmental benefits.

**In finalising the following infrastructure drivers, the NIA should reflect:**

- **Population & demography** – the South East has the largest, and most rapidly ageing, population. Infrastructure to support the resulting high levels of demand is vital. It will be important that the factors driving our population growth, including the relationship with neighbouring London, are factored into infrastructure investment decisions nationally.
- **Economic growth & productivity** – this must include not only local but also national impacts.

#### **FINALISING THE NIA**

***Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?***

***Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?***

**In setting out the NIA portfolio of investments, it will be important that these are based on clear outcome criteria as set out in response to earlier questions** ie. economic growth - jobs and GVA; return on investment; housing growth supported; journey reliability; social benefits/number of people benefitting; environmental benefits. It will also be important to take account of the national benefits that schemes bring – not just the local benefits.

**SEEC has undertaken work with councils across the South East to identify 5 key South East strategic transport schemes that perform strongly on these measures, but which do not currently feature on national priorities – and which are beyond the scope of local budgets.**

Many elements of these headline projects are also identified in Local Enterprise Partnership (LEP) Strategic Economic Plans, which highlight where improvements are needed within each LEP area to remove constraints on economic growth. Better north-south routes and east-west connections are needed to improve national access to major South East ports and airports and link key economic centres. **Support for these 'Missing Links' would improve UK competitiveness and we call on the Commission to help us progress them through the NIA and other actions:**

- A34/M3 and rail links to Southampton-Portsmouth from Oxford, West Midlands & beyond.
- A2/M2 - links to the Channel Tunnel & Dover from London, the East, the Midlands & beyond.
- A27/M27/A259 - from Dover to Southampton-Portsmouth, through developing coastal economies.
- Oxford to Cambridge, including improved A34/M40 link.
- North Downs Rail - from Oxford, through Reading and Gatwick Airport to Ashford in Kent.

#### **ENGAGEMENT**

***Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?***

**Engagement with all tiers of council leaders will help the Commission understand a wider range of economic, social and environmental factors affecting infrastructure needs and priorities across the South East.** We would welcome engagement with the Commission collectively through South East England Councils, as well as more locally with individual councils.

Yours sincerely

[signature redacted]

[name redacted],  
[job title redacted], South East England Councils  
and Leader, Tonbridge & Malling Borough Council

[signature redacted]

[name redacted],  
[job title redacted], South East England Councils  
and Leader, Hampshire County Council

**The National Infrastructure Assessment  
Process and Methodology  
A consultation by the National Infrastructure Commission  
Submission by the South East Strategic Leaders**

This submission is made on behalf of the South East Strategic Leaders (SESL - see Annex 1).

Some questions, posed together in the Commission's consultation document, have been grouped together in providing a response on behalf of SESL.

**Q1.** The Government has given the National Infrastructure Commission objectives to:-

- foster long-term and sustainable economic growth across all regions of the UK;
- improve the UK's international competitiveness;
- improve the quality of life for those living in the UK.

What issues do you think are particularly important to consider as the Commission works to this objective?

**SESL's views:** The Commission should think about the relationships between the economic regions, such as those between London and the South East, and how these relationships can be improved to the benefit of each region. Examples might include rail links between London and the South East to serve both commuting, leisure and freight movements between the areas in the best interests of communities in each area.

The Commission might consider the importance of being proactive rather than purely reactive in identifying opportunities and challenges. This could include the possibility of working with local authorities, partnerships and communities to identify infrastructure needs.

In seeking to improve the quality of life for residents, the Commission should directly involve local partners, such as local authorities, statutory Sub-National Transport Bodies, other potential sub-national bodies and partnerships, in informing and reaching conclusions on national infrastructure. This includes the consideration of national infrastructure managed by bodies such as Highways England and Network Rail.

**Q2.** Do you agree that, in undertaking the NIA, the Commission should be:-

- open, transparent and consultative;
- independent, objective and rigorous;
- forward looking, challenging established thinking;

- comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

**SESL's views:** SESL agrees that the Commission should be open, transparent, objective and comprehensive. The Commission should be clear in setting out what constitutes national infrastructure, including setting out any defining factors related to scale, impact, importance to the nation or combinations of these or other factors.

The Commission states that it wishes to take a comprehensive whole system approach. Whilst this is a laudable aim, there is a risk danger the process could become a very large data analysis project rather than maintaining a focus on modelling that reflects the real world. In looking at changes in demand and scenario planning, the Commission should be aware of the potential impacts and implications of "disruptive" technological or societal change. The Commission might want to plan for uncertainty when developing a view on national infrastructure needs by using planning scenarios. The Chartered Institution of Highways and Transportation has been doing some work on this subject, building on experience from New Zealand.

The Commission should aim to be more collaborative rather than purely consultative. This could include working with local authorities, partnerships and communities to identify infrastructure needs and challenges.

**Q3.** Do you agree that the NIA should cover these sectors in the way in which they are each described?

**Q4.** Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

**Q5.** The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?

**SESL's views:** The Commission should aim to provide clarity and, where possible, precision as to the aims and objectives of its assessment so that the scope of the NIA is clear and all parties have certainty as to how proposals will be handled. Comments on some particular sectors are listed below.

**Transport** – The Commission makes reference to a 'multi-modal approach' which SESL would support as this could have significant implications for the future ports, airports, hubs and links across the South East.

The Commission should also look at the longer term impacts of technology (such as telecommunications) and innovative or emerging forms of travel and delivery (such as personal "pods" and drones) and the potential to reduce the need to travel by traditional means.

The Commission should consider how best to look at transport in partnership with the planning authorities and processes so as to influence the creation of places built around human and business needs rather than just the needs of vehicles.

The Commission should also consider the potential to influence growth, not simply respond to a need for new or improved infrastructure. National scale transformative infrastructure can change patterns of business and trade within the UK and perhaps open up new opportunities. For example, there is currently less transfer between Kent and Essex than might be expected due to severance caused by the River Thames Estuary. Linking the two economies via a Lower Thames Crossing has the potential to create one larger and more efficient economy with businesses trading over larger areas and employers and employees having greater options.

The Commission should be aware that a key aspect of the drive towards creating statutory Sub-National Transport Bodies is the desire on the part of local partners to work with greater certainty of the funding available. The partners to a Sub-National Transport Body will be looking for a 5-year funding envelope with an indicative funding envelope for the following 5 years. Having greater certainty on the funding envelope for the public sector would provide the potential to be more innovative in terms of investment by working with private sector partners on a collaborative basis. It would, therefore, be particularly helpful if the Commission aimed to consider schemes that would feed into and support similar timescales.

The Commission might consider the role of local authorities and or other bodies commissioning work. The capacity and processes of some parties might, at times, be stretched by the scale and nature of work being undertaken and the range of parties involved. Local authorities might want to work towards collaborative delivery by taking on the role of programme management. It is quite feasible to use collaborative arrangements to satisfy any relevant statutory requirements whilst giving projects the direction and momentum to get them delivered.

The Commission might be aware that the concept of a 'Major Road Network' is emerging. This would be a combination of Highways England's Strategic Road Network and the more significant local transport authority-owned roads (such as the A418 and the A41 in Buckinghamshire). Local strategic partnerships, such as the England's Economic Heartland Strategic Alliance, are developing overarching transport strategies that will include the concept of the Major Road Network. Such partnerships and other arrangements including devolution deals, might make a case for the ring-fenced Road Fund Tax to be available for investment in the Major Road Network rather than just being restricted to Highways England's network.

This stresses the point that the Commission should be aware of, and open to, the potentially game-changing arrangements that might come about through local strategic arrangements and devolution deals.

**Digital and communications** – SESL agrees with the need to invest in digital infrastructure, including the need to consider emerging and future technologies.

In undertaking an assessment of national infrastructure needs, the Commission and its partners should not solely base that assessment on the basis of projecting forward current infrastructure technologies. New and potentially “disruptive” technologies, and their impacts, should be considered. For this reason, the use of different planning scenarios is important and welcomed.

**Energy** – Whilst the Commission states that it will not consider ‘upstream energy extraction’ it is important to be clear on what activities the Commission will consider.

The Commission should consider the constraint on planned growth imposed by the current regulatory framework which makes it very difficult for a company to invest in the supply networks (such as sub-stations) in anticipation of planned growth. As a consequence, the capacity in existing networks becomes increasingly limited to the extent that even relatively small developments are asked to pay for significant investment to achieve a step change in capacity, which is reflected in the costs of that investment. This can become a barrier to bringing forward development, as shown by recent examples. The Commission might wish to advice on investment priorities and regulatory frameworks.

**Water and drainage** – The Commission makes little reference to drainage and what role the Commission will play in considering proposals to improve drainage and avoid or alleviate flooding especially in areas where such proposals would help deliver local and national priorities of housing development and economic growth. The Commission might usefully set out what issues and priorities it will assess in relation to drainage.

The Commission should consider the constraint on planned growth imposed by the current regulatory framework which makes it very difficult for a company to invest in the necessary infrastructure (such as water abstraction and waste water treatment works) in anticipation of planned growth. As a consequence, the supply and waste water treatment capacities become increasingly limited, to the extent that even relatively small developments are asked to pay for significant investment to achieve a step change in capacity or the development is not brought forward. This can become a barrier to bringing forward development, as shown by recent examples. The Commission might wish to advice on investment priorities and regulatory frameworks.

**Flood defence** – Should Commission should seek the involvement of the relevant bodies, including Regional Flood Committees, in the consideration of the need and proposals for flood prevention and alleviation. This should include the links to the local and national growth agenda and the consequences of providing, or not providing, appropriate infrastructure.

**Waste** – Major waste management infrastructure (such as plants to release energy from waste) would benefit from a larger than local approach in order to achieve economies of scale, avoid duplication and ensure appropriate access arrangements.

**Infrastructure needs across sectors** – There is a need to look at infrastructure needs across sectors. However, it is not clear that this it is possible to achieve this efficiently at a national level. Successive Governments

have sought to join up things in Whitehall, but it has proved very difficult to do that. It might be easier to work at sub-national level, where there is sufficient scale to enable strategic planning but local and discrete enough to understand local needs. The Commission, and indeed the Government, might consider the need to look to sub-national arrangements or partnerships to do the joining up, perhaps along the lines of statutory Sub-National Transport Bodies or through devolution.

**Q6.** Do you agree that the NIA should focus on these cross-cutting issues?

**Q7.** Are there any other cross-cutting issues that you think are particularly important?

**SESL's views:** It seems reasonable that the NIA should focus on the cross-cutting issues identified. In terms of performance measures, the Commission might consider the effects of investment and infrastructure delivery on the measures of deprivation in looking for the most appropriate ways of accounting for the value and quality of the services provided.

In looking at the best methods for measuring the performance of infrastructure assets, the Commission might consider the need to plan for the long-term management and, if necessary, replacement of an asset.

**Q8.** Do you agree with this methodological approach to determine the needs and priorities?

**SESL's views:** The methodological approach seems reasonable and appropriate.

**Q9.** Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

**SESL's views:** The proposed methodology, including a baseline, modelling, evidence base, scenarios, prioritisation and so on, seems reasonable and appropriate.

**Q10.** Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?

**SESL's views:** The drivers identified appear to be realistic and holistic in that they cover economic, environmental and social issues.

**Population and demography** - This driver refers to ageing but could be more explicit about the needs of people of different ages, such as changing housing issues as people grow older and their needs change.



**Technology** - This driver refers to initiatives, such as smart ticketing, which are positive steps for increasing the efficiency of transport services.

**Q11.** The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

**Q12.** In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

**SESL's views:** It is important that infrastructure investment is guided by the need to facilitate and deliver growth. The Commission should, in all its work but especially in relation to transport infrastructure, seek to influence the achievement of growth, rather than simply respond to an identified "infrastructure need". National scale transformative infrastructure can change the patterns of business and trade within the UK. In this respect it is essential that the Commission works with local authorities, LEPs and other parties to facilitate housing and economic growth. It is also important that the Commission considers planned growth and land allocations alongside the key infrastructure drivers.

**Q13.** How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

**SESL's views:** It is important that the Commission learns from experience across all sectors of development as to the best ways to engage different parts of society. It is important to engage directly with local authorities, Area Economic Partnerships, LEPs, Local Transport Bodies and communities. It is also important that the Commission uses appropriate technologies and media platforms so that all sectors of society can be engaged and the comments received can be handled efficiently, effectively and transparently.

The consultation talks of the need for the Commission to engage with sub-national bodies. We have yet to see how this might be prescribed within the legislation establishing the Commission. However, given that Sub-National Transport Bodies (such as that proposed for England's Economic Heartland) will be established on a statutory basis and will require the Secretary of State to have regard to its Transport Strategy, local authorities would like to see a much stronger obligation on the part of the Commission to ensure its work is produced in partnership with any statutory sub-national partnerships.

## **Annex 1: South East Strategic Leaders (SESL)**

SESL members are some of the most innovative, high performing local authorities in the country committed to making the case for investment in the economic powerhouse of the UK and to driving public service excellence.

SESL is a partnership of 17 County and Unitary authorities from across Southern England. Its members include Buckinghamshire, Essex, Hampshire, Kent,

Oxfordshire, Surrey and West Sussex County Councils, all the Berkshire Unitary authorities - Bracknell Forest Council, Reading Council, Slough Borough Council, West Berkshire Council, Wokingham Council and Royal Borough of Windsor and Maidenhead - Milton Keynes Council and, by extending beyond the traditional South East, Central Bedfordshire, Swindon Borough and Wiltshire Councils.

Direct line: [telephone number redacted]  
Email: [email address redacted]  
Minicom: [telephone number redacted]

5<sup>th</sup> August 2016

**CONSULTATION ON THE NATIONAL INFRASTRUCTURE ASSESSMENT - PROCESS AND METHODOLOGY**

South West Water are please to provide a response to the National Infrastructure Assessment, and welcome further engagement with the Commission on this issue.

We have attached detailed responses to the consultation in Appendix one.

Yours Faithfully,

[name redacted]  
[job title redacted]

## **APPENDIX 1: RESPONSE TO CONSULTATION ON THE NATIONAL INFRASTRUCTURE ASSESSMENT - PROCESS AND METHODOLOGY**

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- ***foster long-term and sustainable economic growth across all regions of the UK***
- ***improve the UK's international competitiveness***
- ***improve the quality of life for those living in the UK***

**What issues do you think are particularly important to consider as the Commission works to this objective?**

We have addressed each of the bullet points in turn below:

- ***foster long-term and sustainable economic growth across all regions of the UK***

A circular economy maximises the sustainable use and value of resources, eliminating waste and benefiting both the economy and the environment. It offers an alternative to what is currently the predominant current (linear) approach where resources are used for one purpose and then discarded. This is an important concept that has been embraced by the EU through the EU Circular Economy package and we should ensure we are looking at the UK economy in a similar manner.

Devolution of infrastructure decision making creates some great opportunities to encourage local growth and development through devolved decision making to local politicians and enterprise partnerships. These local enterprise partnerships have a clearer appreciation of the local challenges facing a region and the balance of risk and cost that can be taken within the region. The challenge of any devolved approach is that local priorities may not align with national needs, resulting in distortions away from national optimums; whilst undesirable these may be acceptable if risks are managed and actively mitigated.

It is also important that resilience is clearly considered for each of the regions being considered, both in terms of potential impact, interactions across infrastructure and the support infrastructure delivers in the recovery phase. Of particular note is the role the Infrastructure Commission should play in the examination of infrastructure interactions and where this responsibility lies across the regulated utilities. An example of this would be that electricity networks are considering resilience

to a certain level of population served (ie >25000 population) whilst water companies may consider risks greater than 10,000 population. So whilst water treatment works may be protected they will not have a power supply. The Infrastructure Commission should consider these interactions and provide guidance to the regulated sectors around how cost allocations should be made across sectors and therefore the fair and reasonable economic burden that should be made between the different sectors and bill payers.

- ***improve the UK's international competitiveness***

In the waste management industry, both the Department for Business, Innovation & Skills (BIS) and Department for Environment, Food & Rural Affairs (DEFRA) have recognised their roles in intervening to assist UK resource security, including the availability of consistently collected, high-quality, secondary raw materials. A UK that aligns manufacturers, re-processors and recyclers therefore presents a real opportunity to position the UK on the international stage, competing against Europe and the far-east. But to do so we need to re-align a UK recycling system.

Against this backdrop, Europe is increasingly throwing away old thinking about waste and is recognising its value as a resource central to economic security and prosperity. We need to ensure we're embracing this thinking in the UK. Viridor is transforming waste to create quality materials and vital renewable energy, renewing our business inside and out, and working with our partners to give the world's resources new life.

Greater use of underground resources should be addressed whether it is minerals, energy or water.

- ***improve the quality of life for those living in the UK***

The UK will need to invest efficiently, affordably and sustainably in the provision of resilient infrastructure assets and services to contribute to the economic growth necessary to enhance the UK's position in the global economy, support a high quality of life and shift towards a low carbon future.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- ***Open, transparent and consultative***
- ***Independent, objective and rigorous***
- ***Forward looking, challenging established thinking***
- ***Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?***

***Are there any principles that should inform the way that the Commission produces the NIA that are missing?***

We agree that the NIA should follow the principles set out in the bullet points above.

We would be supportive of sharing our own experiences and helping develop these principles further should Government wish to implement any pilots or trials of this within the South West region. We believe that the Cornwall devolution deal offers a real and tangible delivery vehicle to pilot such an approach alongside our existing upstream and downstream thinking approaches.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

We broadly agree that the NIA should cover these sectors in the way described. Our views on flood defence however, cover a number of specific issues including;

- Climate change and extreme weather
- The evidential base of flooding and effective forecasting
- Designing for exceedance
- The duty to maintain flood defences
- Public perception and transparency
- Land drainage incentives for land owners and farmers
- Planning and the right to connect to sewer
- Private financing and a revenue return

Government should consider whether the Environment Agency should have a duty to maintain assets it has constructed, in a similar way as Section 37 and 94 of the Water Industry Act places a duty on water and sewerage companies.

***Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?***

Demand management plays a significant role in the delivery of water and sewerage services and waste services. These are incentivised by appropriate mechanisms such as outcome delivery incentives within the 2015-20 period; with additional mechanisms around upstream water trading and sludge management being considered further as part of the Water2020 price control methodology by Ofwat.

Modern, efficient energy recovery not only generates important baseload renewable energy for the UK, supporting energy security, but is capable of enabling social policy when linked with distributed energy and 'smart city' grids powered by energy recovery from residual waste in local authority and municipality areas.

A key focus for all policy and regulation is to plan for the resilience of services. Whilst a resilience duty has been added to most of the regulated utilities to incentivise efficient planning, a similar focus is also required for the non-regulated sectors which remain in public ownership. As we have highlighted above, we consider additional capacity, capability and funding is required within the management of flood defence whose current performance places at risk the resilience of the wider regulated sectors.

***Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?***

A concern we have, particularly on the waste market side is that discussions are too future focused, looking at the situation 10 to 30 years into the future. We also believe that waste must be considered higher up the agenda as a critical area of national environmental infrastructure alongside flood defences for water.

Resilience planning for the future should be across all infrastructure providers and should consider the overall loss of essential services and the impact this will have on homes and businesses. Specifically:

- There needs to be a clear focus on improving the national grid and local electricity networks long term.
- Decommissioning and dealing with legacy infrastructure in a sustainable manner will be an important outcome (e.g. landfill and leachate in waste).

We consider that sharing information from regulated sectors will be critical to enabling this form of cross-industry planning.

One aspect raised by the NAO in recent reviews has been the role Government should play in assessing the overall affordability of utility sector bills, and whilst these are being assessed by each Regulator independently, there is no overriding assessment of affordability of all customer bills. Given the NIC will be considering infrastructure investments across all regulated utilities it would have oversight of the impact of these infrastructure costs. Should the NIC therefore have any duties placed upon it around the overall affordability of such infrastructure investments?

***Q6. Do you agree that the NIA should focus on these cross-cutting issues?***

Yes.

***Q7. Are there any other cross-cutting issues that you think are particularly important?***

Resilience planning for the future should be across all infrastructure and utilities and should consider the overall loss of essential services and the impact this will have on homes and businesses. A resilience planning framework for all utilities, developed and monitored through the National Infrastructure Commission could potentially create the environment for joint working. Support in developing this framework could be provided by UK Regulators Network (UKRN) linked to individual incentives within each regulated sector price control.

Cross-sectoral working would also be best encouraged through the collaboration of industry trade bodies: Water UK, Environmental Services Association and joint-working of government departments such as BIS, DEFRA, DCLG with companies. Stakeholders need to work together in more collegiate manner to ensure the timing and benefits of investment are maximised. Cross-sectorial collaboration can be achieved where there is alignment and benefit to the parties involved.



Skills would be an example where as an industry, we wish to see more women involved in developing the infrastructure of the country and we should have stretch targets in place. This increases our band width to deliver.

Another key outcome would be creating an export platform from the skills and capability developed for skills, manufacturing and contracting.

***Q8. Do you agree with this methodological approach to determine the needs and priorities?***

Effective medium and long term planning across the infrastructure sectors is essential if disruptive technological advances are to be accommodated. Consistent planning guidance and frameworks will be essential to ensure these factors are appropriately considered.

Decision-making and planning of National or major regional infrastructure projects with asset lives in excess of 25 years such as in our business, should be apolitical.

***Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?***

As a WaSC, we are required to develop and implement five yearly Price Reviews (PR). These Business Plans cover the next AMP (5 year Asset Management Period) which is assessed by Ofwat.

In the production our 5 Year Business Plan, we have carried out extensive financial modelling to ensure that the investment decisions we make are prudent and we have a robust strategy in place to manage risks.

By reflecting an appropriate cost of capital, fine-tuning our investment programme and optimising our efficiency we have arrived at a plan which safeguards fair returns for investors and offers additional incentives for outperformance. The plan will also protect our customers from unaffordable bill increases.

Throughout the development of the plan we strive to achieve the best possible balance of activity and investment to meet the needs and priorities of our diverse range of customer and stakeholder groups.

***Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?***

We believe that the Commission has identified some of the most important infrastructure drivers. However, we consider that drivers of demand for infrastructure over the next 35 years should also include Resilience and adaptation, and Resource security.

### **Resilience**

Whilst each industry plans for resilience of services, it relies also on the other service providers for support, assuming that they will not be impacted in the same way at the same time. However, recent experience shows that some of the greatest vulnerabilities occur when all services are impacted in the same area at the same time and there are not clear priorities for responses. (i.e. energy companies incentivised to return power to household customer properties ahead of power to water treatment facilities.)

Resilience planning for the future should therefore be across all infrastructure providers and should consider the overall loss of essential services and the impact this will have on homes and businesses. Specifically:

- There needs to be a clear focus on improving the national grid and local electricity networks long term.
- Decommissioning and dealing with legacy infrastructure in a sustainable manner will be an important outcome (e.g. landfill and leachate in waste).

### **Resource Security**

The UK and global economy are experiencing periods of resource stress, driven by the scale and speed of demand growth from emerging economies and a decade of tight commodity markets. In addition to the depletion of global resources, the outlook is one of supply disruptions, volatile prices, accelerated environmental degradation and rising political tensions and protectionism over access to resources.

As the UK Government identified in its 2012 Resource Security Action Plan, global manufacturers increasingly cite access to resources as one of the biggest risks to their businesses.

([https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69511/pb13719-resource-security-action-plan.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69511/pb13719-resource-security-action-plan.pdf) )

In the waste management industry, both the Department for Business, Innovation & Skills (BIS) and Department for Environment, Food & Rural Affairs (DEFRA) have recognised their roles in intervening to assist UK resource security, including the availability of consistently collected, high-quality, secondary raw materials. A UK that aligns manufacturers, re-processors and recyclers therefore presents a real opportunity to position the UK on the international stage, competing against Europe and the far-east. But to do so we need to re-align a UK recycling system.

Against this backdrop, Europe is increasingly throwing away old thinking about waste and is recognising its value as a resource central to economic security and prosperity. We need to ensure we're embracing this thinking in the UK. Viridor is transforming waste to create quality materials and vital renewable energy, renewing our business inside and out, and working with our partners to give the world's resources new life.

Greater use of underground resources should be addressed whether it is minerals, energy or water.

With regard to **Population and demography**, in today's society we are becoming increasingly dependent on infrastructure to deliver essential services to homes and businesses across the UK. Whilst many aspects of the services are managed independently, the interactions between these services are becoming increasingly intertwined. Operational trends within infrastructure providers include smart networks where power, data and telecommunications become essential to ensure continuity of essential services such as water, electricity and gas.

Under **Technology**, consideration should be given to emerging technologies and disruptive trends. Technological change over the last two decades has resulted in significant changes in access to information and data allowing people to work and use their leisure time in very different ways. The continuation of this trend in technology and data suggests that current demands and trends on infrastructure may be disrupted by these technological advances resulting in shifting demands on

the service networks. Disruptive trends of this nature create risks for planning infrastructure and could well result in shortfalls in one area of infrastructure whilst simultaneously resulting in over capacity and stranded assets in another area.

Effective medium and long term planning across the infrastructure sectors is essential if these disruptive technological advances are to be accommodated. Consistent planning guidance and frameworks will be essential to ensure these factors are appropriately considered.

With regard to **Climate change and environment**, we believe that alongside the updating of design standards associated with extreme flooding event frequencies flood defence design should incorporate two further specific aspects;

- Adaptable modular designs
- Designing for exceedance

The first of these should be that construction designs should be adaptable allowing flood defences to be built higher in a modular manner allowing future costs to be minimised when flood defences need to be built higher in the future (i.e. the costs of abandoning existing assets are minimised).

These modular designs should also allow for temporary structures to extend the flood defence capability to be built during extreme flood events across a region (such as temporary flood barriers deployment).

Whilst the above maximises the capability of the existing primary defences, it is inevitable that there will still be a residual risk during extreme events that some of these defences will be overtopped. We consider that design principles should consider both the primary defence but then also what would occur if these defences were exceeded. These principles of “designing for exceedance” should consider the secondary routing that will occur and how highway design, property protection and sewer design can support the effective routing whilst minimising the impact on people and property. These secondary routes can then be cleared and protected by the relevant civil authorities in the event that the primary routes are exceeded.

***Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?***

We recognise that decision frameworks to support multiple sector infrastructure decisions are in their infancy. Key to any decision framework will be that it focuses on outcomes alongside a robust economic assessment of cost and benefit which results in a realistic assessment which recognises optimism bias and a range of potential benefits. Such a framework should be transparent, so that all stakeholders can understand the impact of decisions to proceed, or not, with investment on the level of service provided to customers and society and on affordability of consumers' bills.

The challenge for future planning is balancing the cost of Climate Change adaptation against the risks of these extreme events and to do so based upon evidential economic knowledge, otherwise an inappropriate burden of cost will be placed upon either our water consumers and or shareholders.

Cross-sectoral working would be best encouraged through the collaboration of industry trade bodies: Water UK, Environmental Services Association and joint-working of government departments such as BIS, DEFRA, DCLG with companies. Stakeholders need to work together in a more collegiate manner to ensure the timing and benefits of investment are maximised. Cross-sectoral collaboration can be achieved where there is alignment and benefit to the parties involved.

***Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?***

Resilience planning for the future should be across all infrastructure and utilities and should consider the overall loss of essential services and the impact this will have on homes and businesses. A resilience planning framework for all utilities, developed and monitored through the National Infrastructure Commission could potentially create the environment for joint working. Support in developing this framework could be provided by UK Regulators Network (UKRN) linked to individual incentives within each regulated sector price control.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

Transparency of infrastructure decision making is key to ensure the public are engaged within infrastructure management. Decision making frameworks should be generally kept simple allowing them to be effectively communicated and engaged with. Appropriate independent governance and stakeholder panels should be implemented to ensure legitimacy and maintain trust in infrastructure decision making.

As Andrew Adonis said in his foreword to the Independent survey of attitudes to infrastructure in Great Britain back in December 2015, “we need to broaden out this debate and establish a compelling case within the minds of the public of the need for and benefits of infrastructure investment.”<sup>1</sup>

That Independent survey of attitudes to infrastructure in Great Britain report found that British people want more discussion of major infrastructure needs in their area and that a two-way conversation helps them to understand the benefits of infrastructure projects. At Pennon Group, we have absolutely found this to be the case and extensive customer engagement is a core part of how we create and evolve our business plans at South West Water and extensive local engagement at Viridor is the key to our success in planning, constructing and delivering a portfolio of Energy Recovery Facilities across the UK.

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<sup>1</sup> [http://www.copperconsultancy.com/wp-content/uploads/2015/12/20151203 Attitudes-to-infrastructure-in-Great-Britain-2015\\_FINAL-PDF.pdf](http://www.copperconsultancy.com/wp-content/uploads/2015/12/20151203_Attitudes-to-infrastructure-in-Great-Britain-2015_FINAL-PDF.pdf)

National Infrastructure Commission:  
The National Infrastructure  
Assessment: Process and  
Methodology

Southern Water's Response

5 August 2016

## **Southern Water's response to the National Infrastructure Commission consultation: The National Infrastructure Assessment Process and Methodology consultation.**

### **Overview**

We welcome the opportunity to contribute to consultation on the process and methodology of the National Infrastructure Assessment (NIA). We are grateful for the open and consultative approach taken by the National Infrastructure Commission (NIC) and its early engagement with us.

We hope the NIC, through the NIA, will be able to provide certainty and tangible outcomes – including specific policy recommendations. The independence of the NIC – particularly when developing the NIA – is integral to ensuring it can properly examine the interdependencies between sectors and make recommendations which bring the greatest amount of multi-sector benefits.

In our response, we highlight the methodological enhancements we have developed, and are continuing to progress, in the area of water resources management planning. These include preparing for more serious droughts than those experienced in the historic record and using Real Options Appraisal to identify future interventions. We hope that these methods will be of interest to the NIC as it continues its analysis.

### **Question 1 – The Government has given the National Infrastructure Commission objectives to:**

- **Foster long-term and sustainable economic growth across all regions of the UK**
- **Improve the UK's international competitiveness**
- **Improve the quality of life for those living in the UK**

### **What issues do you think are particularly important to consider as the Commission works to this objective?**

We feel the NIC should explicitly state the consideration of public health outcomes when working to its objectives – particularly its objective to “improve the quality of life for those living in the UK”. One of the primary objectives of the water industry is the protection of public health – the NIA must reflect this.

The NIC should be mindful of the position of various economic regulators in relation to using markets to deliver efficiencies and drive innovation. We recognise the potential benefits that markets can bring but there is a risk that they take a short-term view so they should not be over-relied upon to plan and deliver future infrastructure needs. Where markets are being developed it is vital there is a clear, long-term planning framework which operates above the market.

The views of regulators could impact how any new infrastructure is funded such as via levies on customers' bills or funding from central government. While there is clearly a need to balance the required outcomes with customers' willingness to pay it is important that neither the NIC nor regulators take too narrow a view of this aspect, as typically customers will undervalue resilient infrastructure, due to its public good characteristics.



**Question 2 – Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

We agree with the principles outlined in the consultation and, as mentioned above, are grateful for the consultative, open approach and the early engagement of the NIC.

It is important that the NIC shows how it acts on feedback it receives. Openness, transparency and demonstrating how input from customers, citizens and stakeholders is used is important to ensure recommendations by the NIC have legitimacy – similar to the mandates given to water companies' plans by extensive customer engagement.

We particularly agree with the principle of being “comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks”. We would like to see this include the relationship between infrastructure providers and their regulators. The different priorities of regulators will need to be recognised and addressed to successfully implement multi-sector infrastructure projects.

The NIC should aim to give specific, clear and, where possible, tangible, recommendations from the NIA. We appreciate in some instances suggesting policy direction may be more appropriate, but think it would provide greater certainty if the NIC could outline specific deliverables as frequently as possible.

**Question 3 – Do you agree that the NIA should cover these sectors in the way in which they are each described?**

In general we agree the NIA should cover the sectors in the ways in which they are described, however we would like to see wastewater infrastructure given greater significance.

Wastewater infrastructure (sewage treatment works and the sewer network) should be considered with the same degree of focus as the provision of drinking water. Wastewater infrastructure is critical to ensuring new housing can be built without detriment to the environment and existing customers in the area.

Wastewater treatment and public water supply are becoming increasingly interdependent. For example, we are undertaking two water re-use schemes where we will release highly treated effluent upstream of a water abstraction point to increase the amount of water available for public supply, while protecting a watercourse. We are also piloting an approach to look holistically at a water catchment and identify interventions across the whole water cycle which could improve the management of water resources, water quality and flood alleviation in a more integrated way.

Sludge – a by-product from wastewater treatment – should be considered as part of the waste sector in relation to the circular economy. Treated and dried sludge is used

as fertiliser or as a bio-fuel. The NIC could examine the regulations of waste products, such as sludge, to ensure that the greatest benefit can be gained from them.

**Question 4 – Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

We welcome the fact that the NIC will examine “soft” measures, including policy changes focussed on interventions such as demand management and catchment-based interventions, as well as “hard” solutions such as capital projects. While capital projects can often solve specific challenges, policy or regulatory changes can address problems on a much larger scale and bring about a more widespread change in approach.

With regards to water supply, the NIC should examine the potential of demand management and water efficiency. Southern Water undertook a universal metering programme that has seen a 16.5 per cent reduction in domestic consumption, as determined through analysis by the University of Southampton<sup>1</sup>. Supported by a customer education programme and water efficiency audits we have reduced average per capita consumption to 130 litres per day, and in some areas to 118 litres per day, compared to the national average of 150 litres.

We are also looking at ways of increasing the water efficiency of new buildings by working with a local authority and house builders on a variable infrastructure charge pilot. We will provide a discount of up to 50 per cent on our connection fees if developers can prove they have installed water efficient devices in new homes. Providing greater incentives to developers to build more water efficient homes is an important way of managing future demand and supporting growth in populations. It also has close links with the energy efficiency agenda and it would be beneficial to consider these two areas together, as suggested in the Walker review<sup>2</sup> and by the Green Alliance<sup>3</sup>.

**Question 5 – The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?**

Flood defences, power generation, water supply and wastewater treatment are critically linked and the interdependencies between them are extremely important. We welcome the NICs focus on these links.

Water supply and wastewater treatment are energy intensive and rely on constant, uninterrupted sources of power. We work to ensure our sites are as resilient as possible and have increased the amount of power we generate from renewable sources from 15 per cent to 17 per cent. We are working to increase the amount of renewable energy we generate from solar power, though policy changes can mean this is not cost effective.

The effectiveness of the wastewater network can be seriously impacted by flooding and surface water. During heavy rainfall some sewers can become overwhelmed by the amount of water infiltrating them if there is not a separate surface water system in place. This can cause internal and external flooding from sewers, restricted toilet use and also reduces capacity when considering future growth requirements.

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<sup>1</sup> [The Effect of Metering on Water Consumption – Southampton University](#)

<sup>2</sup> [The Independent Review of Charging for Household Water and Sewerage Services](#) – page 51

<sup>3</sup> [Cutting the cost of water](#) - Green Alliance – page 17

We invested almost £20 million in the Portsmouth area to remove surface water that was entering the foul sewer network. Doing so increased the resilience of our operations, reduced the risks of flooding and detriment to the environment and provided capacity to support growth. We believe greater focus should be given to issues associated with wider flood management and the impact it has on key public services.

**Question 6 – Do you agree that the NIA should focus on these cross-cutting issues?**

We agree that the NIA should focus on these cross-cutting issues, and feel it needs to be mindful of the demands placed on companies by their regulators and the potential impact on customers – particularly in relation to funding.

**Question 7 – Are there any other cross-cutting issues that you think are particularly important?**

We ask that the NIC considers the regulatory planning frameworks and investment cycles when preparing the NIA. This is particularly important when examining critical interdependencies such as the links between energy providers and water companies. There may be need for greater alignment of planning between utilities in order to achieve specified outcomes.

**Question 8 – Do you agree with this methodological approach to determine the needs and priorities?**

We agree with the methodological approach and hope the consultative, open and transparent approach continues.

**Question 9 – Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

We believe the NIC should take examples of best practice from across multiple sectors – particularly examples of modelling which can account for future challenges rather than being based solely on historical data. The Water Resources Management Plan (WRMP) is the statutory method by which the water industry plans to secure water supplies and is a good example of an effective forward-looking approach to infrastructure development covering both supply and demand options.

When developing our most recent WRMP we used an innovative form of modelling, allowing us to plan for more serious droughts than those previously experienced, thus reflecting the potential impact of climate change. Rather than taking the traditional approach used by the water industry of planning against historic rainfall records, we used a stochastic modelling technique to create 2,000 alternative patterns of rainfall, including drought scenarios more severe than events contained within the historic data.

This allowed us to model the impact of a larger range of droughts against our existing water resources and provided a better assessment of how much water would be available to supply customers in different drought scenarios. It showed that some sources were much less resilient than originally assumed and as result the options put forward in our WRMP changed quite significantly. Plans to increase the capacity of two reservoirs were replaced due to their lack of resilience in a three dry years

drought scenario. To provide greater resilience we are promoting indirect water re-use schemes in two of our water supply zones and a desalination plant.

We also piloted a Real Options Appraisal approach to inform our decision making in our Western water supply region. This modelling technique provides a suggested long-term solution that is robust to variable uncertainties such as power supply, population growth and a reduction in available water as a result of sustainability reductions. We intend to use this approach in the development of WRMP 2019. We also intend to look ahead across a 50-year planning horizon. This will ensure that we choose the best whole-life cost solutions to meet the predicted full impacts of climate change.

When considering future infrastructure needs consideration should also be given to the economic impact of failure, rather than solely basing decisions on customer willingness to pay. Had the 2012 drought continued and resulted in serious restrictions in London, such as not being able to fill swimming pools and restrictions on watering playing and plants, the cost to the economy was estimated at £300 million per day. When considering infrastructure needs, the potential impact to the local and national economy should be taken into account. In the case of water this must consider the impact of failure, risks to public health and an informed decision taken on the necessary steps to avoid this.

We feel it would be beneficial if the NIC could publish the assumptions it uses, such as population growth, energy demand etc. This would provide a common set of assumptions for all infrastructure providers to use. We currently undertake our own population forecasting and, as a result, it can differ from the forecasts used elsewhere. Having a common, verified, set of assumptions would help reduce uncertainty and bring the plans of utility companies and local authorities into closer alignment.

**Question 10 – Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

Similar to our answer to question one, we believe the Commission should consider the protection of public health as a driver for infrastructure provision. This could fall under the overarching driver of population and demography or climate change and environment.

**Question 11 – The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

Similar to our response to question nine, we believe the NIC should look across sectors to find best practice. It could then share examples of best practice, even if not adopted by the NIC. This will have the added benefit of enhancing knowledge and expertise and could encourage greater collaboration between different sectors.

A process similar to this is already underway in the water sector. The water industry is working to develop a strategy and framework to facilitate effective long term planning of water resources. The project will look at drought resilience to a 50 year horizon and will develop high level potential portfolios of solutions including demand management measures and infrastructure investment.

As much as possible, the methodology should align with utilities' regulatory investment cycles and business plan periods. It should look beyond traditional cost benefit analysis and look at benefits over a long time horizon.

**Question 12 – In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

As mentioned previously, we would welcome an approach that aims to provide tangible outcomes wherever possible.

**Question 13 – How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

We feel the NIC needs to ensure it explores the views of citizens and gives their views sufficient weight against those actively engaging with the commission, such as expert panels and infrastructure providers.

The NIC should examine citizens' expectations of infrastructure provision and services – including their tolerance for potential loss of service, such as power cuts or traffic congestion. The research should investigate attitudes towards the future provision of infrastructure as well as relating to specific solutions.

Similar to our response to question two, thorough engagement with citizens and demonstrating how their views have influenced the proposals will provide greater legitimacy to any outcomes. Water companies undertake in-depth customer engagement as part of each business plan process. When developing our business plan for the period 2015-20, we heard the views of more than 34,000 customers and stakeholders and their priorities fed into the promises we made and the targets we were set.

## The National Infrastructure Assessment: Process and Methodology

### A consultation response from SUEZ Resource & Recovery UK

#### Preamble

SUEZ R&R UK (SUEZ – formerly SITA UK) are pleased to respond to this consultation on the National Infrastructure Assessment (NIA) process and methodology. SUEZ are one of the UK's largest waste and resource management companies, providing services to the public and private sectors. A long-term vision and plan for this sector is critical to support and ensure the viability of the new business model our sector is developing, based on the principles of the circular economy. In moving from a disposal (predominantly landfill)-led business model to one that relies on end-markets for recyclates and recovered energy, capital investment in the order of £10-15 billion over the next 10-15 years will be needed across the sector, in order to construct the facilities necessary to recover value from waste in the form of secondary resources. This scale of investment will only materialise if a robust resources policy framework is in place, backed up with an assessment of national infrastructure requirements.

Our responses to the questions posed are provided below.

#### **Q1, Q2. Government objectives and principles in undertaking the NIA**

To date, the waste management sector has been treated in a rather desultory manner vis-à-vis national infrastructure requirements. The *National Infrastructure Plan 2014* prepared by Infrastructure UK focused on infrastructure needs in relation to the European Union's landfill diversion targets, which are limited to municipal waste (see below). For the longer term, the Plan merely stated that

“the government wants to see business leading the way in resource use and management”

leaving infrastructure development more to serendipity than being informed by strategic considerations of national resource needs. The *National Infrastructure Delivery Plan 2016-2021* prepared by its successor the Infrastructure and Projects Authority, reiterated the previous Plan's complacency:

“... the market is delivering sufficient capacity to meet the UK's existing EU landfill [municipal waste] diversion targets. Future waste infrastructure will become clearer in 2018 when current EU regulations are expected to conclude.”

The Green Investment Bank's assessment of *The UK Residual Waste Market* (2014) presented a more in-depth analysis of infrastructure needs, being the first government-linked report to identify a widening capacity gap for UK-generated energetic waste, which currently is being exported to overseas facilities in significant quantities – 4 to 5 million tonnes a year – due to the lack of domestic infrastructure. To date the government has not addressed this gap, resulting in continued leakage of energy-bearing materials out of the UK at a time when the UK is facing an energy crunch in the coming years.

In the wake of the recent referendum result, the UK economy faces fresh challenges. Altered trading arrangements with the remaining EU Member States as well as with the rest of the world is

likely to put increased pressure on the availability of the raw materials needed to drive manufacture and production. UK waste management companies rely heavily on overseas markets for the recyclates and waste-derived fuel our sector produces, markets that are difficult even at today's landfill diversion and recycling rates. These challenges call for an updated UK industrial strategy which recognises the critical role the waste management sector can play in re-shoring value that is currently being exported and exploited by other nations in the form of materials and of energy, while at the same time reducing supply risks by maximising the circulation of domestically-produced secondary materials and recovered energy back into the UK economy.

Regrettably, the UK government has yet to grasp the significance of our sector in these terms. The UK lacks a coherent resource management strategy, while the extant industrial strategy fails to mention resource requirements or future-proofing against long-term resource risks. As recognised by the Green Investment Bank's report, energy policy also fails to acknowledge the important role energy-from-waste can play in providing decentralised low-cost base load power and heat.

It is in the context of a true resource-based (rather than as a narrow waste-based) strategy embedded in the UK's industrial and energy strategies that we urge the National Infrastructure Commission to articulate its vision over a 30-year time horizon, and to conduct its NIA.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

We are pleased that in relation to our sector, the NIA will take account of the "long term objectives and strategy" of "moving towards a more circular economy". As noted above we urge the Commission not to take a narrow view of our sector, but to assess infrastructure requirements in terms of the sector circulating secondary raw materials and energy back into the UK economy. On a site-by-site basis our sector frequently falls below national infrastructure thresholds, because individual sites are generally relatively small, providing as they do local or regional solutions to serve local or regional catchments. But when viewed as a source of supply of (secondary) raw materials and recovered energy supporting the UK's industrial and domestic sectors, our sector in the aggregate assumes national strategic importance, and the sectoral NIA should be conducted with this in mind – as a provider of secondary materials and recirculated products to replace virgin raw material supplies that are frequently imported into the UK.

In this regard the NIA should assess infrastructure requirements not merely to divert waste from landfill, but to extract maximum value out of collected waste – technologies for refurbishment and remanufacture of reusable products, separation and processing into high-quality recyclates, conversion of waste substrates into marketable products, and extraction and distribution of energy (including heat) from waste into domestic grids and industrial processes.

Another aspect of waste management policy on which government currently takes a narrow view is the almost total emphasis on household/municipal waste, despite the fact that commercial and industrial waste arisings outweigh municipal waste arisings by a factor of three. Infrastructure development for the latter has lagged behind that for municipal waste – for residual C&I waste resulting in the export of energy-rich waste-derived-fuel, as discussed above. In conducting its NIA, the Commission is urged to take account of waste arisings other than just municipal waste.

#### **Q5. Interdependencies across sectors**

As the concept of the circular economy implies and as discussed above, the waste management sector should be re-imagined as the resource management sector, in which case the interdependencies between our sector and other sectors such as retail, production, manufacturing, construction, etc as well as between our sector and the energy generation and energy distribution sector, become apparent. Hence our call to the Commission to link up the waste management with the UK's industrial strategy and domestic energy needs when conducting its NIA.

#### **Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

#### **Q7. Are there any other cross-cutting issues that you think are particularly important?**

In addition to the cross-cutting issues listed, population growth, changing demographics (identified further down in paragraph 65), lifestyles and economic wellbeing are all intimately correlated with waste generation and changing waste composition, which in turn will impact on infrastructure requirements. New materials introduced into consumer products will also eventually materialise as waste, which will require new solutions (for recovery and/or disposal) and hence new infrastructure.

In relation to cost and delivery, we emphasise again that while investment on a site-by-site basis may not seem nationally significant, investment in the sector as a whole is substantial, and is almost entirely provided by private finance, which in turn relies on a robust, long-term vision and policy framework to provide the necessary underpinning. This has been conspicuously absent from recent UK waste policy, resulting in a slow-down of investment in the infrastructure needed to transition to a circular, more resource-efficient economy.

#### **Q8. Do you agree with this methodological approach to determine the needs and priorities?**

#### **Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

#### **Q10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?**

#### **Q11. Methodology to determine a portfolio of investments**

#### **Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

We are content with the general approach detailed in the consultation document. In the case of our sector, linking the production of secondary resources (materials and energy) and of reusable products to the resource needs of the UK economy will be a key aspect of the methodology.

We are not aware of a single exemplar model that provides a comprehensive framework for assessing circular economy needs and priorities. Contributions in the academic literature point to the assessment of one or more aspects of circularity – for example, that of Liu *et al* (*The input-output analysis of the circular economy*, International input-Output Association Conference, 2007) in relation to the circular economy law in China, and of Hashimoto *et al* (*What factors have changed Japanese resource productivity?* J Industrial Ecology, Vol 12, 657-668, 2008) in relation to Japan's Fundamental Plan for Establishing a Sound Material-Cycle Society.



In developing its economic and cost-benefit analysis, the Commission should take into account the social and environmental benefits of transitioning to a circular economy. In other words, total monetised benefits should be offset against financial (capital and operating) costs in the assessment.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

We are content with the general approach to engagement outlined in the consultation document. Because of the cross-sectoral nature of the circular economy, it is essential that industry, local government and the waste management sector are collectively engaged by the Commission.

SUEZ

3 August 2016

## **National Infrastructure Commission**

### **Consultation on the National Infrastructure Assessment**

#### **Response by Suffolk County Council**

1. Suffolk County Council (SCC) welcomes the establishment of a National Infrastructure Commission (“the commission”), recognising that the delivery of infrastructure in a timely matter is key to supporting economic growth. As such, the formation of a commission which can help build consensus on the need for particular infrastructure projects by providing independent, objective analysis is a significant improvement on the current situation.

2. The establishment of such a commission provides a particular opportunity to look at infrastructure in a cross-sector way to ensure that the various agents involved in infrastructure planning can be brought together, for example by looking collectively at requirements for our transport networks with our energy networks with our telecommunications networks in a manner that does not currently happen. Currently, each infrastructure sector plans to different time horizons, uses different evidence sets, different methodologies and comes to investment plans in isolation.

3. The production of the National Infrastructure Assessment is the *raison d'être* for the commission and it is important that there is a buy in from stakeholders, including government, in to the methodology so that the mechanism by which we identify and prioritise our nation’s needs has been borne from a process over which there is as much consensus as possible. Again therefore we welcome the current consultation.

4. Overall, SCC, is broadly content with what is proposed, but there are several key points that we ask the commission to take into account.

5. It is not clear to what extent to which the NIA will be a reactive or proactive exercise; i.e. whether the commission will be focussed on past trends projected forward, or whether the NIA will take a more strategic view of where the national should be heading, recognising that infrastructure provision is a powerful tool and can rebalance economics and improve quality of life. Our view is the NIA should be progressive and seek the shape the future, not react to it.

6. SCC broadly endorses the commission’s objectives (Q1) to:

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK’s international competitiveness
- improve the quality of life for those living in the UK

But would add that greater recognition needs to be given to environmental issues, for example the need to sustain natural capital and to mitigate the effects of climate change. Equally, the commission will need to get to grips with the valuation of non-market impacts caused by the general disruption and disamenity of major infrastructure projects to local communities to ensure that there is buy in from all to the provision of new infrastructure. Environmental impacts such as landscape and visual effects would also need to be captured and balanced against monetary benefits.

7. SCC considers that the principles that the commission intends to follow (Q2) and its analysis and approach to the various infrastructure sectors is appropriate (Q3-6). Further consideration needs to be given to the interaction between infrastructure and local growth, however.

8. If the NIA is to be successful in its objective of fostering long term economic growth, it will need to recognise that delivering infrastructure is not the fulfilment of that objective, but an important step along the way. To be successful, the infrastructure will need to promote a response, particularly in land use development and growth. Generating confidence that such a response will take place is a key challenge for the work of the NIC. Without that confidence, planning for (and particularly investing in) major infrastructure becomes a speculative gamble.

9. The interaction of the work of the NIC with the land use planning system, therefore, is key – but there is little reference to it in the consultation. The box on page 18 does say, for instance, that the NIC will make recommendations that co-ordinate the timing and delivery of new infrastructure with the delivery of new housing, but how is this to be achieved?

10. It would be useful if the NIC could be seen to be promoting mechanisms for joined up infrastructure and land use planning. Otherwise, the NIA risks either simply following the consequences of growth planned by planning authorities or pre-empting the outcome of land use plans. Close joint working with plan making authorities is clearly to be encouraged but the importance of integrated planning is so significant that the NIC will need to consider very closely its role as part of a process of joint working, particularly with larger, devolved authorities. The NIC will also need to consider whether there is a case to push for legislative change to more clearly enable cross boundary land use and infrastructure planning, for example along transport corridors.

11. One omission as a cross-cutting issues (Q7) is around skills and the ability of both the infrastructure profession and the construction sector to meet the challenge of providing the infrastructure we need.

12. SCC has no detailed comments on the proposed methodology (Q8-12) though notes the importance of testing a range of scenarios, both related to the state of the economy, but also different geographic scenarios, which might aid in rebalancing the economy. We would also urge the commission to look at infrastructure corridors, whereby different forms of infrastructure are co-located, for example roads with power cables and telecoms. We would also ask the commission to consider how investment in infrastructure can be encouraged through different models of delivery to reduce the burden on the public purse.

13. In relation to engagement (Q13), we would encourage the commission to engage directly with a range of stakeholders, including local authorities. The role of local authorities, which is not mentioned in the consultation document, is to support and drive local growth and much of that is dependent on infrastructure provision. SCC is currently promoting two road schemes that have been designated Nationally Significant Infrastructure Projects, and which will drive significant economic benefit in Ipswich and Lowestoft. It must be remembered that national growth is the sum of its parts and engagement at a sub-regional level to understand how infrastructure provision can strengthen local economies is critical - in particular in an era of devolution.

**Tel:** [phone number redacted]

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NIA Evidence  
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Sent by email to: NIAEvidence@nic.gsi.gov.uk

5 August 2016

Dear Sir/Madam

### **The National Infrastructure Assessment | A Consultation**

The county council welcomes this consultation on the National Infrastructure Assessment. The comments below are officer comments.

Surrey local authorities recently commissioned a study of infrastructure needed to support planned growth in the county to 2030 (<http://www.surreycc.gov.uk/environment-housing-and-planning/development-in-surrey/surrey-future/surrey-infrastructure-study>) that highlighted a significant funding deficit, particularly in relation to highways, rail and flood defence infrastructure. We are therefore pleased to see that the consultation paper recognises the significance of effective infrastructure funding and delivery mechanisms if sustainable economic growth is to be achieved.

However, while we recognise that the Government has decided that the Commission's remit will not include housing supply directly, it is important to acknowledge that uncertainty over/lack of investment in increasing the capacity of supporting strategic infrastructure can impact on housing supply and potentially be the critical factor that determines whether a strategically important housing location can be delivered. We consider this issue, which relates to Q1 and Q4, to be important in relation to the Commission's objective of fostering long term and sustainable economic growth across all regions of the UK.

In relation to governance and decision making (Q7), our experience of producing the Surrey Infrastructure Study has demonstrated that the interaction between strategic planning, local planning and with the investment and planning frameworks of the regulated utilities is fundamental and a particularly important cross-cutting issue. The processes for funding and delivering infrastructure need to be better synchronised with the mechanisms for delivering development.

We look forward to responding to any future consultations and calls for evidence.

Yours sincerely

[signature redacted]

[name redacted]

[job title redacted]

**Please reply to :**

[name redacted], [job title redacted].

Sustainability First

Email : [email address redacted]

22<sup>nd</sup> July 2016

**NIA Evidence**

**National Infrastructure Commission**

**1 Horse Guards Road**

**London**

**SW1A 2HQ**

***Dear Commissioners***

**National Infrastructure Assessment, Process and Methodology, Consultation**

1. I am responding to this National Infrastructure Commission consultation on behalf of environment think tank Sustainability *First*. Sustainability *First* is a small charity that works in the energy, water and waste sectors. We have significant experience of consumer issues and the demand side in the energy sector.
2. In 2015 Sustainability *First* established the New Energy and Water Public Interest Network ('New-Pin') to bring together public interest advocates (consumer, citizen and environment), regulators, companies and representatives from Government to build understanding and find common ground on long-term public interest issues in the energy and water sectors. In June 2016 we held a New-Pin workshop on 'Long-run resilience in the energy and water sectors' that addressed many of the issues covered in this consultation. A copy of the workshop discussion paper, and summary briefing paper, are attached to this response for information.

**General comments**

3. Sustainability *First* warmly welcomes the establishment of the National Infrastructure Commission (NIC), the opportunity to comment on this consultation and the Commission's commitment to work in a consultative way.
4. Infrastructure, by its very nature, is designed to provide or enable services to individuals and society over the long-term. Ensuring that the National Infrastructure Assessment (NIA) takes full account of the public interest, and addresses issues of intra and inter generational fairness, will be crucial if the Commission's work is to earn the trust and confidence of those that will use and ultimately pay for the infrastructure provided.

## Detailed comments

### **Q1. What issues do you think are particularly important to consider as the Commission works to this objective?**

5. Sustainability *First* considers that it would be helpful to look at growth as it impacts different regions *and nations* of the UK. The increasingly devolved context for decision making needs to be addressed up front; both to recognise the different priorities and responsibilities of the devolved nations (as in paragraph 90) but also to understand the infrastructure interactions between them and the scope to learn valuable lessons from their respective experiences.
6. In terms of the quality of life objective, we consider that it is important that this is broadly defined to include quality of life for current *and future* generations. Given the long-term nature and impacts of infrastructure investment, the Commission will inevitably need to take a view on questions of intra and inter generational fairness. The distributional impacts in the NIA will need to be clearly articulated.

### **Q2. Do you agree with the stated principles and are there any principles that should inform the way that the Commission produces the NIA that are missing?**

7. Sustainability *First* supports the existing principles. We consider it important that the principle of being ‘consultative’ is framed in terms of engaging with stakeholders, particularly citizens and consumers. Public engagement is crucial if:
  - the demand side is going to play a role in ensuring resilient, affordable and sustainable infrastructure and services;
  - consumers and citizens are ultimately going to pay for the infrastructure that is built;
  - new partnerships and opportunities for collaboration are to be identified. Although the NIC will clearly not necessarily lead on these, the Commission can potentially play an important sign-posting and facilitative role; and
  - the public are subsequently to be better equipped to engage in response and recovery if there are shocks to the system and infrastructure services.
8. Sustainability *First* proposes also adding the following principles:
  - Accountable – given the potential significance of the NIC’s role, it is crucial that it is accountable – and seen to be accountable - for it’s work. This will be essential to ensure that the Commission’s decisions are seen as ‘legitimate.’
  - Risk based – the NIA will need to take a risk based approach, capturing the full range of risks (including systemic, political and regulatory risks).

## Sustainability First

- Agile – the NIA needs to ensure that portfolios are sufficiently flexible and adaptable to be able to deliver in an environment which due to climate change can be highly uncertain.
- Take account of affordability – both short and long-term.

### **Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

9. Transport: it will be important to take account of the impact of digital technology on changing work practices and the increase in home and mobile working. The particular challenges that arise when there is a mixture of public and private funding for schemes are also relevant in considerations of infrastructure planning in this sector.
10. Digital and communications: recognising the importance of both the visible and invisible aspects of these (eg reliance on Machine to Machine communications) is important.
11. The built environment: Sustainability First notes that the Commission's remit will not include housing supply. This could potentially be problematic and may result in a 'chicken and egg' situation where it could be difficult to get leadership in planning significant new settlements. In order to produce a robust NIA, it will clearly be important for the Commission to receive *timely* information on new housing allocations.

### **Q4. Are there any particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

12. In all the sectors covered, there are significant 'softer' demand side opportunities (eg tariffs, behavioural approaches and smart initiatives) that need to be recognised. From a value for money, resilience and sustainability point of view it will be important that the NIC takes these into account wherever possible.
13. Technology is also enabling new models of service delivery (such as aggregated or shared services) that can potentially disrupt established models of providing services and their associated infrastructure requirements. Understanding the commercial possibilities in the sectors will be just as important as understanding the engineering opportunities and risks.

### **Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?**

14. The interdependency between communications and electricity is clearly important. Electricity can both enable and disable communications. This needs to be factored into decisions about the resilience of electricity infrastructure.



15. Inter-dependencies between the energy and water sectors already exist. Some of the investments that are designed to help secure resilience (such as desalination, fracking or carbon capture and storage) may actually tie the sectors more closely together. There is also a nexus between energy / water and food / farming that the Commission may need to consider, particularly in rural areas.
16. The importance of the resilience of the communications and transport sectors to other essential services, particularly during flooding incidents, also needs to be taken into account (see case studies in the New-Pin resilience paper from New York and Lancaster).

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

17. We support the cross cutting issues identified. In terms of how the issue of ‘Governance and decision making’ is framed, we consider it is important that this is fit for purpose and *in the long-term public interest*. For this to happen, stakeholders need to be engaged in decision making. The NIA will need to identify clear roles and responsibilities, and schemes of delegation, if there is going to be effective leadership from those charged with governance in cross cutting areas. Clarity is needed as to who the decision makers are likely to be at the local, regional and national levels. Governance needs to be sufficiently flexible to avoid inertia, to enable collaboration between institutions and to be able to respond to uncertainties.
18. Whilst we support the evaluation and appraisal methodology, it could be difficult to get this right first time, and events will undoubtedly intervene (eg Brexit), so an adaptive approach may be needed.
19. On the issue of performance measures, a sub-set of these need to be meaningful to the public as they will ultimately be paying for the infrastructure provided.

**Q7. Are there any other cross cutting issues that you think are particularly important?**

20. Standards – is there a need for some common standards in terms of the resilience of infrastructure in different sectors to floods, for example? Although standards can be inflexible, without common cross sector standards for issues like flooding, there is a risk that individual sectors may over or under invest in their infrastructure in a particular locality. This could potentially lead to an inefficient use of resources or single point failure in the event of a shock.

## Sustainability First

### **Q8. Do you agree with this methodological approach to determine the needs and priorities?**

21. The methodological approach described may be more suited to decisions around 'big kit' and strategic investments than demand side 'infrastructure'. In the latter, there are likely to be multiple actors, schemes and interactions (often at a local or even micro level) and a whole suite of technologies involved. We would be interested to understand how the Commission will adapt this methodology to demand side and local service delivery initiatives.

22. The modelling and analysis needs to be practical and actionable; it needs to move beyond academia and be tested on real businesses and users.

### **Q9. Do you have examples of successful models which are particularly good at looking at long-term complex strategic prioritisation in uncertain environments?**

23. Sustainability First's New-Pin Network seeks to build understanding and establish common ground between different stakeholder groups on long-term and complex issues in the energy and water sectors. Through deliberative workshops on issues such as long-term affordability, trust and confidence and resilience, it is exploring cross sector issues between energy and water. Case studies are used to identify practical actions that members have taken to address long-term issues and as a vehicle to open up discussions on the trade-offs that are often made in reaching decisions.

24. Our next New-Pin workshop on 19<sup>th</sup> October will be on 'Consumer and citizen engagement and capacity building in the energy and water sectors.' This will look in more detail at how to engage the public in long-term issues in the sectors. We have commissioned a piece of work from BritainThinks to provide an overview of research techniques that consumer and citizen groups can use to help understand and capture public views on long-term and complex issues in the energy and water sectors. This, along with a wider discussion paper on stakeholder engagement (that will examine how to balance different priorities), will be presented at the meeting.

### **Q10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?**

25. On the issue of population and demography, it will be important that the NIA takes account of the challenges of an aging population, and the end of 'cliff edge' retirement.

26. One other potential area to consider is political risk eg: in the UK (and Europe) post Brexit; or failed states and instability in the Middle East. This could have wide ranging impacts, including on potential resource price and availability (energy), investor confidence, migration

(both in terms of usage of services and workers to construct and deliver these) and environmental standards.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

27. Although we don't have any specific views on this question, we do consider it is important that the public are engaged in drawing the portfolio up and that the reasons why the portfolio has been identified need to be explained and communicated to those that will ultimately pay - in an accessible way.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

28. The approach does not explicitly cover what the barriers and enablers to implementing the portfolio may be. Although these will be for others to address, unless the Commission takes these into account in its deliberations, its proposals may be unworkable.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

29. The Commission clearly needs to be open and inclusive if it is to engage with different parts of society in its work. This will also help mitigate against 'group think.'

30. Ensuring hard to reach groups, and the interests of future users and the environment, are represented, will be important. To develop the Assessment, the NIC needs to build relationships with organisations that already have links with citizen and consumer groups in communities, regions and nations.

31. In doing so, the NIC needs to recognise that different portfolios will have differing distributional impacts (geographically, between consumer / citizen segments and over time). There will be differences of opinion and conflicting interests. It will be important to recognise these and provide deliberative forums for groups with differing views to hear directly from each other and thus build understanding, help begin to identify common ground and to come forward with creative priorities and solutions.

32. Engagement clearly needs to be a timely, but ongoing, process. Unless the public are involved sufficiently early on in the Commission's deliberations, there is a risk that people will feel they are just 'rubber stamping' decisions. The legitimacy of the exercise may therefore be undermined. The Commission needs to follow the 'you said: we did' approach and provide

## **Sustainability First**

timely feedback to those that have engaged, explaining why decisions have been taken and if certain responses have not been taken into account the reasons why this is the case.

33. Ultimately, the Commission will need to 'knit together' engagement activities at different geographical levels and on a cross sector basis. This is likely to be a significant task.

We hope that this submission is helpful and would be delighted to discuss the issues raised. We are due to meet [name redacted] on the 10<sup>th</sup> August to talk about the News Pin Network so in the first instance could pick any points up with him.

Yours

**[name redacted]**

**[job title redacted]**

**Sustainability First**

**CC: [name redacted], [job title redacted], Sustainability First**

### **Attachments**

New-Pin Long-run resilience in the energy and water sector, briefing and discussion papers

**Sustainability First is a registered charity. Chair : [name redacted]. Other trustees : [names redacted]**

[www.sustainabilityfirst.org.uk](http://www.sustainabilityfirst.org.uk)



# Sustainable Energy Association

## Consultation on the National Infrastructure Assessment: Process and Methodology

**Date: 5<sup>th</sup> August 2016**

**Response submitted by: Sustainable Energy Association**

The Sustainable Energy Association is a member based industry body offering innovative policy solutions that link up building-level technologies and the wider energy system to achieve a low carbon, secure energy future for the UK, benefits for UK consumers, and commercial growth for businesses working in the sector. Our membership is comprised of a wide range of organisations that engage to develop our policy positions, establishing member-led working groups and a governing body of members to discuss and authorise policy positions that have real commercial impacts.

The SEA promotes holistic approaches to developing heat policy in line with its wide-ranging membership including energy efficiency, renewable and non-renewable heating technology manufacturers. We welcome this consultation as we think it is crucial that building energy efficiency is included within the remit of the National Infrastructure Committee.

Energy efficiency is a very significant low cost energy resource which can provide the UK economy with an economic advantage if we can develop a comprehensive and innovative approach to unlock its potential. Energy efficiency eliminates waste, preserves the natural environment both in the short term (visual impact/biodiversity) and for future generations, helps maintain the security of our borders and our energy independence and provides economic advantage. In addition, every £ saved on energy bills can be reinvested by consumers elsewhere in the economy through purchase of goods and services.

**For more information on this consultation response please contact**

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**Principles**

1. The Government has given the National Infrastructure Commission objectives to:
- foster long-term and sustainable economic growth across all regions of the UK
  - improve the UK's international competitiveness
  - improve the quality of life for those living in the UK
- What issues do you think are particularly important to consider as the Commission works to this objective?

It is particularly important that the National Infrastructure Commission focuses on buildings, placing buildings at the heart of delivering our energy policy goals making them more energy efficient and using them to produce energy directly through low carbon and renewable sources. The inclusion of energy efficiency in the NIA was recommended by Parliament's Energy and Climate Change (ECC) Committee in 2016 following their inquiry into energy efficiency and demand reduction (Recommendation 7):

*"...the National Infrastructure Commission must consider the infrastructure requirements of meeting the UK's carbon budgets and long-term legally binding carbon reduction targets. Energy efficiency will be a crucial part of the mix. The Government and the National Infrastructure Commission should assess the potential benefits of designating energy efficiency as a national infrastructure priority."*

The Government responded to the ECC Committee's report on 11 July 2016, stating:  
*"DECC will continue to work with the Commission as it prepares its National Infrastructure Assessment. As per the Commission's consultation document, this will examine the future of heating and important role that increasing energy efficiency could potentially play."*

It is important that the future of heating and energy efficiency are recognised as crucial and that demand is considered as well as supply. Reducing demand can reduce costs and carbon emissions, and improve energy security, competitiveness and economic growth.

Energy Efficiency measures can also significantly help improve quality of life, with positive outcomes for health and wellbeing as well as a variety of other positive outcomes. Reducing demand has huge impact on infrastructure as it reduces the need for infrastructure upgrades, additional generation, transmission and distribution capacity. The most efficient way to meet the UK's energy needs is to reduce them.

Analysis by Cambridge Econometrics and Verco in 2012<sup>1</sup> demonstrated that for every £1 invested in energy efficiency, £3.20 is returned to economy. In terms of jobs, a report by the UK-GBC in 2014 also highlighted that major investment in energy efficiency could almost double the number of people were employed in the energy efficiency industry to 260,000.<sup>2</sup> Energy efficiency is seen as the cheapest way for the UK to abate emissions and meet carbon budgets. In summary, the Cambridge Econometrics and Verco report also concluded that the economic case for making the energy efficiency of the UK housing stock a national infrastructure priority is strong.

<sup>1</sup> Building the Future, the economic and fiscal impacts of making homes more energy efficient, 2014  
<http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf>

<sup>2</sup> Up from 135,000 in 2014. UKGBC, A Housing Stock Fit for the Future, 2014.  
<http://www.ukgbc.org/resources/publication/housing-stock-fit-future-making-home-energy-efficiency-national-infrastructure>



<p>2.</p>	<p>Do you agree that, in undertaking the NIA, the Commission should be:</p> <ul style="list-style-type: none"> <li>• Open, transparent and consultative</li> <li>• Independent, objective and rigorous</li> <li>• Forward looking, challenging established thinking</li> <li>• Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?</li> </ul> <p>Are there any principles that should inform the way that the Commission produces the NIA that are missing?</p>
<p>The SEA agrees that the Commission, in undertaking the NIA should be open, transparent and consultative, independent, objective and rigorous. We agree the approach should be forward looking, challenging established thinking, and take a comprehensive, whole system approach. We do not believe this will be achieved unless energy efficiency is properly and fairly considered.</p> <p>We encourage the NIC to employ their whole system approach when considering the total benefits of energy efficiency. A holistic understanding of energy efficiency will capture the financial, environmental, societal and health benefits from installing measures and reducing fuel poverty.</p> <p>In addition the NIC should treat energy efficiency consistently with other energy investments in its modelling for the NIA. As an example in the DECC Pathways Tool many technologies such as carbon capture and storage were modelled with learning rates and cost reductions over time (15% over a 20 year period: 2015 – 2035). Despite this – solid wall insulation which hasn't yet seen much deployment – was not allocated a learning rate and did not see any cost reductions, despite installations. The NIC should treat energy efficiency consistently in their modelling.</p> <p>If energy efficiency is assessed fairly and the methodology and process used is consistent with other options it will stand out as a high value investment which will bring significant rewards for the UK. However, this will only happen if the methodology and assumptions used are applied consistently and fairly when assessing options.</p>	
<p>3.</p>	<p>Do you agree that the NIA should cover these sectors in the way in which they are each described?</p>
<p>The SEA agrees with the approach and the importance of looking at the future of heating and the important role that energy efficiency can play. We agree with linking heating and energy efficiency and believe that heating systems repair and installation provide intervention opportunities which could be used to stimulate energy efficiency measures. The SEA also believes that more focus should be given to the demand side of energy and to reducing energy use rather than focusing on supply. The current programme of house building provides an opportunity to increase standards of energy efficiency which will be lost for decades if not taken opportunity should not be missed. This needs to be addressed.</p>	



4.	<p>Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?</p>
<p>The UK faces a number of energy challenges including how to cost-effectively meet supply and carbon targets, as old generation plants are decommissioned. Energy efficiency presents potentially the most cost-effective means to help the UK ensure security of supply. The built environment and energy efficiency are key to reducing demand and therefore reducing the level of new generation required. Investment in energy efficiency to reduce demand is essential and should form both one of the key themes of the review, with its own dedicated expert panel and work stream, and also be represented across the other infrastructure sectors.</p> <p>Energy efficiency is a very significant low cost energy resource which can provide the UK economy with an economic advantage if we can develop a comprehensive and innovative approach to unlock its potential. It eliminates waste, preserves the natural environment both in the short term (visual impact/biodiversity) and for future generations, helps maintain the security of our borders and our energy independence and provides economic advantage. In addition, every pound saved on energy bills can be reinvested by consumers elsewhere in the economy through purchase of goods and services.</p>	
5.	<p>The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?</p>
<p>Building-level energy straddles a number of areas which the NIC are considering. Energy efficiency helps the UK secure energy supplies and tackle carbon emissions. It also helps the country reduce waste – another area of interest for the NIA, and building-level energy usage can be linked with significant digital infrastructure projects. This is particularly true with heating controls and smart thermostats – which can help user’s better optimise and manage energy consumption. The advent of smart meters and the internet of things creates the possibility for further energy saving in the home. In addition there could be substantial national system-wide benefits to shifting consumption patterns and responding to times of supply shortages.</p> <p>It is crucial that the NIA considers how buildings can be developed to take advantage of this potential. Fundamentally this includes ensuring the UK’s building stock is appropriately renovated to allow for efficient usage of energy.</p>	
<p><b>Cross-cutting issues</b></p>	
6.	<p>Do you agree that the NIA should focus on these cross-cutting issues?</p>
<p>Yes. Buildings should be placed at the heart of delivering energy policy goals, making them efficient, and using them to produce energy directly through low carbon and renewable sources. By doing this we will deliver more affordable, more secure, lower carbon energy for the UK.</p>	





Evaluation and methodology is discussed in paragraph 54 and it is noted that the current appraisal methods for large scale infrastructure projects are to be assessed to ensure things such as system effects are captured. Energy efficiency needs to be addressed here and assessed on an equitable footing to other projects. System costs should be taken into account. Energy efficiency will decrease system costs and reduce the need for expensive infrastructure upgrades. This must be recognised. Analysis needs to capture the benefits of using less energy. It needs to focus on reducing demand rather than simply evaluating different options for supply.

7. Are there any other cross-cutting issues that you think are particularly important?

See answer to question 2 and 6 i.e. evaluation and appraisal is particularly important and needs to be done fairly.

**Methodology**

8. Do you agree with this methodological approach to determine the needs and priorities?

Yes.

9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?

Climate change and environment is a very important driver and the Commission should ensure that energy demand as well as supply is examined. The benefits of reducing demand through improved building fabric and energy efficiency measures should be properly considered as well as more efficient means of meeting that demand.

The Commission highlight the inherent uncertainty with forecasting future priorities, and need where possible to take into account the probability of different scenarios. Climate change and its impact on the UK has significant downside risk and the Commission should consider this when



developing analysis on the opportunities for energy infrastructure investment. Energy efficiency allows for carbon abatement and climate change mitigation.

Building level energy solutions should be recognised as a priority and the Commission should examine the costs of a policy that would reduce demand by 50% by 2030, against the full potential benefits to the economy of prioritising energy efficiency, including the savings that come from avoided demands with savings on required additional new generation and transport losses between them and the consumer. This review should include the ancillary benefits that accrue from such schemes to health and wellbeing, improved social cohesion and area regeneration.

The Government and the National Infrastructure Commission should fully assess the potential benefits of designating energy efficiency as a national infrastructure priority.

**Finalising the national infrastructure assessment**

11.	The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?
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Methodology needs to be applied fairly and consistently – see answer to Question 2 and 6.

12.	In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?
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Not enough emphasis is being given to energy demand. The approach is too focused on supply. The most cost effective means of delivering the UKs energy goals is to put buildings at the heart of the strategy and to reduce demand.

**Engagement**

13.	How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?
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There should be open consultation and options should be considered in a fair and equitable way using consistent methodology. There should be enjoyment with industry and its representatives such at the Sustainable Energy Association and there should be progress reports and reviews at regular intervals

**[name redacted]**

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**From:** [name redacted] <email address redacted>  
**Sent:** 02 August 2016 17:42  
**To:** NIA Evidence  
**Subject:** Consultation response to the NIA

Dear Sir/Madam

Please find below the response of the Swindon and Wiltshire LEP to the NIA consultation.

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

**What issues do you think are particularly important to consider as the Commission works to this objective?**

*The Commission needs to carefully balance its infrastructure assessment to reflect the challenges to economic development in both heavily urban and predominantly rural areas. Linking centres of high population is very important, but ensuring "sustainable economic growth across all regions of the UK" will require more than just peripheral attentions to predominantly rural areas such as the south west. Such areas are going to require investment in energy systems, digital and transport infrastructure. Improvements in technology in agriculture, such as the use of driverless farming machinery will lead to productivity improvements, but also a need for ultrafast broadband and 100% mobile coverage in rural areas. We can anticipate hydrogen being a major source of fuel so easy access to locally produced hydrogen will be essential for commercial and personal travel needs. The delivery of goods and material both into and out of rural areas will increasingly rely on driverless HGV convoys. These will require a major upgrade of the strategic road network managed by Highways England and the arterial routes managed by local authorities in order to create smart network links. The distances involved and the types of existing roads in these areas will require significant investment to avoid these regions being left behind by the most populated areas of the country. If this happens, the objective of the Commission will not be met.*

*Infrastructure developments in all areas need to add to the appeal of the area due to the high quality of design used in producing solutions. As this is a first national infrastructure assessment, it is a wonderful opportunity to showcase great design, replicating the impact of the Victorian benefactors and municipal corporations who transformed the face of British infrastructure.*

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

*The SWLEP agrees with the principles on which the NIA will be produced. The SWLEP is particularly keen for a holistic, whole system approach, which should produce added value by not compounding the weaknesses of reductionist thinking.*

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

*Yes, the SWLEP agrees with the proposals.*

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

*On flood defences, the emphasis should be on a catchment area approach, leading to more up river prevention activities rather than total reliance on expensive flood defences at key points down river.*

*With regard to water and drainage, the SWLEP endorses work on the needs of the waste water and sewage sector and in particular work to prevent sewage outflow at times of flooding.*

*Our national grid is based on flows of energy from a limited number of large power stations. Currently, some of the difficulty in bringing local power generation to the market is the inability of the energy network to handle numerous local power generators. A need for the future is a national power network which is predicated on decentralised power generation.*

*We should seek to make the most of digital centres to aid cyber security. In the south west, we have data capacity, computing capability and power source resilience in a triangle of Corsham (MoD and private sector hosting of government data), Cheltenham (GCHQ) and Exeter (meteorological service super computer). These are world leaders with potential to solve society's concerns about trust in the use of big data.*

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think uch interdependencies are likely to be important?**

*Digital is important to all the developments*

- *Energy and digital to ensure smart networks supporting balanced production and deliver*
- *Transport and digital to control driverless vehicles, drone (and their successors) delivery*

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

*Yes, the SWLEP agrees with the cross-cutting issues.*

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

*The first cross-cutting issue of geography and local growth raises the conundrum of an eventual national infrastructure plan and an entirely local, ad-hoc devolution strategy. The former shows the government seeking greater efficiency and effectiveness and the latter portrays a system which seeks change through an inefficient strategy that will not deliver equal levels of devolution of local decision-making across the country.*

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

*Yes, the SWLEP agrees with the methodological approach.*

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

*It will be interesting to observe how the Brexit negotiations lead to a balance of pragmatism and long-term strategic prioritisation. The negotiations will certainly take place in an uncertain environment! Can we learn anything from places like the United Services Institute which has knowledge of the long-term planning of other political systems, both legitimate and non-legitimate?*

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

*Yes, the SWLEP agrees with the identified infrastructure drivers. With regard to population and demography, the main reason people of working age move to another area is in search of a job. It is only the minority who attracted by an area's infrastructure and quality of amenities sufficiently strongly to make them move.*

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

The methodology should produce a portfolio of investments which achieve the objectives to:

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

*None, content with the approach.*

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

*Engage with the LEPs as they represent business and political leaders all around the country. In the same areas there are often local nature partnerships which bring together the interests of using natural capital and improving the quality of life of people in the area. Engaging a range of people of different ages through digital media, online discussion forums and webinars. In particular, focussing on secondary school pupils as they will be the ones experiencing a lot of real change through their adult lives and by 2050 will be society's decision-makers.*

[name redacted]

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## National Infrastructure Assessment consultation response

Q1. The Government has given the National Infrastructure Commission objectives to:

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

What issues do you think are particularly important to consider as the Commission works to this objective?

*We are the UK's largest water and wastewater services provider. Every day, we supply around 2,600 million litres of tap water to 9 million customers across London and the Thames Valley. We also remove and treat more than 4 billion litres of sewage for 15 million customers. We have a statutory responsibility for managing sewer flood risk and work with the Lead Local Flood Authorities on managing river, surface water and groundwater flood risk.*

*The population of London and the south-east is predicted to grow rapidly. The Greater London Authority (GLA) estimates that the capital's population will grow by 1.8 million by 2040<sup>1</sup> – this is the equivalent of adding the current populations of Birmingham, Edinburgh and Cardiff to the city<sup>2</sup>.*

*Water security – the provision of a sustainable and affordable supply of wholesome water in all but extreme circumstances – is critical to supporting and enabling sustainable economic growth. A lack of water security will hamper the UK's international competitiveness and severely affect the quality of lives of those living in the region.*

*One of our primary concerns is making sure that the most economically important and rapidly growing part of the country has a high level of water security. In addition to the pressures from an increasing population, abstraction reform and the disruptive effects on climate change mean there is a growing gap between supply and demand which, left unchecked, would equate to the water used by 2 million people by 2040 in London alone.*

*Abstraction reform is being proposed to protect the environment, such as our globally important wetlands, rivers, and chalk streams. The abstraction and management of water needs to change to manage our natural environment sustainably. This could result in greater pressure on water supplies by reducing the amount of water available for abstraction, particularly in the south of England. The Thames is the most intensively used catchment in the country, with more than 55 per cent of the effective rainfall licensed for abstraction.*

*The UK Climate Projections suggest that climate change is likely to have a disruptive effect on the availability of water in the UK. Whilst the average annual rainfall is not expected to vary, average and extreme seasonal rainfall is predicted to change, with significantly wetter winters and drier summers expected for the second half of the century compared to the baseline period. A requirement under the Environment Agency's drought plan guidelines to be resilient to more extreme droughts confirms this national need, which is most critical in the south-east. It will be necessary to capture and store this winter rainfall so that we can use it to provide reliable water supplies to customers.*

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<sup>1</sup> [GLA 2014](#)

<sup>2</sup> Birmingham = 1,020,589; Edinburgh = 448,850; Cardiff = 315,040. Source: [www.citymayors.com](http://www.citymayors.com)

*Our existing 25 reservoirs require statutory inspection once every 10 years. Drawdown, inspection, work and refilling can take a considerable amount of time, ranging from months to years if issues are uncovered. There is a risk that the drawing down of a reservoir for statutory inspection outside of a drought period coincides with an unplanned outage at another reservoir, could put the security of supply at risk if weather conditions dictate that refilling cannot take place.*

*The severe restrictions on water supply that would need to be imposed in a near worst-case drought scenario could cost up to £330m<sup>3</sup> a day in London alone. Rota cuts (where customers would experience a rota of temporary cuts in their water supply) could affect almost all areas of the economy, potentially forcing workplaces, schools, hotels and restaurants to temporarily close due to a lack of hygiene (toilets) and safety (fire suppression systems). The restrictions may also impact on other water intensive uses, such as the use of air conditioning for non-human health purposes, possibly affecting IT systems.*

*The £330m per day economic cost estimate comes from an independent report by NERA, which we commissioned in 2012. We are reappointing NERA to carry out a review and update of their report, and expect this to be completed by the end of 2016. We will be happy to share the report with the Commission and discuss the implications of its findings.*

*We believe the Commission could help address the question of how best to provide a water supply network resilient to the risk of severe water shortages that are becoming increasingly likely as a result of population growth and climate change. The Commission could play a valuable role in finding the appropriate balance between resilience and affordability. This may ultimately mean adding more weight to the need to provide a safe and reliable service, which should not come at the expense of efficiency, or an imperative to keep costs as low as possible.*

*Since privatisation we have invested heavily in infrastructure, at a rate of £1bn per year on average, delivering major projects such as the London Ring Main and a new desalination plant, although much of our core infrastructure dates back to the Victorian era. We have beaten our leakage targets for ten years in a row and are introducing innovative, ambitious demand-management methods, such as our smart meter programme. However, the size of the growing gap between supply and demand means it cannot be closed through demand management alone.*

*Our Water Resource Management Plan for the period 2015-2040, approved by the Secretary of State in 2014, identifies the need for a large water supply scheme from the mid-2020s onwards. The plan identifies three potential options: wastewater reuse; the transfer of supplies into our region; and a large reservoir. These are subject to detailed studies to determine the best value combination of option for us to promote in the next revision of our plan, to be published for consultation in spring 2018. The Water Act (2014) requires water companies to be resilient to a range of hazards which further supports the need for an improved supply and demand capability.*

*We believe the Commission should examine the need for at least one new large water supply scheme for London and the south-east. As described above, additional water resources are required both to support the predicted levels of housing and economic growth, and to provide sufficient headroom against the economically damaging impact of drought.*

*Although a new large water supply scheme would be a strategic asset for the capital and the south-east, it would have national significance. For example, the transfer option has a geographical footprint that potentially stretches to the north-west of England. In addition, the capital and the south-east collectively*

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<sup>3</sup> Analysis by NERA, commissioned by Thames Water in 2012.



*make up 38% of the UK's GVA - a failure to build sufficient water infrastructure would therefore have a significant impact on the nation's economy.*

*To support the projected growth in London and the south-east we need wastewater infrastructure to be treated with greater urgency. Urban creep<sup>4</sup>, loss of green space and climate change all put pressure on the sewerage network. Development in the capital in particular has led to a 19% increase in impermeable areas in 40 years. Population growth adds to these challenges but the new development needed to accommodate it creates opportunities for improvements, provided the drainage is correctly designed. A recent high profile example is the UK's largest sustainable drainage scheme at Nine Elms, delivered through a partnership between Thames Water and Nine Elms Vauxhall Partnership. Rainwater landing on an area the size of 20 football pitches will be channelled back into the Thames to stop it entering the capital's overstretched sewers.*

*However, the present funding arrangements for wastewater infrastructure are no longer fully efficient or effective to service the needs of new development. Successful reform would enable growth and allow all water companies to better support developers.*

*We proactively work with local planning authorities, seeking to ensure that development is allocated and phased, taking into consideration our infrastructure capacity. This is predominantly through liaising with local planning authorities on the drafting of their Local Plans, which we are a statutory consultee for. We use the growth forecasts and development sites that come out of council Local Plans to develop our strategic infrastructure requirements, including upgrades to sewage treatment works, water resources and water treatment works. We then look to include such assumptions in our 5 year business plan and our 25 year water resource management plan.*

*As we are not a statutory consultee on planning applications, we therefore have to proactively track key development sites that are coming forward in our region by liaising closely with local planning authorities. We work hard with councils to try and understand what is coming, but there are wide variations in the level of co-operation we receive, and getting clear visibility of the pipeline of future development can be challenging. This is why we are looking to develop stronger relationships with developers, to understand their portfolio of work at an earlier point to make sure we can prepare for it.*

*The current charging framework acts as a disincentive for investing before need. The funding that water companies receive from developers is currently included in their revenue cap but this form of income is outside of our control – it is driven purely by how much development is happening within the area. The money leaves the water company but the responsibility to deliver infrastructure, and the associated cost, remains. There is the opportunity for significant reform to connection charges, including the possibility of removing income from connections from the revenue cap and the creation of a market to provide greater flexibility for developers.*

*Finally, further consideration needs to be given to how the delivery of major long-term developments can be accelerated by better planning for water and wastewater infrastructure. For example, a significant upgrade may be required of existing infrastructure – costs for strategic upgrades need to be shared efficiently between multiple developers and existing customers, whilst avoiding a situation where the 'first mover', i.e. the first developer to begin construction, pays a disproportionate cost. We have successfully worked with the GLA on Integrated Water Management Strategies and believe this model can be refined and implemented elsewhere.*

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<sup>4</sup> The loss of permeable ground through using impermeable materials in urbanisation.

Q2. Do you agree that, in undertaking the NIA, the Commission should be:

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

*We strongly supported the decision to establish an independent National Infrastructure Commission and for the Commission to urgently undertake a National Infrastructure Assessment. We believe the Commission can play an important role in making sure that critical decisions about the country's infrastructure needs are founded on a strong evidential basis, and in decoupling key long-term decisions from shorter-term political considerations.*

*We agree with the Commission's proposed principles when undertaking the NIA and particularly welcome the commitment to undertaking a 'comprehensive...whole system approach'. In the water sector this includes considering the links between micro-level proposals, such as Sustainable Drainage Systems (SuDS) and water saving measures, the links between water supply and wastewater treatment and energy, the requirement for strategic infrastructure, and the critical role that regulators and other stakeholders play in ensuring the delivery of interdependent infrastructure. In considering how best to provide water and wastewater infrastructure, a co-ordinated, integrated, whole system approach can help ensure disparate policies and responsibilities shared across agencies and departments are shaped to contribute towards common goals.*

Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

*We believe that in addition to the description given in paragraph 45, the NIA can play a valuable role in identifying the level of resilience required to safeguard growth and against the potentially crippling economic damage of drought. It can also help identify the appropriate balance between resilience and affordability.*

*In addition to the disruptive effects of climate change, the Commission should consider the impact of abstraction reform on reducing the availability of water in the future. For some water companies in the south of England this could reduce the amount of water available by up to 50 per cent, according to Water UK.*

*There is a limited description of the approach towards wastewater and sewerage. The delivery of strategic infrastructure is connected to the meeting of targets for reducing surface water drainage into the sewerage network. A coordinated approach is necessary to provide greater certainty for those delivering strategic infrastructure, including the demands that would be put on the network through growth, the increase in impermeable surfaces in our cities, and the upcoming review of the National Policy Statement (NPS) for wastewater, including resilience against surface water flooding from heavy rainfall. This needs to be considered in reference to the Water Act (2014), which requires Ofwat to act in accordance with the Government's Strategic Policy Statements. Overall, we have a network of drains and sewers that were not designed to capture, convey and treat the amount of rainwater that they are currently expected to and which is expected to increase in the future.*

Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

*As set out in the answer to question one, we believe the NIA should examine the need for a new large water supply scheme(s) for London and the south-east. Additional water resources are required both to support the predicted levels of housing and economic growth, and to provide sufficient headroom against the economically damaging impact of drought.*

*Wastewater infrastructure is essential for growth and development, and there are opportunities to reform the funding mechanisms for its delivery to encourage 'investment ahead of need', particularly on complex, long-term development sites. An Integrated Water Management Strategy, where water and wastewater requirements are examined holistically at the earliest stages of planning for major development, can identify if there is a need for a high level of investment and provide evidence supporting the apportioning of the costs between developers and all customers. We are successfully using this model at Old Oak Common, working closely with the Mayor of London and the GLA.*

Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?

*Water supply is dependent on a continuous and reliable power supply. Without power to treat and pump drinking water and wastewater, companies would be unable to continue to supply customers, there could be sewer flooding, and environmental harm from untreated discharges, leading to severe economic damage. Desalination and effluent reuse are energy / carbon intensive forms of water supply and although we are increasingly producing our own power, for example through biogas from sludge or floating solar panels on reservoirs, we are reliant on a resilient energy sector.*

*The current water resource system lacks sufficient headroom to cope with a sustained period of low rainfall and this is being further reduced by the factors set out in the questions above. Absence of water supply prevents all economic growth and insufficient resilience against drought would result in severe financial damage to every sector of the economy.*

*In addition to considering the availability of water for public water supply, manufacturing, energy generation and agriculture, the Commission should consider the importance of a predictable, affordable supply of water to support the construction of new development (homes and workplaces), infrastructure (e.g. High Speed 2) and industrial processes (including fracking).*

*The predicted new housing in London and the south-east cannot be delivered without an increase in supply, even after ambitious demand management measures, including leakage reduction, universal water metering, and improved water efficiency. Over a million new households are predicted in London alone by 2037. Although we understand that the Commission's remit does not extend to housing supply, we believe that a new water source(s) does fall under the Commission's responsibility to coordinate the timing and delivery of new infrastructure with the delivery of new housing.*

Q6. Do you agree that the NIA should focus on these cross-cutting issues?

*Yes. We supported the creation of the Commission in part due to economic infrastructure being viewed in isolation, resulting in uncoordinated decision making. We believe that consideration of these cross-*

*cutting issues will result in a more strategic, innovative, and sustainable approach in delivering water and wastewater infrastructure.*

*One model to overcome sporadic delivery of infrastructure at a regional level is the London Infrastructure Delivering Board, which brings together devolved government and deliverers to achieve efficient, integrated and innovative solutions.*

Q7. Are there any other cross-cutting issues that you think are particularly important?

*The Thames Tideway Tunnel (TTT) is an example of an innovative financial model that is delivering a £4.2bn project with minimal impact on customers' bills and at no cost to the taxpayer. When originally proposed with a traditional utility model, the costs on customers' bills were estimated to be £70-£80 per year on average. Through the model used, bills will instead rise by £20 to £25 by the mid-2020s.*

*The TTT model is a first for the UK water industry and involves the creation of an independent infrastructure provider (IP). The cost of capital is reduced by the financing of a single significant asset with suitable protection against exceptional construction risks associated with deep tunnels that could not be insured against through the private sector, enabling the IP to attract substantial private investment, including from domestic institutional investors. The model is applicable to other forms of infrastructure, particularly other regulated or monopolistic assets such as transport infrastructure. We welcome the NIA examining financial and funding models to deliver infrastructure, and recommend consulting widely to identify innovative schemes such as the TTT.*

*We welcome the suggestion that the NIA examines how cost relates to the quality and resilience of infrastructure, and the level of risk. Overreliance on conventional cost:benefit analysis alone is unlikely to lead to decisions (and outcomes) that are in the best long-term interests of the UK. Least cost does not necessarily equate to 'best value'. In our experience, over adherence to a framework that requires advance proof that the benefits from infrastructure investment exceed the costs can, over time, lead to under-investment in infrastructure. Costs are often uncertain, particularly for large water resource schemes, environmental and social costs are an inexact science, and we need to account for the broader benefits of an improved supply/demand balance outside of a drought. An example of these broad benefits would be having a major supply-side resource, such as a large reservoir or water transfer scheme. This additional capacity would allow us to reduce reliance on more environmentally sensitive abstractions.*

*Although we appreciate that the Commission's remit does not fully extend to housing policy, there are potential reforms to the approach to wastewater infrastructure investment that would better support growth and housebuilding, where there is currently a disincentive to invest in wastewater infrastructure to meet the requirements of growth.*

*Water companies are not statutory consultees on planning applications, and therefore have to proactively track key development sites by liaising closely with local planning authorities to take into consideration our infrastructure capacity. We use growth forecasts to plan upgrades to our infrastructure capacity and work with councils to try and understand what is planned, but ensuring clear visibility of the pipeline of future development can be challenging.*

*The funding of wholesale water and wastewater infrastructure through price limits differs slightly. In particular, while there are clear statutory mechanisms for recovering off-site reinforcement costs that are necessary to supply water to a new development, the same is not true for wastewater. At the last price review, Ofwat analysed the costs water companies incur making connections to the network, and the*

*income we receive through the charges developers pay. This concluded that connection costs are fully funded through the then level of connection charges, so we receive no additional funding.*

*The current charging framework acts as a disincentive for investing before need. If the housebuilding market continues at its current pace, the money we receive from developers will exceed the amounts expected when the revenue cap was set and therefore some companies may need to reduce charges to customers to remain within their price control even though this form of income is outside of our control – it is driven purely by how much development is happening within each company area. The money leaves the company but the responsibility to deliver infrastructure, and the associated cost, remains with the company.*

*Our Water Resources Management Plan housing forecast in 2014 was for 181,000 new homes in the region. The latest forecast, from 2016, estimates 198,000 homes will be built. If this occurs, then the inclusion of income from connections in the revenue cap results in the company funding any work required for the 'extra' 17,000 homes, despite housing growth being fully outside of company control.*

*Although this falls within Defra's responsibilities, the Commission could push for a review of the inclusion of connection income in the revenue cap to be carried out – a change would bring potential benefits to the water industry, developers, and the Government as it would provide greater support for developers. Any review would be in the context of the Water Act (2014), which requires Ofwat to act in accordance with Government's Strategic Policy Statements.*

Q8. Do you agree with this methodological approach to determine the needs and priorities?

*Given the complexity in this area we welcome the Commission's decision to engage widely on the use of models and make use of the substantial existing knowledge that exists. We would be happy to provide our models and recommend that the Commission consider the modelling undertaken recently for the long-term water resources planning study led by Water UK.*

*This study takes a 50 years perspective, longer than the current 25 year statutory requirement for water resources management plans, and develops new modelling of droughts, climate change impacts, and the resilience of supplies. It was funded by Water UK, led by a steering group comprised of water companies, regulators and UK and Welsh Government representatives. The work was carried out by a consortium of experts in the field and peer reviewed.*

Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

*In order to move away from conventional cost:benefit analysis, which can lead to long-term under-investment in infrastructure and fails to identify best value, we are using multi-criteria performance assessments. This approach is particularly suitable when examining investment in a future where there is significant uncertainty relating to some of the investment drivers, for example the forecast impacts of climate change, population growth and the requirements of the environment. A detailed explanation of this method's use in the water industry is available from Thames Water or Professor Julien Harou of Manchester University.*

*The Environment Agency has developed an approach for enhancing long-term resilience and enabling investment despite uncertainty. The Thames Estuary 2100 project provides a long-term strategy for managing tidal flood risk in a rapidly changing estuary. It sets out a series of flexible adaptation*

*pathways, identifying different flood risk management options and defines the trigger points where rising sea levels require moving from one option to another. This allows options to be safeguarded and creates clear decision points on when to act. We are also applying this approach to our long-term water resources planning and, again, we would be happy to share our latest work with the Commission.*

*London's continued growth threatens to increase pressure on our sewer network and further development will only be sustainable if we manage surface water to avoid creating or increasing flood risk. This means keeping surface water out of the sewer network to the greatest possible extent. We have worked closely with the GLA and other partners to support the development of the Sustainable Drainage Action Plan. As part of this work we have developed a strategic model for London, which illustrates the areas where there is likely to be significant pressure on the wastewater network.*

Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?

*We agree with the infrastructure drivers and welcome the inclusion of water abstraction in the environmental considerations. The assessment of issues such as water abstraction should include the potential future tightening of regulations which, in this area, will lead to a reduction in the amount of water available to water companies. Similarly, consideration of climate change should include the UK's resilience against extreme weather events, such as flooding or prolonged drought.*

*For water and wastewater infrastructure, topography is a key driver. There are high energy costs associated with pumping water/sewage that could have an impact on interdependencies. Maximising the use of gravity can reduce energy demands and will be a consideration in determining preferred locations for new infrastructure.*

Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

*As set out in our answer to question seven, an over reliance on cost:benefit analysis can lead to a long-term underinvestment in infrastructure and ignores the broader benefits that projects can bring. A 'least cost' approach typically involves choosing a single solution, defined predominantly by cost. It may not be the most robust plan or a 'best value' solution where the future is uncertain and outcomes can change.*

*An approach is needed that allows the selection of 'best value' solutions given the many uncertain but plausible future scenarios that could occur. Multi-criteria analysis has the additional benefit of meeting the needs of a range of stakeholders with multiple goals, some of which may conflict. The use of adaptive pathways builds flexibility in to the approach, which could help manage the long-term and uncertain nature of climate change impacts.*

Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

*Our response to Q11 covers this question.*

Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

*We recommend undertaking a broad assessment of benefits to capture the value that proposed infrastructure would deliver for society. In the context of infrastructure, we consider social benefit to be the increase in the welfare of society derived from taking a particular course of action. This should cover both public and private benefits, including:*

- *the value customers place on a service they receive directly as a result of the action;*
- *the avoided costs that would otherwise have fallen to society or a company if the action was not completed;*
- *environmental benefits and natural capital gains beyond those considered or recognised by the general public, and broader economic benefits that may be created or protected.*

*Wherever possible, these benefits should be monetised, but some of the societal value that needs considering will not lend itself to monetisation.*

*The range of benefits that need to be assessed require a broad base of society, stakeholders and end users to be engaged. This will necessarily include both informed and uninformed stakeholders who will be both paying for and receiving benefits (in differing proportions). Therefore it is crucial to engage with the general public which includes both those paying for and those directly affected by infrastructure investment. Aspects like environmental impacts, both adverse and beneficial, as well as technical understanding of issues like resilience require expert input.*

*Water companies' Water Resource Management Plans and other activities in our business have to be underpinned by the views of customers. We agree that public support for infrastructure is important, but there are issues with traditional 'willingness to pay' research and effectively engaging with customers on long-term risk. We are therefore taking a qualitative research approach to allow us to have in-depth discussions with our customers on these complex issues. We are planning a series of whole-day deliberative workshops with household and non-household customers, giving them sufficient time and appropriate levels of information to understand the issues and come to an informed point of view. In addition to this we will hold workshops and interviews covering the same topics with specific customer groups that may be particularly interested or affected by water resources issues – such as local communities, future customers and large employers. We will also carry out a quantitative survey with household and non-household customers to get the views of uninformed customers.*

*Our most recent research identified a desire from customers that we plan for the future, including the safeguarding of supply. Specifically, we were requested to continue to tackle leakage and explore the option of continued water meter roll-out, explore options for increasing supply, and look at the option of recycling water. Again, we would be happy to share our engagement methods and most recent research results with the Commission.*

*We would also recommend that the Commission proactively works with devolved bodies, such as the Mayor of London and London Assembly, who have detailed proposals and knowledge of potential infrastructure that would have national significance.*



## National Infrastructure Commission

### National Infrastructure Assessment: Call for Evidence

#### BSA Response

In October 2015, the BSA welcomed Chancellor George Osborne's announcement of a new National Infrastructure Commission (NIC). When established on a statutory footing, the NIC will help provide constructors with a clear vision of what the UK's infrastructure landscape in the medium to long-term will look like. This is even more important in light of Britain's vote to leave the European Union. Below is the BSA's view on what NIC should consider when assessing UK infrastructure priorities. These will focus on:

- Skills - Building a diverse skills base aimed at meeting infrastructure needs
- Connectivity - Ensuring the UK's large cities and small towns are better connected to improve productivity
- Devolution - Clarifying how combined authorities and local government fit into national infrastructure planning
- Funding - Maintaining and improving the flow of infrastructure investment and building comprehensive business cases
- Technology - Understanding how technology influences construction, skills, and how people interact with infrastructure

#### Skills

The Government's National Infrastructure Pipeline (NIP), as of March 2016, is worth £483bn<sup>1</sup>. Whilst many of the projects are shovel ready and have workers on the ground, the Pipeline is as much a vision as it is a reality as the skilled workforce needed does not exist. The National Infrastructure Assessment's (NIA) role to chart Britain's infrastructure requirements up until 2050 also needs to take into account the skills required.

The National Infrastructure Plan for Skills<sup>2</sup> estimates that approximately a quarter of a million construction workers and engineers will need to be retrained or 'upskilled' in order to deliver the NIP in full. Uncertainty around the future of immigration policy significantly complicates the matter. Meeting this challenge will prove one of, if not the biggest, faced by the construction industry and the NIC's assessment of need will be crucial to catalysing training and investment in the workforce.

The BSA welcomes the announcement of new National Colleges for High Speed Rail in both Birmingham and Doncaster earlier this year<sup>3</sup>. The colleges will boost Britain's construction skills base and ensure the development of bespoke training for the UK's future engineers. Additionally, this will

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<sup>1</sup> <https://www.gov.uk/government/publications/national-infrastructure-pipeline-2016>

<sup>2</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/464354/NIP\\_for\\_skills\\_final\\_web.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/464354/NIP_for_skills_final_web.pdf)

<sup>3</sup> <https://www.gov.uk/government/news/major-step-forward-for-national-college-for-high-speed-rail-as-construction-starts-in-birmingham-and-doncaster>



ensure that workers trained to specifically deliver HS2 will have the capabilities required to deliver future high-speed rail lines.

The BSA urges the NIC to explore options for establishing future infrastructure colleges in a similar mould to the National High-Speed Colleges. This will ensure Britain has a diverse construction and engineering skills base, capable of delivering a wide-range different projects. Potential colleges could focus on energy grid management, roads, aviation and urban transport. The industry would want to support the development of such institutions and contribute resources and expertise to boost effectiveness.

The biggest risk to building and maintaining a skilled workforce is a stop-start pipeline. The BSA recommends project continuity, for example, ensuring Crossrail 2 commences soon after the completion of Crossrail. This allows the skills base built on the latter project to be retained and built upon, increasing productivity and effectiveness.

The NIC should encourage the Government to use procurement to pursue its broader skills objectives. Provisions such as hiring a certain number of apprentices or ensuring workers are trained to a certain standard will help Britain broaden its construction skills base. BSA members are ready, willing and able to provide such training and help the Government reach its ambitious apprenticeship targets. Such an approach will allow industry to take the lead in building an infrastructure skills base and ensure training becomes an embedded part of the procurement and construction process, as is often the case already.

## **Connectivity**

One of Britain's major infrastructure challenges is improving transport connectivity. Improving the speed at which people and goods reach B from A is key to improving UK productivity. Additionally, improving transport connectivity is essential to realising the Government's long-held ambition of rebalancing the economy and strengthening the regions. The BSA supports the NIC's finding that the North of England needs 'immediate and very significant investment' and the need to kick-start projects such as HS3 and increasing M62 capacity<sup>4</sup>.

The NIA should therefore focus on which projects are likely to achieve improved connectivity across the north, which routes should be priorities and what measures can be introduced rapidly and cost-effectively. Projects such as HS3 will significantly improve both capacity and journey times across the region's different towns and cities. However it is a project unlikely to be completed for a few decades, potentially longer. Whilst the NIA's remit covers medium to long-term infrastructure need, shorter term options, such as rail electrification, larger and longer trains (where possible) and road surface improvements, shouldn't be ignored.

Connectivity doesn't just cover city to city transportation. Intra-city connections are as, if not more, important to productivity and prosperity. The Government's devolution agenda, including the establishment of numerous sub-national transport bodies, such as Transport for the North and Transport for the West Midlands, can drive connectivity improvements. Different cities and regions will have different infrastructure priorities to suit their characteristics. The BSA would therefore encourage the NIC to engage with the newly formed Combined Authorities to understand their priorities, before undertaking a nationwide assessment of infrastructure need.

The NIC's recommendations and assessments should ensure improved connectivity does not come at the expense of smaller towns. Major projects have a tendency to focus on links between larger cities. However the risk of excluding smaller towns, often lying at the perimeter of major conurbations, can lead to their decline. The Cities Outlook 2015 report from the Centre for Cities found a significant number of smaller cities in close proximity to major urban centres have 'low wage, high welfare'

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<sup>4</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/507791/High\\_Speed\\_North.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/507791/High_Speed_North.pdf)

economies<sup>5</sup>. Improved transport connectivity is one of the measures the Government can take to improve the prospects of these ‘outlying’ areas.

## Devolution

The NIC’s most complex challenge is to determine, with a set amount of resources, the value of different infrastructure projects, in different sectors. Decisions about whether to spend a set amount of funding on a new power plant or a new rail line presents a unique challenge. The NIC must ensure that the potential multiplier effect of new investment is fully calculated e.g. boosts to housing capacity, effect on productivity, impact on wages and demand.

The emerging range and number of combined authorities, as part of the Government’s drive for the devolution of powers, has seen a particular focus on infrastructure. Whilst the decision making process for construction projects at a central government level is clear, the relationship between Whitehall and combined authorities is less clear.

The NIC should make clear its position in relation to devolved bodies and whether its proposals should be delivered at a combined authority or national level. Reports also suggest that a number of combined authorities and devolved bodies have begun establishing their own infrastructure pipelines<sup>6</sup>. As these continue to develop, with the possibility of more localised infrastructure commissions, it is crucial for the NIC to closely cooperate with their development.

## Financing

In light of Britain’s vote to leave the European Union, and the subsequent downgrading of the UK’s credit rating, the construction industry needs reassurance that streams of funding will continue to flow from Europe and beyond. Although it is not within the NIC’s remit to secure funding, a clear list of viable infrastructure projects, with a clear business case will help boost investor confidence. The NIC should not simply back the simplest option, with bold, innovative but viable projects likely to energise investors.

The BSA recommends using the HM Treasury ‘better business case framework’ to help support a vision and decision making<sup>7</sup>. In some cases it might be the private sector partner bringing that business case to Government.

## Technology

We were pleased to see a recognition of the importance of technology for improving infrastructure delivery in the NIC’s recent reports, in particular the energy storage analysis<sup>8</sup>, and urge the NIC to continue assessing the role of technology. Given the medium to long-term nature of the NIC’s work, it is crucial that the rate of technological advance is factored in to cost analysis. A prohibitively expensive project today may not be so in 10 years. Additionally, it would be useful if, when proposing project ideas, for the NIC to include analysis of how the pace technology change could both bring down cost and affect timelines.

The NIC, as part of assessing longer-term needs, should examine how technology is changing people’s interaction with infrastructure. Transport in particular is undergoing a technological revolution that will usher in the next generation of vehicles and digital railways<sup>9</sup>. The BSA encourages the NIC to include as part of a wider report into infrastructure, or even as a separate report, analysis of how

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<sup>5</sup> <http://www.centreforcities.org/publication/cities-outlook-2016/>

<sup>6</sup> <http://sheffieldcityregion.org.uk/about/lrb/>

<sup>7</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/220541/green\\_book\\_complete.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf)

<sup>8</sup> <https://www.gov.uk/government/publications/smart-power-a-national-infrastructure-commission-report>

<sup>9</sup> <http://www2.deloitte.com/uk/en/pages/business-and-professional-services/articles/transport-in-the-digital-age.html>

technology has changed people's relationship with infrastructure, for example, since the introduction of smart meters and contactless payments on transport.

The analysis of technology and its relation to training and skills is another aspect for the NIC to consider. Technology developments such as BIM have fundamentally altered the construction process, giving the industry a more high-tech, innovative feel. Such changes can be used to enthuse potential engineers and the builders of the future to consider a career in construction, where they may have looked elsewhere. The BSA would like to see the NIC evaluate and propose ideas for how technological advances can be used to both improve the existing skills base and encourage future workers.

### **Summary of Recommendations**

1. Explore options for establishing further bespoke infrastructure colleges, similar to the National College for High Speed Rail, in partnership with the construction industry.
2. Encourage project continuity between similar schemes, such as Crossrail and Crossrail 2, to ensure the skills base is retained.
3. Use procurement to meet broader skills objectives including increasing apprenticeships
4. Focus on the connectivity between smaller towns and major cities when examining any major transport project between urban centres.
5. Conveying to the industry the 'multiplier effect' of any investment when comparing infrastructure need across different sectors, making the case to industry and investors.
6. Incorporate analysis of the rate of technological advance into assessment of medium to long-term need.
7. Outline how technology is altering people's everyday interaction with infrastructure and how this might further change in the future.

The Chartered Institute of Building

submission to the

National Infrastructure  
Commission

on the consultation on the

Process and methodology for the  
National Infrastructure Assessment

*5 August 2016*

**Q1. The government has given the National Infrastructure Commission objectives to:**

- **Foster long-term and sustainable economic growth across all regions of the UK**
- **Improve the UK's international competitiveness**
- **Improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

Policy shifts following changes in Government have created a 'stop-start' approach to investment in infrastructure. The quality of UK energy and transport infrastructure is thought to be particularly poor when compared with other developed economies. The UK ranked 27<sup>th</sup> in the world rankings for global competitiveness of overall infrastructure and 30<sup>th</sup> for road quality<sup>1</sup>. As a percentage of GDP, public investment in infrastructure over the last 15 years has remained well below many of the UK's principal competitors - including France, Canada and Japan.

Businesses are not convinced that this performance gap will close any time soon either. A 2011 survey from the Confederation of British Industry (CBI) found 59% of companies saw EU infrastructure in a more favourable light<sup>2</sup>. This figure increased to 61% in 2014. Despite this assessment, data from Arcadis reveals the UK has jumped to 9<sup>th</sup> place in its Global Infrastructure Investment Index<sup>3</sup> - meaning the UK has become more attractive to investors in part because of its low risk business environment.

The CIOB welcomes the introduction of the National Infrastructure Commission (NIC) designed to help create a long-term vision for infrastructure and decouple provision from party politics. By setting out specifically what projects are in the pipeline, the Commission has the potential to anticipate demand for skills. This is essential if the UK is to realise the targets set out in the Construction 2025 Strategy; to cut costs by 33% and ensure a 50% reduction in completion times.

UK Competitiveness firmly depends on skills availability and client demand, both of which are intrinsically tied to business and investor confidence. Given that figures from the CITB suggest that the construction industry will need to find more than 232,000 new recruits by 2020<sup>4</sup>, the impetus to act now and reduce the likelihood of future bottlenecks is evident. When working to its objectives, the Commission should consider the benefits of engaging in greater dialogue with professional bodies and local authorities to help manage skills expectations. The Commission should also consider the additional pressures exerted on local authorities as a result of budget cuts which have restricted their ability to carry out regular repair and maintenance works.

Whilst the Government's plan to create three million apprenticeships is ambitious the Commission must recognise the scale of the shortages and look carefully at the various skills levels to understand where pinch points are most likely to occur. This is particularly

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<sup>1</sup> [World Economic Forum, The Global Competitiveness Report 2014-15](#) (Based on 144 countries).

<sup>2</sup> [CBI, Taking the long view: A new approach to infrastructure. CBI-URS Infrastructure Survey 2014.](#)

<sup>3</sup> [Arcadis, Third global infrastructure investment index 2016: Bridging the investment gap.](#)

<sup>4</sup> [CITB, UK construction set for growth – with 230,000 jobs to be created, 2016.](#)

prevalent for roles which require Level Four skills – which are frequently sought for management positions within the industry.

Naturally there are other factors to consider. Whilst estimates for the cost of congestion vary - official data suggests that direct costs for the UK were in the region of £2bn in 2010 and would reach £8.6bn in 2040<sup>5</sup> - in the absence of effective intervention. According to ICE State of the Nation report (Transport 2013)<sup>6</sup> the volume of UK traffic on roads has risen by around one-fifth in the past twenty years. Data from the 2015 Annual Local Authority Road Maintenance survey also found that one in six of England's roads were in poor structural condition<sup>7</sup>. Congestion not only serves as a drag on UK competitiveness and productivity but also leads to serious health conditions and can lower the quality of life for those affected.

As already noted, business confidence is a serious issue for policymakers to consider; and one that costs HM Treasury billions each year in delays and lost business. Confidence is compounded by a range of factors which include skills availability, procurement and access to finance. Here it is evident that the Commission has its limits and success is likely to be determined by a range of factors – some of which are outside its control.

The Commission must recognise the boundaries of the remit set by the government. Whilst recommendations made by the Commission to increase capacity on public transport - including the rail network are aimed at improving the service for passengers - this service is unlikely to improve without more real-time information regarding travel disruption; a factor the NIC has very little control over.

Similarly, whilst recommendations that mention greater rail electrification and investment in the road network have the potential to increase capacity and help cut journey times, the extent to which this is realised will ultimately depend on the performance of train providers and disruption on other sections of the road network. The Commission therefore needs to recognise the boundaries of its remit and consult closely with public transport providers to ensure that its recommendations are feasible and possible to implement.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

The CIOB agrees the Commission should be open and transparent in the way it operates. The Commission should also be adaptable and be able to manage competing interests. In undertaking the National Infrastructure Assessment, the CIOB believes the Commission should also recognise the wider value of construction and infrastructure. Specifically, we consider the Commission should take into consideration the wider benefits of infrastructure

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<sup>5</sup> Construction News, [DfT unveils policy statement aimed at speeding up infrastructure planning](#), 2013.

<sup>6</sup> ICE, [The state of the nation report: transport 2013](#)

<sup>7</sup> [Annual Local Authority Road Maintenance Survey 2015](#).

– particularly the various stages of construction. As we know, the value of better buildings transcends multiple boundaries. By ensuring individuals are happier and healthier, improvements in the built environment has the potential to increase the productivity of the UK economy as a whole. We therefore believe the Commission should consider this relationship when working to its objectives.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

The CIOB agrees that a long-term vision for the provision of UK infrastructure is needed. It believes that sectors should be not assessed individually for infrastructure needs; instead a multifaceted approach should be taken. It therefore welcomes the approach outlined.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

NA

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

Given the destruction and devastation caused by the floods in December 2013 and early 2014, the CIOB believes the Commission should pay particular attention to improving the UK's response to water and floods.

Given the ability of flood water and torrential rain to bring down power lines, close local transport networks and cut the supply of energy to homes and businesses, failure to invest in our response to cases of flooding has the potential to submerge virtually all other forms of economic infrastructure and bring growth to a grinding halt. For this reason, the interdependencies between flooding and each of the sectors outlined in the consultation should be given careful consideration.

Whilst the APPG for Excellence in the Built Environment argues - in its report on water - that the UK ought to transition towards an approach that looks at living with water, rather than mitigation and the construction of greater flood defences, the CIOB believes that we also need better designed buildings to help reduce run-off.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

The CIOB agrees that the NIA should focus on the cross-cutting issues specified in the consultation. What is less clear is how performance will be measured. Specifically, at what point in a projects life-cycle will its performance begin to be measured; during the construction phase, or post-completion.

This is particularly important for the construction industry and measures of its productivity. As the CIOB's recent report entitled: [\*Productivity in Construction: Creating a Framework for the Industry to Thrive\*](#) found, improvements in the built environment often lead to productivity gains in other sectors; as users derive a higher benefit from better buildings. As noted previously in this response, improvements in the built environment have the potential to improve the productivity of the entire workforce by making individuals happier, healthier and safer.

The report also argues that construction productivity is not being measured in the most accurate way, with consulting in the sector being recorded under financial services. Similarly, many offsite processes in construction continue to be classified under the heading of manufacturing; providing a distorted impression of construction output. This is an important point to consider and suggests that an independent review of how construction productivity is measured may be necessary. While the CIOB agrees that the Commission should focus on the cross-cutting issues identified, the way in which these issues are assessed and measured may need to be reconsidered.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

One factor that is noticeably missing from the consultation document is the issue of the construction industry's business model. Given the tendency to outsource, contractors in the sector work to tight profit margins, meaning there is little scope for error. This not only affects the levels of training and staff development, but also makes it harder to manage skills expectations. We believe the NIC is suitably placed to review the industry's business model and suggest potential alternatives for major infrastructure projects.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

We agree that the Commission has identified a suitable approach to determine the UK's infrastructure needs and priorities. Whilst we welcome the Commission's desire to engage with a range of stakeholders, it is unclear how the Commission intends to prioritise certain types of evidence. The CIOB therefore welcomes greater clarity on this issue.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

NA

**Q10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?**

We believe that the commission has identified the most important infrastructure drivers. However, the subject of defence is also likely to determine future demand for infrastructure.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demand of the UK in the future. Do you have a view on the most appropriate methodology to determine the portfolio?**

NA

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

No



**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

We believe the outlined model of engagement and data collection is sufficient and fit for purpose.

## **NATIONAL INFRASTRUCTURE COMMISSION**

### **CONSULTATION ON THE NATIONAL INFRASTRUCTURE ASSESSMENT**

#### **RESPONSE BY THE NATIONAL INFRASTRUCTURE PLANNING ASSOCIATION**

1. This is a response to the consultation launched in June 2016 by the National Infrastructure Commission on the process and methodology for arriving at its National Infrastructure Assessment in 2018.
2. The National Infrastructure Planning Association (NIPA) is an organisation of several hundred members created to bring together all those involved in the planning and authorisation of nationally significant infrastructure projects (NSIPs) in the UK, particularly those projects requiring development consent under the Planning Act 2008 and to promote best practice.
3. NIPA's members are drawn from a wide variety of organisations: project promoters, local authorities, law firms, environmental consultants, planning consultants, surveyors and so on and all members have had an opportunity to comment on this response.

#### **Overall issues**

4. The National Infrastructure Assessment presents one of the most significant opportunities to shape the future direction of the UK, and NIPA is grateful for the opportunity to participate.
5. One of the overarching issues facing the NIC in its approach is the extent to which the National Infrastructure Assessment will be reactive or proactive. Will the 2017 vision document set out what the NIC thinks will happen or thinks ought to happen? If the NIC is to fulfil its third objective of improving quality of life, then its vision should tend to be more proactive, and NIPA would support this.
6. There are quality of life issues such as rebalancing the economy between the south east and the rest of the country to which infrastructure planning can make a contribution, rather than simply supporting the likely growth in the south east by providing more infrastructure there. A balance should therefore be struck between the three objectives throughout the NIC's work towards its assessment.
7. The contrast between some sectors largely being funded by the public sector (e.g. transport) and some by the private sector (e.g. energy) should not mean that the NIC focuses on one rather than the other; the assessment of need for infrastructure should be agnostic as to how it will be funded. The importance of making the NIA a document designed to attract private sector investment should also not be underestimated.
8. Finally, the NIC should ensure it works with the emerging sub-national bodies such as Transport for the North, Midlands Connect and combined authorities, both to tap their understanding of their areas and to ensure integration rather than conflict between the national and sub-national levels.

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

9. The main issue that will inform much of the direction the country takes is the extent to which climate change features. If the UK is to reach (or even exceed) its 2050 target of an 80% reduction in carbon emissions from 1990 levels, the decarbonisation of electricity generation and transport will be a more significant factor than the three objectives set out above.
10. Other issues include social and health impacts – for example at the most basic level shelter, food, water and energy/heat supply and security, and health and education opportunities and outcomes. It is also about better connecting and providing opportunity for more deprived communities with employment opportunities; natural resource demand, utilisation and management in both a rural and urban context; development density – the benefits and issues raised by higher rather than lower density of development; and the impact on and relationship with local and sub-national planning policies and regulatory frameworks, funding mechanisms and planning periods caused by the Commission's recommendations.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

11. Yes. It is worth noting that the abolished Infrastructure Planning Commission had five principles: openness, engagement, sustainability, independence and consensus. It will be important to ensure real public engagement (not just consultation and presentation) and therefore to add engagement and consensus expressly to the NIC's principles, as they should go to the heart of the NIC's work (although they are covered later in the consultation document and by inference referred to as part of the first principle). In addition, when taking a comprehensive whole system approach it will be important that this is a whole and ecosystems approach. This should also be clearly set in a spatial context.
12. The NIA should aim to take a UK-wide approach and the NIC should seek to work with both the UK Government and the devolved administrations.
13. It is important that the NIC takes a genuinely long-term perspective on infrastructure needs and opportunities. The NIC should look well beyond individual parliamentary cycles and create certainty for infrastructure planning and investment, which typically requires policy and political support across the span of several parliaments.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

14. NIPA generally agrees with the sectors and the manner in which they are proposed to be covered. In each case, the NIC should balance economic, social and environmental considerations.
15. Whilst NIPA recognises that housing supply is currently outside the scope of the NIA, it should be recognised that housing is a key driver in the infrastructure sectors which are being considered. The assessment will have to recognise the influence of the spatial distribution of housing on all infrastructure sectors (and vice versa).
16. NIPA questions whether steps should be taken to incorporate a high level assessment of natural resources as a separate “sector”, recognising both the constraints and opportunities presented by natural resources and building on a sustainable development approach.
17. As part of the NIA, NIPA suggests that consideration should be given to the location of infrastructure, building on the *Smart Power* report which recognises the capacity for substantial technological change, although this should not inhibit commercial opportunities for infrastructure provision.
18. On energy, the priority is to ensure that there is sufficient generation to meet demand (while using the interventions such as storage and local peak spreading set out in *Smart Power*), particularly since as energy consumption is decarbonised, electricity demand could increase significantly.
19. On flood defences, NIPA questions whether it would be more appropriate to consider flood risk beyond the period of the assessment, since infrastructure developed up to 2050 will be expected to have a design life well beyond that date. As part of a holistic approach, NIPA suggests that flood risk, the adequacy of defences, and the protection of infrastructure should be considered over a longer period of 80-100 years.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

20. Yes. NIPA suggests that the NIA should consider the way in which costs should be balanced against other considerations, for example landscape impacts. This could include considering existing methods of assessment (e.g. WebTAG) and considering whether there is scope for developing new metrics for quantifying costs and benefits of infrastructure provision, either generally or in relation to specific sectors. NIPA recognises that this point is touched upon as a “cross cutting issue” in paragraph 54 of the consultation document.
21. We also suggest that as well as making recommendations for the government to endorse as it sees fit, the NIA should recommend that National Policy Statements that the NIC considers to be absent, incomplete or out of date be updated. For example, there is no water supply NPS, despite the Planning Act 2008 covering such infrastructure; the suite of energy NPSs does not cover some technologies such as tidal energy or electricity storage, and that suite is now five years old.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

22. Yes. NIPA has identified the following areas where interdependencies are likely to be particularly important:

- Waste and energy – for example through energy from waste/biomass schemes;
- Transport and digital and communications – reducing the need for travel by improving telecommunications and digital connectivity to support remote working, and improving productivity by considering the needs of business and leisure travel by providing greater connectivity on public transport.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

23. Yes. The NIA will need to recognise the distinct challenge inherent in the cross-cutting theme of 'geography and local growth'. If the NIA is to be successful in its objective of fostering long term economic growth, it will need to recognise that delivering infrastructure is not the fulfilment of that objective, but an important step along the way. To be successful, the infrastructure will need to promote a response, particularly in land use development and growth. Generating confidence that such a response will take place is a key challenge for the work of the NIC. Without that confidence, planning for (and particularly investing in) major infrastructure becomes a speculative gamble.

24. The interaction of the work of the NIC with the land use planning system, therefore, is key – but there is little reference to it in the consultation. The box on page 18 does say, for instance, that the NIC will make recommendations that co-ordinate the timing and delivery of new infrastructure with the delivery of new housing, but how is this to be achieved?

25. It would be useful if the NIC could be seen to be promoting mechanisms for joined up infrastructure and land use planning including collaboration between the public and private sectors. Otherwise, the NIA risks either simply following the consequences of growth planned by planning authorities or pre-empting the outcome of land use plans. Close joint working with plan making authorities is clearly to be encouraged but the importance of integrated planning is so significant that the NIC will need to consider very closely its role as part of a process of joint working, particularly with larger, devolved authorities. The NIC will also need to consider whether there is a case to push for legislative change to more clearly enable cross boundary land use and integrated infrastructure planning, for example along transport corridors.

26. Any financial assumption made by the NIC should only be seen as a guide, and should not be used by economic regulators as a definitive cost to deliver as they are best placed to make decisions on costs. NIPA recommends that the NIC work with regulators and regulated utility firms to estimate the impact of any recommendations on consumer bills.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

27. Yes. Although NIPA broadly agrees with the cross-cutting issues identified, the following issues might be added:

- Skills: ensuring a skilled and appropriately and practically educated workforce is critical to securing the delivery of the desired infrastructure, and to the extent that there are skills shortages these need to be identified at an early stage given the lead time for developing skills.
- International interconnectivity: this issue is particularly relevant to transport infrastructure but has broader relevance e.g. in energy and digital communications. The extent and pattern (existing and desired) of international connectivity is an important driver for the quantum and location of infrastructure.
- Investment priorities: the NIA should identify how investment priorities might affect the desired pattern of infrastructure development, for example whether prioritising distributional aims would lead to a different infrastructure pattern than if infrastructure development were focused simply on raising overall output.
- Security: this point may be covered in “resilience”, but NIPA considers that security should be identified as a separate cross-cutting issue.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

**Q11. The NIA will aim to set out a portfolio of interventions that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

28. Overall, undertaking a nationwide assessment of need and prioritisation of potential infrastructure solutions is a huge task and one that will be widely reviewed and critiqued. The assessment and prioritisation will necessarily be based on a wide range of assumptions and therefore, by its very nature, cannot possibly have a single right answer. There is much value in the process and discussion of establishing a NIA and the understanding it should build in relation to the interactions between different sectors and effect of investment in the UK infrastructure networks. We would suggest that as well as the process being of value the outcome from the work needs to be right enough to inform decision makers in their decision making of schemes and investments to promote or approve and provide some certainty on project pipeline for the UK. NIPA would encourage a pragmatic approach with as broad a buy-in as possible.

29. The NIC will need to use its judgment and it may be helpful for it to set out what confidence it has in the models it uses, and to reflect on the judgment of experts and interested parties from the consultation so that it gives the appropriate weight in forming its views.

30. The NIC should consider combining different types of infrastructure in corridors – where safety and other factors such as resilience, technical feasibility, cost and environmental issues permit – to reduce its impact, such as telecommunications and electricity networks along road, rail and inland waterway corridors.

### **Methodological Approach**

31. The methodology set out in Section 3 is a commonly-used and, importantly, recognisable process of issue identification through evidence gathering; analysis and modelling of future baseline conditions and projected scenarios of key drivers; sectoral and geographical slices through the analysis; and prioritisation to develop a suite of potential solutions that can be measured against scenarios to establish a central case for investment. Using a recognisable process is helpful to those engaging in the process; supports the NIC's desire for transparency and objectivity; and provides certainty for promoters as it is consistent with development work being undertaken in progressing schemes. NIPA therefore supports the principles set out in the proposed methodological approach to determine needs and priorities.
32. Paragraph 37 makes it clear that the range of solutions which are in scope for the NIA are policy, demand management, maintenance and operation, enhancement (as in capacity), improvement (as in improved operation, maintenance or resilience) and construction. It is implicit that the scope includes all infrastructure in the identified sectors regardless of funding source.
33. There is, however, little mention of infrastructure as something delivered mostly by the private sector and how private sector decision-making might influence the allocation of public sector resources other than the reference to the funding and financing cross-cutting issue identified in Paragraph 50.
34. It is the case that around two-thirds of the current national infrastructure pipeline is expected to be funded solely by the private sector with around a further 10% of projects having a mix of private and public funding. A £100 billion of the current pipeline is purely publicly funded<sup>1</sup>. This, of course, is the current pipeline of schemes (60% of the projects and programmes within the pipeline are either in construction or part of an active programme<sup>2</sup>) and the NIA horizon is much further out, but it would seem that it is unlikely that a reversal of this funding mix would occur such that public funding of infrastructure became greater than that provided by the private sector.
35. This might therefore suggest that there should be more explicit recognition that infrastructure assets are investments and purchased/promoted for long term asset value gain and/or profit generation for shareholders. We would suggest that this important characteristic of the UK infrastructure networks needs to be considered in the assessment methodology including the response private sector investors may have to public sector policy and investment decisions.
36. In terms of solution selection, the NIC will need to take care to ensure the process continues to reflect the scope of potential solutions. Transport strategies in particular have a tendency to

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<sup>1</sup> *National Infrastructure Pipeline factsheet July 2015, Updated 10 August 2015*, Infrastructure UK, HM Treasury and Infrastructure and Projects Authority, 10 August 2015

<sup>2</sup> As reported in (1) and *National Infrastructure Delivery Plan 2016–2021*, Infrastructure UK, HM Treasury and Infrastructure and Projects Authority, March 2016

promote infrastructure solutions and this type of investment is likely to come forward from promoters. To this end it may be useful for the NIC to separately look at high level impacts and potential benefits of different investment levels in new infrastructure; enhanced capability, improved operation, maintenance, resilience; and even decommissioning to gain an overall understanding of value and need for the different types of solutions required.

37. We assume the NIC will take a multi-criteria approach to the assessment of potential solutions, again common practice, and a key component of this will be the three objectives set out in the consultation document:

- foster long-term and sustainable economic growth across all regions of the UK;
- improve the UK's international competitiveness; and
- improve the quality of life for those living in the UK.

38. The NIC officers and commissioners will be well versed on the evolving practice and debates about how best to measure economic growth and quality of life. Overall the different mechanisms for measuring these are relatively well established. However, there have been very few schemes of a size and impact that result in an effect on international competitiveness so this will require some thought as to what and how this will be measured. Even the very large schemes, such as the strategic case for HS2 and the Airport Commission's strategic case for Heathrow Airport Northwest Runway do not include international competitiveness as an objective (although this is part of the Heathrow submission of evidence). Whilst economic theory would lead the NIC to measure international competitiveness as the relative cost of UK goods and services against its competitors, how this is practically done when trading off infrastructure solutions will need to be looked at. The measures of this objective also, presumably, needs to not also measure economic growth which is addressed by the first objective.

39. The treatment of the cross-cutting themes needs further clarification. Some may become part of the multi-criteria for assessment such as the 'Cost, delivery and resilience' and 'Sustainability' themes. Some might be treated through scenarios such as the 'Funding and finance' theme and others as stand-alone pieces of analysis such as the 'Evaluation and methodology' theme.

40. The assessment will necessarily be qualitative and quantitative. There will be a temptation towards quantification as this enables ranking in prioritisation exercises. This will be challenging given the scope of the exercise and the timescales. The NIC may need to look where quantification will most add value to the decision making process and focus analysis on this. With the qualitative assessment, the NIC will need to think about the breadth of views informing that assessment.

41. The innovative part of the methodology is the NIC's desire to understand the interaction and interdependencies of the UK's infrastructure. Para 65 sets out that "The Commission has identified four key drivers ... the interdependencies across them and their interaction with infrastructure will be explicitly considered and examined. This interaction includes the feedback loops by which infrastructure can also affect each of the drivers".

42. The NIC should not rely on old methodologies but neither should it rely on methodologies that produce counter-intuitive results. System dynamics is a modelling technique designed for simulating interactions and interdependencies between people and physical entities. It has



been used to simulate the evolution of complicated urban areas over time, including the development of infrastructure (transport, housing, commercial property). This method could be used to look at entire infrastructure networks of people, businesses, suppliers, markets, finance, etc. all interacting over time under different scenarios. The method is well suited to beginning with simple models and expanding them as knowledge develops, and is open to collaborative working. The process can be supported, or preceded, by scenario analysis techniques such as 'Strategic Choice.'<sup>3</sup>

43. This type of approach would provide the NIC with improved understanding of the linkages and feedback loops within the infrastructure system to determine how investment might 'behave' and at the highest level inform the development of the NIA prior to more traditional assessment and prioritisation beginning at a sector level.
44. Another suggestion is that the NIC might want to consider undertaking some uncertainty modelling.
45. The most common approach in transport infrastructure assessment is to develop a cost benefit analysis from the most likely values of inputs and assumptions and to qualitatively estimate the uncertainty in the results by changing these parameters individually. There has been some move away from this in the assessment of capital costs through Quantified Risk Assessment. Uncertainty modelling, such as QRA considers inputs and assumptions as a range, rather than as a single value and a probability distribution is provided on a range of potential outcomes. The outcome is a succession of versions of the world (iterations) each based on random sampling of the range of assumptions. This approach is different and, importantly, the best performing option based on the most likely values of inputs and assumptions may not be the strongest over a range of likely outcomes.
46. Finally, the EU has commissioned research into risk assessment methodologies dealing with capacity, security, vulnerabilities and resilience of infrastructure, which might be incorporated into the NIC's approach<sup>4</sup>.

## Drivers

47. The four infrastructure drivers set out in the consultation document are:
  - Population and demography
  - Economic growth and productivity
  - Technology
  - Climate change and environment
48. We would agree that these appear to be the most important drivers when considering long term infrastructure needs. Another driver could be social attitudes to how and where we live and how we travel. For example, arguably it has become socially unacceptable not to recycle where this was not the case twenty years ago. In some areas, car use is now considered anti-social (idling outside school areas for example) and whereas car ownership has become a luxury it may start

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<sup>3</sup> Planning Under Pressure: The Strategic Choice Approach, Friend and Hickling, 2004, Oxford, Butterworth-Heinemann

<sup>4</sup> [http://ec.europa.eu/home-affairs/doc\\_centre/terrorism/docs/RA-ver2.pdf](http://ec.europa.eu/home-affairs/doc_centre/terrorism/docs/RA-ver2.pdf)

to become out-dated in the future time horizons considered by the NIA. Society attitudes on the types and safety of certain power generation sources also change over time.

49. This may be captured by demography but it is broader than population characteristics and quite difficult to capture or forecast. We suggest that some reflection of changing attitudes and potential future attitudes might be a useful exercise and support the NIC's desire for broader engagement particularly with future users of infrastructure networks.
50. Whilst not a driver of need, an important driver of infrastructure (build, enhancement, improvement) is the perceived investment value of infrastructure, market reaction to that value and investor confidence. The NIC may want to consider private sector confidence as a driver of infrastructure.
51. We would also mention that 'climate change' should cover ensuring infrastructure both minimises any contribution to climate change, and maximises its ability to cope with climate change if it occurs, i.e. climate change mitigation and climate change adaptation.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

52. This process could be seen as the most ambitious and far-sighted review of our common objectives since the post-War years.
53. The engagement of as many parts of society as possible in this process is therefore vital, but also challenging. Vital, because there can be serious problems if the public do not buy into a project but it carries on regardless, as the recent referendum result has starkly demonstrated. Challenging, because although the public will engage fairly readily when an actual application is under consideration, they are harder to engage at the strategic planning stage.
54. Having said that, 'designing the future' of the UK should be a sufficiently important and interesting task as to engage the public. Young people in particular, often a hard to reach category, will be most affected by the conclusions of the National Infrastructure Assessment.
55. The NIC expects to be given a non-specific duty to consult in the Neighbourhood Planning and Infrastructure Bill. This is acceptable provided they discharge it at least to the level of the duties to consult on National Policy Statements in the Planning Act 2008. The track record to date has been disappointing (but partly explained by the shortness of time the NIC had) – apart from a call for evidence, with no attendant publicity, there has been no public engagement on the five specific studies the NIC has been asked to produce so far.
56. To mirror consultation on National Policy Statements, which have an equivalent status to endorsed recommendations, there should be a parliamentary element to the engagement, as well as involvement of the general public to ensure there is no democratic deficit. Relevant select committees have scrutinised draft National Policy Statements, but because the NIA will cut across departmental competencies, perhaps an ad hoc National Infrastructure Select Committee should be formed for the purpose of participating in the National Infrastructure Assessment. While it is not for the NIC to dictate Parliament's practices, it could recommend that such a committee is formed to ensure an engaged and informed response and transparency.

57. The advertising of the consultation on the NIA needs to be extensive in order to reach as many people as possible. Simply announcing it on the [www.gov.uk](http://www.gov.uk) website with an accompanying press release would be inadequate – the NIC should use a variety of media such as print, radio and even television advertisements, newspaper notices, a website and social media. . As a quasi-public organisation NIC also need to consider how it will approach. integrate and discharge their duties under the Equalities Act 2010.
58. The proposals in the consultation suggest that the only public engagement will be this consultation and the consultation initiated by the Vision and Priorities document next year. If the efforts to involve the public on this consultation is a guide to the future, it falls far short of what is required. The level of public engagement with the work of the Airports Commission was also very limited and should not be followed.
59. There is also to be ‘social research’ to understand the views and opinions of the public. That appears to be more promising, but no detail is provided. It is to be hoped that the NIC will engage experts to advise it how best to meaningfully engage the public in terms of reach and encouragement to actively participate and respond. NIPA has many members working in this field and would be happy to be involved further.
60. The NIC does not propose consultation on the final assessment and recommendations. Given the importance of the NIC’s work, it would seem fair and therefore highly desirable to allow stakeholders to comment on the full assessment and recommendations before these are finalised. This will also help to secure buy-in from stakeholders which will enhance the prospect of turning the NIC’s recommendations into projects “on the ground”.
61. Finally, the question itself suggests that engagement is only to provide evidence and testing of conclusions that have already been developed. That is again inadequate. The prospect of designing the future of the UK should be an exciting one and it should therefore be possible to involve the public throughout the NIC’s work towards a National Infrastructure Assessment and not just on hard evidence and testing conclusions.

## **The National Infrastructure Assessment – Process and Methodology**

### **Woodland Trust Consultation Response - July 2016**

#### **Summary**

1. The Woodland Trust (The Trust) is the UK's leading woodland conservation charity. Our vision is of a UK rich in native woods and trees, enjoyed and valued by everyone. We own and manage over 1,000 sites and have over 500,000 members and supporters across the UK.
2. The Trust welcomes the opportunity to engage with the National Infrastructure Commission. We are very concerned that irreplaceable habitats are not being considered as part of the proposed methodology. We also have some reservations regarding the definition of 'sustainable economic growth'.
3. Only those questions that fall within the Trust's charitable aims have been answered.

#### **Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

#### **What issues do you think are particularly important to consider as the Commission works to this objective?**

4. The Trust is concerned that the use of the term 'sustainable economic growth' is too focussed on economic growth alone. We would have preferred to simply see 'sustainable development' used. The issue of measuring success against this exclusively economic aspiration is also questionable. In 2015 the UK Government signed up to the UN's Sustainable Development Goals (SDGs). In June 2016 The International Development Committee (IDC)<sup>i</sup> published a report setting out concerns about the "insufficient" progress towards domestic implementation and a "worrying lack of engagement" across government departments so far. However as it is a publically funded body the work of the Commission offers an opportunity to embed these goals within on-going infrastructure work
5. SDG goal 9 states. "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation". There is no mention of sustainable economic growth; instead the focus is on resilience and sustainability. The Trust would like to see the Commission mirror this goal so the work of the Commission can be planned, monitored and assessed against internationally agreed criteria.

6. In addition the Commission has a UK wide remit. The Well-being of Future Generations (Wales) Act 2015 requires public bodies working in Wales to work together in a sustainable manner to deliver the Welsh Assembly's legal obligation to achieve sustainable development. The Act defines sustainable as: "sustainable development"<sup>ii</sup> means the process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle, aimed at achieving the well-being goals". The guidance notes go on to stipulate that these four elements of well-being should be considered equally. As such the current economic focus of the Commission could be seen as being unlawful in Wales and we call on the Commission to be a genuine champion of sustainable development in the full and accepted meaning of the term.
7. The environment should be considered central to the Commission's aspiration to improved quality of life. Trees and green space encourage healthy lifestyles, improving public health. The ageing population is putting pressure on health and care services. An increasing proportion of the population is obese, particularly amongst the young. Together, physical inactivity costs the NHS £1.06 billion annually. International evidence has demonstrated the critical impact trees have in encouraging more active lifestyles and alleviating the symptoms of some of our most debilitating conditions such as dementia, obesity, heart disease and mental health problems. It is critical that trees and green spaces are properly integrated into infrastructure to enable people to live healthier lives in the provision of so called 'green infrastructure'.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

8. The Trust welcomes the principles particularly with regard to the Commission being open and consultative. We work closely with the public across the UK to identify and campaign on cases where ancient woodland comes under threat from development. Early engagement can help ensure better outcomes for irreplaceable habitats such as ancient woodland.
9. A forward looking approach is to be applauded - but it is critical that this approach considers not only technological and societal changes but also the challenges wrought by a changing climate. Changes in flood risk, soil erosion and temperature among many other factors will all have a critical bearing on infrastructure provision.
10. A whole system approach requires a comprehensive approach to delivery of the full remit of economic, social and environmental sustainability without undue emphasis on economic outcomes.

- I1. The attainment of these values requires a sea change in engineering approaches diversifying away from traditional hard construction dominance. This has to be demonstrably championed by those selected to lead the NIA.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

- I2. We welcome the inclusion of water and drainage and flood defences as sectors for consideration. The importance of trees and woods in reducing the risk of flooding was recognised in the government's Natural Environment White Paper. It is also critical that water quality is considered alongside water supply. Woods act as filters, removing damaging pollutants from rivers that run through them<sup>iii</sup>. Correctly situated trees can also stabilise river banks. More use and consideration of the use and benefits of trees for flood alleviation would protect against erosion and further pollution.
- I3. Equally, it is important that flood defences are not considered simply as a matter of hard infrastructure. Natural solutions such as trees and green infrastructure have critical role in preventing and alleviating flooding. Surface water runoff is the major cause of flooding in our towns and cities. The risks are increasing as more hard surfaces areas are being created, by paving over gardens and developing business car parks for example. The frequency and severity of storms are predicted to rise as our climate changes and thus the problem of surface water flooding is likely to worsen. However, preliminary results from research by Manchester University indicate that trees can help reduce surface water runoff by as much as 60% compared with asphalt.<sup>iv</sup> Trees decrease the rate at which rainfall reaches the ground and runs off into watercourses and drains. In both urban and rural areas this allows more time for natural and man-made drainage systems to take water away, reducing the likelihood or severity of rivers flooding or surface water inundating homes.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

- I4. Yes, the NIA should focus on these issues but further clarification should be given on the issue of geography. Paragraph 49 sets out that physical geography should be considered in relation to infrastructure provision and development. The emphasis on the physical rather than accepting landscape as a biological and social construct is hardly "Forward looking, challenging established thinking", or "taking a systems approach."
- I5. The mapping of habitats should be central to this. Of particular concern to the Trust is ancient woodland. Ancient woodland habitat (including aged and veteran trees found outside woodland), as found in long-established and ancient woods, planted or restored ancient woodland sites, ancient parkland and heritage wood pasture is irreplaceable. Any loss or damage can be neither mitigated, nor adequately compensated, for. Once destroyed, an ancient woodland habitat is gone forever.

16. Ancient woodland is mapped on the Ancient Woodland Inventory which is held by Natural England. This is a provisional record of ancient woodland and much of our remaining fragmented habitat remains unmapped, partially ancient woodland under two hectares. High Speed Two Ltd found this to be a problem in their planning of Phase I of High Speed Two from London to Birmingham. The Woodland Trust carried out mapping work and found 13 additional ancient woodlands along Phase I (which have since been added to the Inventory by Natural England). This is good example of the necessity for thorough studies which are carried out prior to infrastructure planned so irreplaceable habitats can be avoided.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

17. The Commission identifies climate change and the environment as one of the four drivers of infrastructure. This is to be broadly welcomed, as is the aspiration to enhance the environment. It is however critical that environmental protections are also considered by the Commission. Damaging or destroying ancient woodland or other irreplaceable habitats means environmental enhancement - and indeed 'no net loss' - is impossible to achieve. The protection of irreplaceable habitats should be central to the aspirations of the Commission and a key driver in decisions on infrastructure and its location.

18. The Trust believes that environmental protection should be at the heart of infrastructure delivery. We would ask the Commission to do the same and use an approach that fully recognises and utilises the need for "soft" engineering of habitats and green infrastructure. Woods and trees have the ability to deliver multiple benefits. Their presence can also encourage more active transport choices through walking and cycling, minimising congestion and having a positive impact on residents' health. As such, they should be central to all infrastructure decisions.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

19. Given the ubiquitous role that trees and woodland play in moderating impacts on air, land and water, the Trust would ask for a place at one of the proposed expert round tables and/or panel of experts. We have experience with working with the Department for Transport on roundtables for both the Strategic Road Network and HS2 and have a positive contribution to make to the on-going decisions on infrastructure in the UK.

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<sup>i</sup> <http://www.publications.parliament.uk/pa/cm201617/cmselect/cmintdev/103/103.pdf>

<sup>ii</sup> <http://gov.wales/docs/dsjlg/publications/150623-guide-to-the-fg-act-en.pdf>

<sup>iii</sup> From Source to Sea- working with water, National Trust 2008

<sup>iv</sup> <https://www.escholar.manchester.ac.uk/api/datastream?publicationPid=uk-ac-manscw:179923&datastreamId=FULL-TEXT.PDF>



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5 August 2016

## **The National Infrastructure Assessment (NIA) - process and methodology consultation**

### **Introduction**

Tidal Lagoon Power is driving a critical change in the UK's energy mix with the development of low cost, low carbon, predictable electricity sources that are sustainable, UK based and deliver long-term energy security for 120 years. Swansea Bay Tidal Lagoon, the pathfinder nationally significant infrastructure project (NSIP), gives the UK a necessary new energy generation option, required now and into the future if we are to secure a low carbon transition to meet 2050 emissions reduction targets, foster economic growth and competitiveness, and achieve quality of life aims. Although a tidal lagoon is a power plant, as our plans for Swansea Bay demonstrate, a tidal lagoon can deliver and enable a range of significant additional national, regional and local economic, social and environmental benefits.

We have previously responded to consultations by the National Infrastructure Commission (NIC); on the call for evidence on delivering future-proof energy infrastructure (8<sup>th</sup> January 2016), and governance, structure and operation (17<sup>th</sup> March 2016).

We welcome this consultation on the process and methodology of preparing the NIA. It is also welcome that the consultation paper sets out the intended timeline of engagement milestones.

### **Independent Review of Tidal Lagoons**

The Independent Review of Tidal Lagoons, led by Charles Hendry, ("Hendry Review") is currently underway, with an expectation that it will conclude in autumn 2016 with recommendations to the UK Government. The Hendry Review aims to assess the strategic case for tidal lagoon development in the UK. The expected timescale enables the conclusions of the Hendry Review to be integrated early with the process of preparing the NIA. Without prejudice to the





conclusions of the Hendry Review, we call for advance consideration of how both process could be integrated.

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

**What issues do you think are particularly important to consider as the Commission works to this objective?**

Climate change should be a central consideration. We would encourage the NIC to build on the findings of the Committee on Climate Change for a meaningful analysis of the infrastructure needs and priorities in the long-term to 2050 and beyond, which accounts for the lead times associated with infrastructure delivery. The relevance of the statutory 2050 emission reduction targets is across all infrastructure sectors, in the transition to a low carbon economy. Also, in respect of resilience and adaptation to climate change, a longer-term perspective is necessary (see also response to Q.9 and Q.10).

The contribution of infrastructure to economic development is a fundamental issue that should be addressed. The value of infrastructure to local, regional and national economies needs to be understood to inform an NIA, this must go beyond the immediate costs and benefits within a sector. Tidal lagoons, as illustrated by the Swansea Bay Tidal Lagoon pathfinder project, provide a good example of infrastructure that can simultaneously meet energy sector demands whilst adding value through significant contribution to other infrastructure sectors such as flood defence and transport, as well as potentially contributing to the maritime economy, regeneration of coastal communities, and providing tourism and recreation facilities. The Commission's perspective and ability to overcome 'siloes', as explained in the consultation paper, should enable a more comprehensive evaluation of the value of existing and future infrastructure.

Please refer above to our comment on the need to integrate the recommendations of the Hendry Review with regards these objectives. The terms of reference of the Hendry Review means that it will consider the the potential scale of opportunity in the UK and internationally, including supply chain opportunities, which should feed into the NIA.



**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedback?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

We would encourage the Commission to consider a facilitative role (that goes beyond consultative), particularly in respect of Devolved Administrations (paragraph 90 of the consultation paper). The objectives of the Commission are UK focused, which necessitates a proactive role to facilitate involvement of the Devolved Administrations to ensure a UK-wide assessment of infrastructure that respects the devolution settlements. Without their involvement, which should be facilitated by the Commission, there is risk that the NIA is not able to consider the relevant sectors (described at pages 17 to 18 of the consultation paper), and the economic geography of the UK (which crosses administrative boundaries).

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are described?**

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

The Commission should consider infrastructure that crosses sectors, in addition to the cross sectoral interdependencies.

For instance, although primarily energy sector infrastructure, tidal lagoons have significant potential to support the flood defences sector, acting as a barrier to potentially damaging and disruptive storm surge and waves that threaten coastal communities and infrastructure. They are designed to be resilient to at least 1 in 500 year storm surge and wave, have an asset life of 120 years, with the ability to increase the height of the structure in order to adapt to sea level rise. We responded to the Hendry Review call for evidence with information to substantiate this potential, which we would also be able provide to the Commission.



The interdependency between the transport and the energy sectors is recognised in the consultation paper, also energy and digital sectors (note this is specifically recognised in the Swansea Bay City Deal prospectus<sup>1</sup>).

Note also our previous comments in response to Q.2; responsibility is generally shared between the UK Government and Devolved Administrations for each of the sectors identified. In order to cover the sectors as proposed across the UK, the Commission will need to consider how to involve the Devolved Administrations.

We note the comments on considering the built environment and the interaction with long term land use planning. Marine areas should be considered by the Commission to ensure that infrastructure priorities are understood and articulated in emerging marine plans.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

**Q7. Are there any cross-cutting issues that you think are particularly important?**

Climate change should be approached as a cross-cutting issue. Although climate change is a key driver of infrastructure need (as set out on page 25 of the consultation paper), the Commission should consider the influence of climate change now and into the future on the economic, social and environmental factors that influence each infrastructure sector.

Devolution should be addressed under 'governance and decision making'. 'Geography and local growth' should consider economic geographies that can cross administrative boundaries (such as north Wales and the north west of England), and into marine areas.

Skills should be considered as a cross-cutting issue relevant to provision and maintenance of infrastructure assets, and infrastructure services. Increasingly, addressing skills and training is an integral part of planning for infrastructure projects. We believe investment in skills and training to be a fundamental area that requires attention in order to realise the potential of a UK based tidal lagoon industry. We are working with the independent Tidal Lagoon Industry Advisory Group and the Skills and Training subgroup to identify and develop strategies to respond to the challenge of maximising the skills and training opportunities generated by tidal lagoon projects.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

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<sup>1</sup> Swansea Bay City Region: A City Deal 2016-2035.



Yes. In addition to 'quality and condition of infrastructure' (under 'understanding the infrastructure baseline'), capability of infrastructure should be considered, including the capability to adapt to changing circumstances and capability based on longevity of assets. These factors should be relevant to consideration of future options as well as understanding the baseline.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

**Q10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?**

Infrastructure drivers may change over time. Climate change will be increasingly influential.

A perspective to 2050, and beyond, is required for climate change mitigation, to reflect the 2008 Climate Change Act commitment to reducing carbon emissions by at least 80% in 2050 from 1990 levels. The Act also established a system of five-yearly carbon budgets, to serve as stepping stones on the way, with the fourth carbon budget requiring a 50% reduction by 2025. The UK has since signed up to the Paris Agreement<sup>2</sup>, a more ambitious aim than the basis of the UK's statutory 2050 target.

Consideration of climate change adaptation and resilience requires a longer-term perspective to avoid mal-adaptation. A 100 year horizon is relevant to the built environment and flood defence infrastructure; existing and future coastal defence lines are already considered with a 100 year horizon in mind with (Shoreline Management Plans).

Resilience to extreme events such as flooding should be considered. Our understanding is that Government is reconsidering what constitutes critical infrastructure and would now be aiming for flood resilience to a one in 1000-year standard for infrastructure<sup>3</sup>.

**Q11. The NIA will aim to set out a portfolio of interventions that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

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<sup>2</sup> FCCC/CP/2015/L.9/Rev.1 <http://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf>

<sup>3</sup> Paragraph 66: Environmental Audit Committee, Flooding: Cooperation across Government, Second Report of Session 2016–17



When defining a portfolio of interventions, the Commission will need to consider innovation. Identifying potential innovations on the horizon may ensure a portfolio is responsive to changing circumstances and better interventions.

The process of preparing the NIA should be undertaken in such a way that infrastructure projects are not dependent on conclusion of the process in order to come forward. The approach should be mindful to the need to facilitate NSIPs and other infrastructure projects in parallel with the NIA process.

An approach to monitoring should be developed to inform periodic reviews of the NIA including the portfolio of interventions, this can address changing circumstances including innovation.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

An engagement and involvement strategy should build on the proposals at section 4 of the consultation paper. Public awareness is important. Such strategies should reflect geographic variances and distinctiveness in order to appreciate economic geography and local growth issues that may be relevant to the NIA. The Commission should engage with those involved with City Deals and Growth Deals.

Tidal Lagoon Power welcomes further engagement and an opportunity to be more involved with the process of preparing the NIA. Our involvement, on behalf of a tidal lagoon industry, should be informed by the recommendations of the Hendry Review.

If you have any queries, wish to discuss further or be provided with further information (as indicated in this letter), please contact me at [telephone number redacted] or [email address redacted].

Yours faithfully,

[name redacted]

[job title redacted], Tidal Lagoon Power

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August 2016

## TCPA's response to National Infrastructure Assessment consultation

### 1. About the TCPA

Founded in 1899, the Town and Country Planning Association (TCPA) is the UK's oldest independent charity focused on planning and sustainable development. Through our work over the last century we have improved both the art and science of planning in the UK and abroad. The TCPA puts social justice and the environment at the heart of policy debate and seeks to inspire Government, industry and campaigners to take a fresh perspective on major issues, including planning policy, housing, regeneration and climate change. Our objectives are to:

- Secure a decent, well designed home for everyone, in a human-scale environment combining the best features of town and country;
- Empower people and communities to influence decisions that affect them;
- Improve the planning system in accordance with the principles of sustainable development.

The TCPA welcomes the opportunity to comment on the process and methodology of the National Infrastructure Assessment (NIA) that will be undertaken once each parliament by the National Infrastructure Commission (NIC). We would like to make the following key points.

### 2. Key points

#### 2.1 'Economic infrastructure' should include social infrastructure and green infrastructure

2.11 The TCPA strongly believes that the NIC's definition of 'economic infrastructure' should include what the consultation refers to as 'social infrastructure' ie schools and hospitals. Given the critical role of such social infrastructure to provide jobs, growth and important amenities to an area, we believe that it is vital that these elements are carefully considered along with other forms of infrastructure. The NIC's remit includes consideration of people's quality of life and whether or not, for instance, hospitals, schools and homes have good transport links etc, has a direct impact on people's quality of life.

2.12 We also think it is vital that the NIC's definition of 'economic infrastructure' includes green infrastructure, the network of trees, parks, green spaces, verges, waterways, green roofs and sustainable urban drainage. The economic importance of green infrastructure is now widely recognised and has been highlighted by the work of the Natural Capital Committee<sup>1</sup> (NCC). The NCC's third report, in particular, makes a very strong case for the

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<sup>1</sup> See [www.naturalcapitalcommittee.org](http://www.naturalcapitalcommittee.org)

economic value of green infrastructure, and urban green infrastructure in particular. The NCC is now advising Defra on the preparation of the cross-Government 25 Year Natural Environment Plan and it will be vital to ensure co-ordination between the 25 Year Natural Environment Plan and the periodic National Infrastructure Assessments.

## **2.2 The NIA should be spatial**

2.21 . It is the TCPA's view that if the NIA is not spatial it will not achieve the Government's objective of ensuring that the infrastructure that the UK needs is planned and delivered in an efficient, co-ordinated and timely fashion. Consequently, we strongly recommend that the NIC is specifically tasked with producing an NIA that is spatial and includes maps of the UK indicating roughly where the infrastructure the country needs should be created and how different types of infrastructure relate to each other in specific parts of the country.

The current planning regime for infrastructure is fragmented so that, for example, technological and demographic change are not considered together. The loss of key national data sets and the end of regional planning have left us ill equipped to plan for the future. A position where there is no linkage between high-level national policy and localised planning strategies is either practical nor in the best interest of the sustainable development of the nation.

In essence, the NIA should include maps, overlaying a wide range of data so that the interrelationships between economy, population, transport, flooding etc in particular locations can be considered. Much of this spatial data is already available from various sources – what is missing, and the NIA could provide – is a way of bringing it together so that the cumulative implications of the different data, and the way it relates to places at different scales, can be considered.

## **2.3 Social justice and public engagement**

2.31 The TCPA welcomes the fact that the NIC's remit includes considerations of people's quality of life but urges the NIC to consider how the advantages (or disadvantages) that infrastructure brings to people are distributed among the population. The NIA should overtly aim to help reduce inequalities, rather than exacerbate them.

2.32 The NIA will have an impact on the lives of everyone in the country and it is vital that the NIC is properly resourced to ensure that people are genuinely informed about it and involved in its creation.

## **2.3 Climate change**

2.31 The impacts of climate change, and how these play out in different ways in different parts of the country, will have a major effect on the need for, and effectiveness of, all forms

of infrastructure. It is vital that the NIA's assessments of what infrastructure the country needs are underpinned by the latest available evidence of the way in which climate change will impact different parts of the country.

2.32 Although the NIA will look at the country's infrastructure over a 30-year horizon, it should take into consideration any relevant and robust data that spans a longer time-frame. For instance, it would be foolish to build a new train line in a location that will be satisfactory for 30 years, but is highly likely to be underwater in 50 years' time.

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For further information contact:

**[name redacted]**

[job title redacted]

TCPA

[email address redacted]

[phone number redacted]



## **The National Infrastructure Assessment Process and Methodology Consultation**

### **Response of Transport for Greater Manchester**

#### **1 Introduction**

1.1 Transport for Greater Manchester (TfGM) welcomes the opportunity to comment on the National Infrastructure Assessment. We strongly support the development of a longer-term view of infrastructure needs. This aligns with the approach to transport infrastructure planning that we have set out in our draft Greater Manchester Transport Strategy 2040 [www.tfgm.com/2040](http://www.tfgm.com/2040), which is currently the subject of consultation. In this document, we set out a long-term and integrated view of our transport needs to deliver a successful, resilient city region. Our strategy is structured around a series of “spatial themes” which cover a range of different journey types. Of particular relevance to the national infrastructure assessment are the elements of our 2040 strategy that focus on improving city-to-city connectivity and global connectivity (via Manchester Airport and Port Salford). We would be happy to share our thinking on these elements of our strategy should this be of interest.

#### **Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK’s international competitiveness**
- **improve the quality of life for those living in the UK**

#### **What issues do you think are particularly important to consider as the Commission works to this objective**

Transport for Greater Manchester agrees with the objectives, particularly in terms of fostering long-term and sustainable economic growth across all regions. These fit well with GM’s strategic objectives – particularly sustainable economic growth and quality of life. However, we would

recommend that environmental protection and enhancement is included more explicitly as a key objective.

As our draft 2040 Strategy sets out, connectivity to global business, tourism, and commodities markets is vital to enable the UK to compete effectively on the world stage. When striving for this improved international connectivity, it is important to consider not only the gateways into the country, but the way these are integrated with national and regional networks for both people and freight to deliver a truly integrated network and journey experience.

We agree that recommendations also need to be consistent with the UK's critical environmental commitments, particularly around carbon reduction. Where this is not the case, then robust mitigation measures need to be planned at the same time. Environmental commitments must include the need to improve air quality, in view of the evidence of serious health impacts which impact on both quality of life and on the economy.

**Q2) Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

Yes, we agree. In particular, there is a need to understand interdependencies and feedbacks, for examples in the role of infrastructure in stimulating economic growth.

Challenging established thinking and embracing new approaches to long-term planning would be welcomed. Use of scenario-planning exercises and back-casting, for example, could be used to help develop a clear vision of what sort of future we might want and how that might be achieved through better integrated planning of long-term infrastructure requirements.

**Q3) Do you agree that the NIA should cover these sectors in the way in which they are each described?**

**Q4) Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

We support the focus on a multi-modal and integrated approach to transport infrastructure planning. There is a need to consider:

- the ability to respond to global changes such as changes in freight movements following the widening of the Panama Canal;
- speed and capacity of the rail network;
- linkage of ports and airports to national networks;
- how best to facilitate the shift to a low-carbon transport system for people and freight;
- an understanding of business travel and the importance of an integrated national transport network to support businesses across the UK; and
- a long-term approach to travel demand management, recognising that it is not always possible or desirable to increase the capacity of our transport networks, we also need to find innovative ways to manage demand to make best use of existing capacity.

As referenced in our draft 2040 strategy, links between cities are critical to our success. Many of our current inter-city road and rail networks are heavily congested and unreliable; and journey times are too slow. Transformation of city-to-city connectivity would deliver significant economic and social benefits.

**Q5) The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular needs where you think such interdependencies are likely to be important?**

There is likely to be increasing interdependency between the transport sector with both the digital and energy sectors. The NIA should help facilitate this.

For example, significant improvements to digital communications will play an important role in supporting better connectivity and may reduce the need to travel for some activities. However, the relationship between

improved digital communication and travel patterns is not straightforward. In some cases, new relationships between people and places built on improved digital connectivity, could lead to more demand for travel. Alternatively, digital connectivity can lead to significant changes in travel demand, as in the case of increased levels of online shopping where personal retail trips are replaced with different patterns of goods movement.

Similarly, a move towards low-emission transport technologies will have a significant impact on future demand for energy from different sources.

**Q6) Do you agree that the NIA should focus on these cross-cutting issues?**

Yes.

**Q7) Are there any other cross-cutting issues that you think are particularly important?**

Sustainability needs to include air quality as a critically important issue.

Furthermore, the evaluation and appraisal methodology needs to ensure that regeneration impacts are fully captured.

While we understand the rationale behind the exclusion of housing supply from the NIA, it will be important to understand the impact of new infrastructure (particularly new transport capacity) on future land use patterns as new transport links could directly or indirectly influence spatial distribution of new development and such implications need to be carefully considered.

**Q8) Do you agree with this methodological approach to determine the needs and priorities?**

It will be important to draw on relevant up-to-date evidence from different regional areas. In particular, Combined Authority areas have undertaken significant work on infrastructure needs and the relationship with sustainable economic growth.

**Q9) Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

Work to develop the Northern Transport Strategy has generated significant background evidence, including an Independent Economic Review for the North of England which should provide an excellent foundation for understanding the key issues. Similarly, Greater Manchester has developed a significant evidence base in developing our 2040 Transport Strategy and also through work on a new Greater Manchester Spatial Framework. We would also be happy to share our thinking on different modelling and analytical tools, and prioritisation to support the NIA work.

**Q10) Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?**

Transport and wider supporting infrastructure does not exist in isolation, it is there to support people's lives, business activity and to deliver more successful places. In developing our long-term transport strategy, we have considered six key drivers of future travel demand (see our [2040 evidence base](#) for more detail):

- Economy and Employment;
- Technology and Innovation;
- Society and Community;
- Urban Development;
- Environment and Resources; and
- Policy and Governance

These correlate closely with those set out in the consultation document, but it would be a useful exercise to cross-reference to ensure a comprehensive evidence base is developed. In particular, the relationship between infrastructure development and land use and urban planning policy will be a very critical part of the national infrastructure assessment work and we would strongly support the inclusion of this driver within the assessment methodology.

An additional critical driver might be resilience. Although this is partly covered by the climate change driver, the issue is a wider one covering the resilience of infrastructure to global political influences e.g. security of national energy supply. Resilience needs to be seen not just in terms of the resilience of a particular piece of infrastructure, but whether new infrastructure can improve the resilience of networks overall (e.g. by providing alternative routes).

**Q11) The NIA will aim to set out a portfolio of investments that best meets the demand of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

When exploring this methodology it is important to explore at how infrastructure can enable agglomeration. It will also be important to carefully consider regional and sub-regional priorities in determining and prioritising investment within the final portfolio. While we understand that this is a nationally-led assessment, it is crucial that the assessment reflects more local priorities and that there is strong integration between development of local and national infrastructure networks.

When identifying future priorities, it will be important to take a balanced view of potential interventions, considering the need not just for new infrastructure, but also for better managing and maintaining existing infrastructure. This will help to maximise the long-term future reliability and resilience of our infrastructure networks.

**Q12) In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

It will be important to consider the scope for behavioural change to reduce demand and whether this needs levers at the national level. There may be national interventions or policies around transport pricing, for example, that would have a significant bearing on future travel demand and that should be considered alongside potential capacity enhancements.

It is also important to consider potential disruptors to future demand. Advances in vehicle technology (such as development of connected and autonomous vehicles), for example, has the potential to disrupt future travel demand and could place different demands on our transport infrastructure.

There may also be wider societal trends that affect future demand for travel. For example, changing attitudes to car travel among younger generations could have a major influence on future transport investment requirements. Such trends should be explored further, with a range of future scenarios considered, and the resilience of the infrastructure priorities carefully tested in light of different possible alternative futures.

**Q13) How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

TfGM supports the proposal to identify best practice from overseas – it is critical that we take a broad view of possible approaches to planning long-term infrastructure requirements and learning from elsewhere can help to understand potential opportunities and risks associated with different planning approaches.

Similarly, any evidence on wider societal changes and behaviours will be important to understand the current and likely future drivers of demand for infrastructure.

It will be also be vital to engage across the political spectrum to avoid potential changes of direction with each new government. Similarly, engagement with businesses will be very important to understand their long-term infrastructure priorities.

***Process and Methodology: Consultation***

**Joint response: Transport for London and Greater London Authority**

4 October 2016

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Transport for London (TfL) and the Greater London Authority (GLA) welcome the opportunity to provide a submission on the National Infrastructure Commission's proposed process and methodology for the National Infrastructure Assessment.

*Page 15 - Principles*

Q1. The Government has given the National Infrastructure Commission objectives to:

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

What issues do you think are particularly important to consider as the Commission works to this objective?

In meeting these objectives, we think the Commission should particularly consider the economic payback of infrastructure investment (and the links to investment appraisal and decision making, and how infrastructure is funded), as well as balancing both the type of infrastructure investment and where that investment takes place, recognising the role of London in the wider UK economy and the UK's economic relationship with the rest of the world. Further, the Commission should have a robust and meaningful method of assessing impact of infrastructure upon quality of life if this is to be a key guiding principle.

*Economic payback*

The Commission should consider both the impacts on gross value added (GVA) and welfare improvements from infrastructure projects. Increasingly funding discussions around projects revolve around their GVA impacts. The UK's current major project appraisal system is based on the quantification and evaluation of benefits to transport users. While some wider benefits can be included, this approach provides only partial analysis, particularly in the case of large, transformative schemes, as it does not take full account of changes brought about by the investment in the way land is used. As a result, it does not provide a reliable means of appraising the likely impacts of investment on the economy's output potential, which risks distorting decision making.

This is particularly an issue for transport investment in cities. For example, the traditional appraisal methodology was not favourable for the Jubilee Line Extension business case. However, the extension has played a crucial role in stimulating the development of Canary Wharf, establishing a globally-competitive financial centre in London. In order to ensure that the economic performance impacts of investment options are properly taken into account, the Commission should seek to base its recommendations on comprehensive appraisal that incorporates fully potential changes in land use. This will allow the GVA and welfare approaches to be integrated and fully consistent with one another. The GLA and TfL are exploring new economic modelling and appraisal methodologies that will improve our understanding of the scale and nature of the benefits of strategic investment in London.



These include system dynamic modelling and a national LUTI model for London. We will be in a position to share this analysis with the Commission shortly.

### *Funding arrangements*

The Government expects an increasing proportion of the cost of projects to be raised from funding sources at the sub-national level and has taken some steps to enable this, such as the devolution of business rates by 2020. We believe there is scope to go further, and in response, the Mayor has re-formed the London Finance Commission (LFC) to review and assess existing arrangements for government funding of London, including capital and revenue, and examine the potential for greater devolution of both taxation and the control of public expenditure.

The only way for London to make the required investments in infrastructure, and in turn support growth not only in London but the rest of the UK, is to have a stronger, more local, fiscal base. In view of this imperative, the Commission should consider how innovative mechanisms (including taxation based mechanisms) could help scheme promoters in cities such as London capture the uplift in land values arising from their schemes. This should help deliver more overall investment and ensure those who benefit from the improved accessibility contribute towards the cost. TfL would be happy to discuss its current study assessing the potential for greater land value capture in London. The Commission's approach to prioritisation of schemes should take account of the proportion of scheme costs that can be met from these alternative funding sources.

### *Balancing different types of infrastructure investment*

In order to make recommendations about how to prioritise capital budgets for infrastructure investment, the Commission will need to compare very different types of schemes. In particular, options for improving transport capacity and connectivity within city-regions may need to be compared to options for improving inter-urban transport infrastructure. The relative importance of investment in international gateways should also be considered.

In some cases it may be possible to achieve the same overall strategic aims through influencing mode shift or with measures from a different sector. For example, the need for more transport infrastructure can be reduced through increased quality of communications infrastructure, and the need for housing infrastructure in a specific constrained location can be reduced by improving the frequency and capacity of transport links to locations where housing needs can be met. Such linkages demonstrate the importance of transport investment, particularly within cities, that is focussed less on transport *per se* but on wider constraints on competitiveness, such as the limited housing supply available for workers in key employment locations. The Commission will need to ensure its methodology can make such comparisons robustly, in particular with respect to the expected wider growth and competitiveness aspects.

We agree that increasing the capacity of existing assets and demand management have a role to play. As well as generating additional capacity, resilience and reliability are important considerations and the Commission should include these alongside capacity considerations. A further useful distinction exists between schemes that have relatively local development benefits and those that offer significant network effects with far more dispersed benefits and the ability to achieve a transformational economic shift. An example of the former in London

is the Northern Line Extension, while Crossrail 2 represents an example of the latter. Both are important in different ways and the Commission will need to ensure its methodology can value both for each of the sectors.

### *Recognising the value of place*

In addition to assessing the demands on moving people and goods from one place to another, the Commission should recognise the value of “place” and the role of infrastructure development in creating places to live and do business.

Increasingly, part of what drives economic competitiveness (whether of a town centre, a city or the UK) is the physical quality of that infrastructure and the extent to which it contributes to a sense of ‘place’. This is both influenced by how people experience the transport infrastructure when they are ‘inside’ the relevant transport system as well as when they are in the public spaces to which transport infrastructure contributes.

TfL, London boroughs and private developers are investing significantly in initiatives which seek to unlock the value of ‘place’ and maintain London’s international competitiveness, particularly on the London road network. The economic sectors on which London's prosperity relies put a very high premium on ‘place’.

### *Supporting London’s economic role*

We agree that all the UK’s regions need transport infrastructure investment to support sustainable economic growth, the UK’s international competitiveness and improved quality of life.

The Commission should recognise the unique economic role that London plays for the UK (as acknowledged in ‘Fixing the Foundations’<sup>1</sup>), including London’s net contribution to the national exchequer, and hence to the funding available for investment throughout the UK. London is a net contributor to public finances, and contributes some 22% to total UK GDP despite having only 13.5% of the total UK population. And London’s population is growing rapidly and much faster than any other places in the UK, placing significant pressure on existing infrastructure systems. Whilst there needs to be higher transport infrastructure investment to serve the growth potential of other UK cities and regions, this should not be seen as an alternative to the investment in capacity and connectivity in London and the greater South East that is needed to maintain agglomeration driven growth alongside a rising population.

The Commission should note responsibilities of the Mayor of London to frame London’s key linked policies for planning, transport and economic development. These policies recognise the importance of transport infrastructure in enabling the agglomeration driven growth process at the heart of London’s growing economy. London largely competes with other global cities rather than with other locations in the UK, and as set out in various Mayoral documents (including the London Plan and 2050 Infrastructure Plan), London’s true economic potential cannot be unlocked through any feasible alternatives to growing its global employment centres – for example through ‘decentralising’ employment growth to other UK city centres. Given that the Mayor is uniquely well placed to coordinate the range of

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<sup>1</sup> HM Treasury, “Fixing the Foundations: Creating a more prosperous nation”, July 2015.

policies and investments needed to unlock the city's full economic potential, we seek the Commission's support for devolving further powers that will enable London to fund more of its own investment and ultimately grow at a faster rate.

Q2. Do you agree that, in undertaking the NIA, the Commission should be:

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

We agree with the four principles listed.

We welcome the Commission taking a longer term (to 2050) view. It is a similar timeframe to the one taken by London in its 2050 Infrastructure Plan. As part of being forward looking, the Commission should consider how infrastructure decision making can be ‘future-proofed’ – taking a long-term view that is resilient to uncertainties about future demand, innovation and new technologies and the impacts of climate change. The Commission’s approach should be flexible and adaptive to changing economic, demographic, technological and social trends, and the Commission should also be prepared to be open to radical change and other disrupters. The Commission should encourage an approach which involves making better use of existing technology and innovative practices now – and projects should demonstrate a commitment to this principle. A good example is Crossrail, where innovative ideas have been encouraged throughout the construction process through an innovation portal, not only just at the time of project inception.

In terms of the longer term horizon, there should be more focus on estimating supply and capacity constraints using best available data and available modelling, and less focus on identifying specific solutions, which more or less can only come after there is widespread acknowledgement of the challenge that is trying to be addressed. Scenario testing can play a valuable role in this as it will shape choices. It is likely that some project proposals will be core to all scenarios, while others will be more relevant under certain assumptions. A major component of early development of the next London Plan involves scenario testing to understand the land use implications of different spatial patterns of development. We are working to understand the infrastructure implications of the different scenarios so spatial options can be costed as part of the analysis process.

Further, while challenging established thinking, the Commission should draw on existing plans and project pipelines, where they exist, and complement them with new analysis and ideas, or propose alternative solutions in the Commission thinks they do not address the key issues. We have previously argued that evaluation of options ideally should not be undertaken on a project-by-project basis but on a strategically connected basis, as is done as part of the land use planning process for cities or regions. This will require considering locally-specific contexts, strategies and goals, and recognition should be given to differences in spatial characteristics across the UK and a special case presented for London, given its size and different rate of population growth. This represents a big part of our forward approach to developing the London Plan. We are leveraging new technologies such as the London Infrastructure Mapping Application (available at [maps.london.gov.uk/ima](https://maps.london.gov.uk/ima)) to ensure infrastructure is aligning to projected growth and other local dynamics, and working closely with stakeholders across London and the wider South East.



Q3. Do you agree that the NIA should cover these sectors (transport; digital and communications; energy; water and drainage; flood defences; waste) in the way in which they are each described?

Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

We support the NIA covering the full breadth of economic infrastructure sectors, but note that certain sectors such as green infrastructure (which has an economic benefit) have not been highlighted for consideration. When developing the London Infrastructure Plan 2050 in 2014, we took a full sectoral view of London's infrastructure requirements, recognising interlinkages and dependencies, including those of green infrastructure alongside other sectors such as transport, energy, digital and water.

### *Transport*

A main focus of the assessment should be on the role of transport of both people and freight in enabling sustainable economic growth and development. In particular new transport infrastructure is needed to unlock the economic potential of our major cities, enabling them to support growth in a range of high productivity economic sectors in which the UK has a comparative advantage. Many of these sectors depend on agglomeration economies for their competitive advantage. Developing a fuller understanding of the role of both local and urban agglomeration economies in supporting these activities will be vital in determining the scale and nature of infrastructure investment that is needed. Equally, it is important to develop a much more sophisticated understanding of the relationship between transport investment and land use changes. We would be happy to share our work to develop a modelling approach and appraisal tool that takes full account of land use-transport interactions, which is being applied for Crossrail 2.

The 2006 Eddington Transport Study identified that investment in transport networks should be targeted in three areas to support their economic success – firstly, within growing urban catchments; secondly, key inter-urban corridors; and thirdly, key international gateways. It is important for the Commission to recognise that in addition to national inter-urban travel and trips to and from international gateways, intra-urban travel within core cities is also of national importance, given its vital role in supporting employment in key economic sectors. Inter and intra-urban travel needs should be considered within a systems approach, which recognises that the impacts of a transport network as a whole are greater than the combined impacts of constituent components.

We agree that taking a multi-modal approach to analysing transport need is the right approach. The Eddington Transport Study offers a useful model. Within a relatively short timeframe (between 2005 and 2006) this succeeded in demonstrating how transport networks could contribute towards productivity and economic growth at a national level.

The Eddington study was followed by a series of Multi-Modal Studies (MMS), which sought to prioritise major scheme transport investment at the sub-regional corridor level.

Unfortunately, this proved to be a resource intensive and time consuming process which yielded limited practical outcomes in terms of enabling better decision-making by the then regional bodies. The Commission can look to ensure that a streamlined and high-level

approach is taken that avoids some of the difficulties and problems that arose during the MMS study process. A clear, high level vision will be important if the Commission is to succeed in synthesising very different types of schemes into a coherent overall investment strategy. This should build on the significant work already done in areas like London.

Network Rail, Highways England, HS2, TfL and other UK city-regions have considerable modelling expertise that should be drawn upon to help to forecast future travel needs for a range of modes over the thirty years to 2050. We are ready to assist the Commission to help it to understand the multi-modal travel needs of the London city-region and its hinterland. In terms of understanding of the function of networks, the Department for Transport's (DfT) National Networks outputs from the last parliament provide a helpful starting place for key strategic corridors of national importance for the transportation of people and freight.

### *Energy*

Energy infrastructure must consider both power and heat and the respective ability of the related networks to support and supplement each other in a fully integrated energy system. Generation, distribution, storage and consumption must be considered from both a quantity, spatial and temporal perspective.

Population projections should be considered as part of the assessment at a suitably granular spatial scale to identify spatial variation in infrastructure need prior to demand. The London Energy Planning scenarios are examples of some of the work London has produced: <https://www.london.gov.uk/WHAT-WE-DO/environment/energy/scenarios-2050-london-energy-plan>.

In considering the transition to low carbon heating solutions it is important to think about system-wide and not just building-level solutions and energy efficiency at neighbourhood as well as building level. In this context, heat networks have an important role to play in creating a technology agnostic distribution infrastructure network capable of continual decarbonisation through the exploitation of both renewable and waste heat sources. Specifically in the context of exploiting waste heat sources, heat networks offer area-wide energy efficiency, reducing demand for upstream primary energy sources.

Within this context it is also important to recognise and exploit the additional benefits of heat networks supporting the wider energy system in grid balancing and integration of intermittent renewable energy generation through their ability to store electrical energy in the form of heat.

The ability to achieve these objectives will be particularly dependent on our energy system evolving and proactively responding to the energy trilemma – security of supply, affordability and low/zero carbon – using new smart technology and exploiting the interrelationships that are possible between power and heat infrastructure, and not continuing to respond in a reactive manner as it has throughout the twentieth century.

Although the assessment will not cover housing supply, it is important to highlight the imperative to reduce energy demand through retrofit of energy efficiency measures to existing homes. As suggested by London's aforementioned scenarios, new low carbon energy generation and supply infrastructure alone is unlikely to meet regional or national greenhouse gas reduction targets. The primary aim should always be to reduce the total

amount of energy we use and the peaks of energy usage to avoid the installation of costly new generation capacity.

We agree the assessment should cover the energy system as a whole but in considering 'smart' it must continue this integrated energy system thinking by explicitly looking at 'Smart Energy' and not just 'Smart Power'.

### *Water*

We note that the description of 'water and drainage' section should explicitly refer to sustainable drainage to address surface water flooding and integrated water management, looking holistically at the full water cycle. Such an approach is recognised in the energy section.

### *Green Infrastructure*

We note the absence of green infrastructure being considered as a distinct infrastructure sector. Green infrastructure, which includes the national network of green and blue spaces and features, such as nature reserves, rivers and floodplains, gardens, street trees, ponds and green roofs, should be considered on the same basis as energy and water infrastructure. Investment in green infrastructure can reduce the requirement for large capital projects, in a similar vein to energy demand reduction through efficiency measures avoiding the need for new generation capacity to be installed.

Green infrastructure delivers a wide range of economic, social and environmental benefits, including (but not limited to) improved water resource management, improved public health and urban cooling. These directly contribute to the Commission's objective of improving quality of life. Without considering the role of green infrastructure, analyses of water, drainage and flood risk are arguably flawed.

The 2010 Lawton Review, *Making Space for Nature* identified the need to consider green infrastructure at a strategic level, summing up the necessary approach as "more, bigger, better, and joined". Examples of large scale GI projects include the 12 Nature Improvement Areas. A Defra-funded assessment (WC1061) of these projects identified many different benefits, including water resource management, carbon storage and sequestration, and employment creation. For every £1.00 of initial government grant, £3.49 financial value of additional resources generated, of which £2.03 was from non-public sources.

At the London level, the importance of a strategic and integrated approach to green infrastructure was recognised in the London Infrastructure Plan 2050. The Plan set out that investment in London's green infrastructure is required alongside investment in the transport, water, energy and other infrastructure. Further progress was made in the Green Infrastructure Task Force's 2015 report, *Natural Capital*, which outlined a series of recommendations to help London make the most of its green infrastructure resource. Several of these recommendations are now being followed through, including an evidence-based review of the All London Green Grid. This will map environmental and social challenges that green infrastructure can help ameliorate, to help identify where and how green infrastructure investment should be targeted.



The London Environment Strategy is also taking this integrated approach, by considering green infrastructure and natural capital as integral to the delivery of other environmental goals, such as improved air quality, improved flood risk management, and reduced urban heat island effect.

By considering green infrastructure the Commission will help to meet its principle of taking a whole system approach. One way of ensuring that the NIA meets its principles of objectivity and forward-thinking is through pioneering the use of natural capital valuation to help inform infrastructure investment decisions and rectify the current situation of green infrastructure being ignored in cost-benefit analyses. The Natural Capital Committee is contributing to the development of national natural capital accounts, working with the Office for National Statistics and Defra.

*Page 18 – What the NIA will cover: sectors*

Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?

Our work developing the London Infrastructure Plan 2050 highlighted the importance of recognising interdependencies across sectors. In view of this, we argue that the Commission prioritise projects on the basis of integrated, cross sectoral analysis which views investments in terms of cross-sectoral packages rather than as single projects. Often this will require a full understanding of infrastructure requirements at the strategic level.

In the case of London, this evidence base is largely available, and is particularly relevant to transport projects which may 'unlock' significant housing growth, and therefore demands on other infrastructure sectors such as energy or water networks, flood defence infrastructure, or schools and health.

We agree considering the impact of the future transport provision on the energy sector, particularly through increasing electrification, is important. TfL already runs one of the largest private power networks in the country for the London Underground. There is continued investment in new capacity to transport more people daily, and consideration of how best to interface the network with the National Grid, increase redundancy, decarbonise the electricity supply and reduce costs. On our roads, increased electrification of the bus, taxi and car fleets is likely in order to tackle air quality and carbon issues. This will place pressure on the electricity supply and distribution system and greatly increase peak demand. Without greatly enhanced electricity infrastructure it will not be possible to decarbonise road based transport.

There are other interdependencies with transport being explored by TfL which may be applicable on a broader scale. With regard to energy supply, TfL is investigating whether waste heat from its transport operations (for example, from tube tunnels) can be utilised more systematically and commercially. This could reduce greenhouse emissions and the cost of heating buildings, and potentially be a new source of revenue which can be used to pay for new infrastructure. Providing low carbon heating from waste heat is currently being trialled at the City Road shaft in conjunction with Islington's Bunhill heat network scheme.

The interdependency between transport and digital and communications is also becoming increasingly important. Improved digital connectivity can help to increase the capacity of an existing infrastructure asset by improving efficiency (for example, advanced train signalling and smart motorways) and provide more information to customers (for example, through TfL's trial of displaying live traffic information on the back of buses). Similarly an integrated electrified transport system will only be possible with excellent digital and communications infrastructures.

We agree it is sensible to look at interactions with housing supply, given the two-way reliance between housing and transport, with vital links between housing density and sustainable travel patterns in particular. Accessibility and transport can influence viability of housing development given the need for and value placed on connectivity. But housing development can also influence the viability of a transport project, through generating fares income and other funding streams linked to development and local taxation. With this in mind, it will be important to consider alternative funding mechanisms including potential reforms that could enhance land value capture and local taxation mechanisms for helping pay for new infrastructure, particularly given constraints on public expenditure in particular at the national level.

*Page 19 – Cross-cutting issues*

Q6. Do you agree that the NIA should focus on these cross-cutting issues?

Q7. Are there any other cross-cutting issues that you think are particularly important?

We agree it will be important to consider cross-cutting issues impacting the planning and delivery of infrastructure. In particular, as mentioned in different part of this response already, the Commission's focus on the funding and financing of infrastructure, cost, delivery and resilience and on the evaluation and appraisal methodology used for infrastructure projects may prove to be some of the most important areas of the Commission's work. Economic and fiscal devolution is the key factor of success for delivering infrastructure in the UK in the long-term, alongside greater local-level influence in infrastructure planning, delivery and regulation, particularly in the digital, energy and water sectors.

We also recommend that the Commission consider skills as part of its cross-cutting analysis due to the significant constraint it imposes on the capacity to deliver new infrastructure, as well as the social dimension of infrastructure.

*Funding and financing*

The Government is devolving significant funding and responsibilities to the local government level, and the Mayor supports these efforts, particularly in terms of fiscal devolution. This presents a significant opportunity for cities to position themselves for success through more localised decision making. As mentioned previously, the Mayor has reconvened the London Finance Commission, which is now developing options for further fiscal devolution to be presented to Government. Devolving infrastructure development, delivery and operations offers clear benefits by better aligning risk and reward. In particular it links the responsibility for funding infrastructure with policy making at the local and regional level, which should incentivise more integrated, better quality decision making (for example, with planning, housing etc). This will help overcome current constraints on growth and the capacity of cities to invest in the projects that can drive them forward.

However, it is unlikely central government will be able to absolve itself completely from infrastructure provision and funding. There will be transport initiatives which are of such scale, complexity and importance that they cannot be delivered by a single local authority on its own, including 'mega' projects with national benefits and requirements such as Crossrail 2. The Commission should consider the appropriate role of the national government in delivering nationally significant infrastructure in this context. This should include devolution of further funding streams (for example, the ability to capture land value uplift resulting from transport investment) and provision of greater financing powers so cities can invest in transport on the basis of their ability to then capture the benefits of growth that this catalyses locally.

As part of this, the Commission should address a broader question about how infrastructure is funded and financed, and the capacity and appetite of users and governments to pay for new infrastructure. It could look at the proportion of infrastructure costs paid by users through fares compared to government subsidies, how these proportions vary across different modes and regions, and whether these levels are appropriate. From there one can consider both the level of investment that is appropriate given infrastructure users' willingness to pay, as well as the other avenues for raising funding for infrastructure investment (for example through land value capture mechanisms, road user charging etc). The Commission should seek to ensure that the funding of projects reflects the benefits delivered to different classes of beneficiaries, whilst ensuring optimal use of the infrastructure networks.

The Commission could also consider financing questions – i.e. how to pay for the costs of constructing the infrastructure, given that funding generated (such as fares and local taxes) will frequently arrive over many years after construction. Without government support – for example, through the guarantee scheme – this may involve authorities being exposed to levels of economic risk that it cannot reasonably be expected to manage without the devolution of significant new funding streams.

#### *Cost, delivery and resilience*

The Commission could emphasise the importance of considering whole of life costs when evaluating infrastructure proposals. Associated with this is the importance of effective maintenance to maintain an efficient infrastructure asset base. Costs should also be considered in the context of the long-term system evolution of infrastructure and also the contribution one infrastructure investment can make to another. For example the role that embedded generation and heat networks can play in electricity grid balancing and the deferral or elimination of local electricity network reinforcement costs.

The London Infrastructure Plan was underpinned by a comprehensive cost model developed by Arup, which has continued to evolve to reflect changing priorities and assist with prioritisation and spatial planning. We aimed to 'fully cost' London's long term infrastructure requirements (across all the key sectors) considering available plans, data and policy. The model is responsive to different rates of population and economic growth, which is useful in view of changing economic circumstances expected over coming years. The headline figure from the Arup analysis is that total required investment in London's infrastructure between 2016 and 2050 will reach £1.45 trillion. This work was recently updated (early 2016), and provides a valuable evidence base from which the Committee may wish to draw.

The Commission may wish to discuss the appropriate role of the private sector in infrastructure provision, at all points of the infrastructure planning and delivery process. This could include private financing and construction, as well as how the private sector is involved in planning infrastructure. There could be merit in evaluating whether the UK effectively harnesses private sector innovation and expertise in this part of the process, and whether it could encourage greater participation, for example through an unsolicited proposal process.

When considering sustainability, beyond existing carbon and environmental commitments, the Commission should be cognisant of broader objectives to build more infrastructure which is more resilient to increased extreme weather events and the impacts of climate change, as well as being sustainable and protecting and enhancing the natural environment.

### *Evaluation and appraisal*

The Commission is in a unique position to play a clear and consistent role in recommending models which are capable of achieving long-term objectives and not subject to political cycles. It should seek to ensure that our cities and city-regions can play a full role in driving the development of future infrastructure projects. We would be keen to work, alongside other UK cities, with the Commission to make the case for a modern framework for infrastructure investment, appraisal and delivery.

Performance of assets should link to a quantification of their impact on the core objective of improving quality of life.

Furthermore, evaluation and appraisal methodology should ensure value is attached to contributions made by one infrastructure to another in order to ensure that such value is recognised so that funding can be made available to realise this added value.

In addition to considering the evaluation and appraisal methodology before construction, the Commission could consider the importance, and the UK's current effectiveness, at conducting post-hoc analysis of infrastructure projects after they are completed to ensure lessons are learnt.

### *Skills*

In terms of fostering long-term and sustainable economic growth, it will be important to highlight the need for workers having the right skills to carry out the required infrastructure planning, construction and maintenance activity. There are already identified and well-documented skills shortages in the construction industry, which could be further impacted depending on the outcome of migration related aspects of the UK's withdrawal from the European Union,

The supply of and demand for vocational skills is currently the subject of the Area Review process, a government programme focussed on Further Education and Sixth Form Colleges designed "to establish the appropriate set of institutions to offer high quality provision based on the current and future needs of learners and employers within the local area."

Additionally, the Government's Post-16 Skills Plan, published in response to the Sainsbury Review of Skills, highlights construction as one of 15 key skills routes, presently employing in excess of 1.6 million people nationally. The findings of the Area Review and the

implementation of the Post-16 Skills Plan will both present opportunities to factor in anticipated short, medium and long term skills demand indicators with future skills supply.

### *Social dimensions of infrastructure*

There is a lack of emphasis on social equity and fairness in the consultation document, and there is no cross cutting issue covering such social dimensions. The Mayor places considerable emphasis on fairness and equity in terms of opportunity and access to services. We know that currently for example there are parts of London without access to adequate broadband because market conditions are unfavourable for investment, whilst other parts of London suffer from poor air quality, transport services, or access to green space. These are pressing priorities that need to be addressed as part of future programmes of infrastructure investment.

#### *Page 24 – Methodology- Vision and Priorities report*

Q8. Do you agree with this methodological approach to determine the needs and priorities?

We agree with the proposed approach to determine needs and priorities.

The nation's transport requirements will not simply emerge through competitive 'market forces' or piecemeal planning. An 'objectives led' approach, like the one proposed for the NIA, is needed with a clear national economic and spatial vision at its heart. It should be linked to regional and city planning, and aim to shape land use and transport patterns in ways that support desirable economic, social and environmental outcomes.

In determining our long term transport infrastructure requirements it is vital that the interactions between transport supply and demand are taken into account. This should be achieved through understanding the infrastructure baseline and studying the key drivers of infrastructure, as proposed. Transport demand results from decisions people make about where and how they live, work, study, shop and spend their leisure time. Such decisions take place in a complex environment over a variety of timescales and at different spatial levels, from the international to national, regional, sub-regional and local. They are determined by the opportunities people perceive are available to them. Transport infrastructure is one of the main factors that influence how people perceive these opportunities and therefore plays an important role in shaping their choices.

This is important from a policy making perspective because the patterns of land use and transport that result from people's decision making have wider effects over time, both positively and negatively. These patterns influence the quality and location of housing development, the types of lifestyles on offer, the range and quality of employment and leisure opportunities available to people, and a whole range of environmental impacts from air quality to climate change effects.

Taken together, these influence the sustainability of our cities and, related to this, their attractiveness as places to live, work and invest in, which will be important in determining their future economic prospects. The existence of these wider effects also result in path dependencies between transport infrastructure provision and future demand, which helps explain why some of the most pressing transport challenges are in areas with already very high levels of provision, relative to other areas, such as central London.

When it comes to determining priorities, the approach taken by the Commission should be flexible and adaptive to changing economic, demographic, technological and social trends. There should be more focus on estimating the current infrastructure asset base, future demand and gaps that need to be addressed, with less focus on identifying specific solutions to fill those gaps (particularly in the long term). Other solutions aimed at managing use and increasing capacity or utilisation of existing infrastructure must be considered, for example through changes to operations, processes, technology or behaviour (including influencing mode change) – these will often prove to be simpler and cheaper, offering better value for money than major upgrade works or new infrastructure. The Commission could review leading practice from the UK and abroad to identify economic impacts of different types of infrastructure investment. Nevertheless there will be challenges that can only be solved through major new infrastructure and it is important to recognise that there are long lead times and that there are significant benefits from a supply side perspective arising from the certainty that a committed pipeline of projects can bring.

As mentioned in response to question four, the Commission should draw on existing plans and project pipelines, where they exist, and complement them with new analysis and ideas, or propose alternative solutions in the Commission thinks they do not address the key issues.

Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

The Commission has recognised that while important, modelling is merely a tool of analysis and it can never provide definitive answers. However, this is not a justification for substituting judgment or 'rules of thumb' for high quality quantitative modelling and analysis.

Good models are a means of synthesising the best available information and knowledge. They provide an objective way of taking into account and working through the complex effects of multiple factors that influence travel demand over the long term that would not be possible through other means. The process of understanding the particular limitations of any models being used may itself yield valuable analytical insights. The strategic transport models that are available in London benefit from very high quality data compared to those used in most places and are in many ways more innovative than national approaches. When used in conjunction with experience and professional judgment they can provide powerful evidence based analysis which is flexible and creative, rather than mechanistic.

The proposed approach could be more ambitious about the role of modelling and the planned reliance on existing and simple custom made models is perhaps too conservative. Existing transport models based on estimating changes in the generalised costs of forecast trips between fixed origins and destinations will provide limited guidance to infrastructure requirements over a thirty year horizon as the quantities estimated by them will be far from accurate. A broad analytical approach should be adopted that recognises that very significant changes in demand and supply conditions are to be expected, including in patterns of land use, and that a major role for transport is to influence the nature and scale of these changes.

Land use-transport interaction models such as TfL's LonLUTI model do, however, take into account interactions between demographic and economic change, transport and land use, and could offer useful longer term insights to the Commission. An appraisal tool that is capable of integrating transport and land use effects (ULTrA) is also being developed for TfL. This uses a utility function based on accessibility rather than one based on trip making, allowing the relative benefits of people choosing to undertake particular activities in different locations to be directly estimated. We would be happy to discuss this approach further with the Commission.

The London Infrastructure Plan 2050 provides a strong evidence base for London specific issues from which a national infrastructure assessment can be developed, and the Mayor is leading on work developing a strategic programme of infrastructure investment for London which also has potential to feed into the Commission's evidence base and prioritisation activities. Our evidence base continues to develop as work progresses developing the next iteration of the London Plan, the Mayor's spatial strategy.

As noted previously, the GLA is also exploring with TfL options for developing a systems based model of London which recognises the multi-dimensional systemic nature of London, known as the London Simulator, in partnership with Greenwood Strategic Advisors. This model is being developed to inform policy and investment appraisal, as well as other types of decision making. The aim of the work is search for high-leverage combinations of

investments and complementary policy changes, by viewing the city as an interconnected system of systems (jobs, housing, population, debt, output etc), with many feedbacks. The application of this type of technology at the city level is innovative and something that we are able to provide further insights to the Commission on.

With regard to the broader NIA exercise, Infrastructure Australia completed a similar audit (Australian Infrastructure Audit, May 2015) and planning exercise (Australian Infrastructure Plan, February 2016). The Commission may be able to learn from Infrastructure Australia's experiences in completing this work.

*Page 24 – Methodology- Vision and Priorities report*

Q10. Do you believe the Commission has identified the most important infrastructure drivers (population and demography; economic growth and productivity; technology; climate change and environment)? Are there further areas the Commission should seek to examine within each of these drivers?

The drivers of infrastructure identified are appropriate and recognise the importance both of interactions between them and with infrastructure provision itself. However, we recommend the Commission adds an additional driver related to the social dimension of infrastructure as mentioned above in our response. Improving access to opportunities and seeking to combat inequalities are important considerations of infrastructure investment. This issue is at the core of the priorities of the Mayor of London and of the recently appointed Government.

Furthermore, whilst the overarching 'Climate change and environment' driver is appropriate, the description currently lacks the context of continuing biodiversity loss and the need to consider protected habitats and species. This is where including green infrastructure with the other sectors outlined in the consultation document could pay dividends, by flagging constraints and opportunities early in the process.

While understanding key trends and projections will be important, it is vital that the approach recognises that decisions about infrastructure provision will play a powerful role in shaping these trends. This was not well understood in the past. For example, the predict and provide approach that prevailed for several decades ignored the now well documented phenomenon of 'induced traffic' in response to increased road infrastructure, and as a result of this failure was discredited, in urban settings at least. The NIA's guidance should make it possible to avoid repeating this kind of effect both in the transport sector and other sectors.

However, there could be further discussion in order to provide an integrated and comprehensive 'objectives led' approach, as discussed in response to question eight above. Developing options and identifying priorities is best undertaken within a framework of (horizontally) integrated wider policy making. It should also recognise the need for (vertically) integrated planning of infrastructure for the different levels of trip making from international to national, regional, sub-regional and local. This should be made more explicit in the methodology.



Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

We agree that options should be considered within portfolios of investment, rather than in isolation, and that strategies should be tested across a range of scenarios. Clearly some elements can be treated as ‘stand alone’, while there may be some core schemes that merit consideration in alternative packages. However, the Commission should recognise that some scenarios are more likely outcomes than others and this should be reflected in the prioritisation process.

Clearly there are significant uncertainties associated with planning infrastructure provision over a thirty year horizon. Conventional Cost Benefit Analysis was originally designed for appraising marginal schemes that were assumed not to have significant impacts on the wider economy. The portfolios under consideration are likely to be non-marginal on a national scale and, particularly in the light of the answer to question eight above, a traditional ranking process using standard benefit-cost ratios is likely to be misleading.

Rather than attempting to rank schemes using conventional metrics, a scenario based approach might be preferable in these circumstances, with priorities developed through testing within an objectives based assessment framework. A useful approach could be to develop a progressive series of external scenarios with assumptions set out transparently along with consideration of their probabilities. This might include some quantitative risk analysis. The case for each of the portfolios of proposed interventions would then be presented under each scenario. This would allow decision makers to determine their priorities within an objective decision making framework that allows for transparent judgment of the plausibility of different assumptions about the future. It would also allow for the risks (both upside and downside) of both underinvesting and overinvesting to be considered objectively.

The Commission should exercise caution in making specific recommendations for new infrastructure projects, particularly in the medium to longer term. The Commission’s work could focus on determining demand and supply pressures, and conducting a gap analysis between the determined need and current plans to meet that need. The approach should be adaptive and flexible to respond to changes in the identified infrastructure drivers over time.

Any recommendations should outline how the private sector could best be engaged to deliver required infrastructure for example through competitive market structures or incentives.

Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

The consultation document notes that the assessment will take account of the fiscal remit that the Government has set. While it is important to be conscious of broader fiscal constraints, the Commission’s analysis should be focused on the infrastructure required to address gaps and constraints, and to deliver economic growth and meet broader objectives.

The next step is to consider what infrastructure can be delivered both within current funding mechanisms but also what other steps can be taken to fund and finance new infrastructure. Fiscal envelopes should be tested in scenario planning given the longer timescales (spanning multiple governments) for the investment considered here.

The Commission should recognise that transport investment can itself play an important role in expanding future fiscal envelopes – it is important that a long term view is taken that makes a clear distinction between productive investment that generates economic payback and other less productive forms of government expenditure. The economic paybacks should be explicitly assessed so the benefits of investment, as well as the disbenefits of underinvestment, are well understood. The methodology should take account of the net cost to the Exchequer (including the additional taxes raised from impacts on incremental GVA) as well as the gross cost of schemes / portfolios, including alternative scenarios in relation to the fiscal impact of the proposed portfolios of investment.

*Page 30 – Engagement*

Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

It is just as important to ensure the wider public can support the vision for UK infrastructure set out by the Commission as those who will be directly impacted or involved in delivery. It will therefore be important for the Commission to consult widely, including with the Mayor of London, the GLA and TfL, and provide sufficient opportunities for stakeholders to provide input and fully understand potential benefits and the costs involved in achieving them. The Commission should learn from planning and delivery of past and current infrastructure projects, for example HS2, particularly in how best to engage with opposition stakeholders and landowners.

As noted above, TfL and the GLA are willing to assist the Commission as it develops the National Infrastructure Assessment. We are well placed to comment on London specific infrastructure issues, and have an interest in being involved in the dialogue regarding the wider South East.

A taskforce set up to focus specifically on skills supply and demand to meet the need of the NIA findings may afford a practical means through which infrastructure and skills stakeholders could share information, and would support the Commission's aspiration to see a whole system approach which would include skills needs.

Date: 12 August 2016

**Transport for the North**  
2nd Floor  
4 Piccadilly Place  
Manchester  
M1 3BN  
Tel: 0161 244 1450

Dear [name redacted],

**Re: Response to NIC National Infrastructure Assessment Consultation – Transport for the North**

Transport for the North is pleased to respond to the National Infrastructure Commission's consultation on the new Assessment process and methodology. We welcome the introduction of the INA and the opportunity it offers to establish a national, long term strategic vision for infrastructure.

As you will know from the March 2016 update of the Northern Transport Strategy, and our work together on High Speed North, TfN will make the case for developing the strategic transport networks needed to achieve a step change in economic growth across the North, making a more significant contribution to the UK economy through higher productivity at the same time as increasing job opportunities. Following the publication of the Northern Independent Economic Review in July, we now have a coherent, evidence based vision for achieving a vibrant and growing economy across the North of England.

The evidence from the NIER will set the direction of the next phase of our work. In 2017 we will An integrated, multi-modal transport plan, owned and developed by the North, will set out the investments required to achieve significantly enhancing connections in the North to support a transformed Northern economy and better connect the major urban centres and economic assets of the North to a larger labour pool and wider market opportunities.

In developing our integrated plan, we are beginning to address a similar set of issues and challenges you have set out in the consultation document. We see three areas in particular where we can support the development of the Infrastructure Needs Assessment:

- **Helping to shape the role of the emerging sub national transport bodies in the assessment process.** Our Strategic Transport Plan will provide the commissioning framework and investment plan under which TfN will make the case for major investment programmes / projects and influence the investment programmes of the government agencies. Ensuring that economic objectives are aligned between local and national priorities, and that we have consistency of evidence gathering, assessment and prioritisation across national and sub national infrastructure bodies.
- **Establishing a common understanding of the relationship between infrastructure investment and economic growth, and how that relates to the regional economies and the North in particular.** We are commissioning new work that will build on the IER to develop future travel demand scenarios across the North for the first time.

- **Contributing to the work on cross cutting infrastructure issues.** We see this as an opportunity for the NIC to encourage fresh innovative thinking and set direction, particularly in respect of funding, finance and project appraisal.

Although not part of the consultation, I wanted to make two points about governance and the remit of the NIC. The first is that it is critical that the formal role of the sub national transport bodies in relation to the NIC is clarified, so that we and others can understand how our Strategic Investment Plan will need to take account of the INA. I also want to make a wider point about infrastructure funding in respect of the fiscal remit. Whilst we obviously recognise the fiscal constraints under which the NIC needs to operate, the wording of the agreement implies a fixed pot determined by HMT. We would expect the NIC to make the counter case to government, if the evidence shows that there is a case for a greater level of overall investment that exceeds the level set out in the overall fiscal remit.

Our formal response is attached. I have asked [name redacted] to share more of our thinking with [name redacted] in more detail, and agree how we can support you in developing this important agenda.

Yours sincerely,

[signature redacted]

[name redacted]  
[job title redacted]

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **Foster long-term and sustainable economic growth across all regions of the UK**
- **Improve the UK's international competitiveness**
- **Improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

We agree the objectives and welcome the underlying principles. In establishing the precise remit of the NIC and the NIA in legislation, the government will need to consider the remit of the NIC in respect of the emerging sub-national transport bodies in balancing local and national infrastructure priorities. The INA methodology should set out in more detail how the evidence and priorities from Transport for the North and other emerging bodies will be incorporated.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

Agree. The principles are very welcome and reflect the initial work Transport for the North is doing to establish its integrated transport plan.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

Yes.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

It would be sensible, both in the INA and the ongoing 5G project, to consider the interaction between transport infrastructure and communications, for example ensuring that major transport projects incorporate broadband infrastructure improvements, and that rail passengers have access to high speed data connectivity whilst travelling.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

Yes. Our view is that 2017 report on vision and priorities is a clear opportunity for the NIC to set strong direction on the critical drivers of infrastructure need, particularly on funding, finance and project appraisal issues. Establishing a national position on these issues will support the development of the sub national transport bodies and help avoid duplication or inconsistency. We particularly welcome the opportunity to contribute to the NICs work on the relationship between infrastructure investment and economic growth, something which is at the heart of Transport for the North's remit.

On economic geography, the INA will need to consider the extent to which this is an analysis of national variation in economic costs and benefits, or at the level of detail we have established in our recent Independent Economic Review. It would be helpful to see more detailed thinking on the approach ahead of the publication of the 2017 document.

On project appraisal, the limitations of the DfT appraisal framework for assessing major transport infrastructure projects are well documented.

TfN is working with DfT to develop best practice in appraisal techniques to ensure that decision-makers understand the economic potential of the North and impacts in terms of productivity, investment and employment from transport investments, building on the report Transport Investment and Economic Performance. Our work will explore impacts across a range of economic scenarios and examine how projects perform as part of overall programmes of investment, which will include complementary economic policies.. We would be happy to share our thinking in more detail and would support the NIC in establishing. The vision document as a major opportunity for the NIA to set out a new approach to appraising major infrastructure projects based on a broader set of economic benefits and taking a longer term view of infrastructure projects.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

No

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

Yes

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

No. Though we would suggest the NIC review the approach which Transport for Scotland has taken its appraisal methodology.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each of these drivers?**

Yes. No further comment to make.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

The consultation document sets out a clear and coherent methodology and we welcome the rounded and balanced approach that has been set out. In the next stages of the work, the NIA will need to work with the Transport for the North and the other emerging sub national transport bodies to establish the emerging plans and priorities for infrastructure identified those bodies are captured within the overall assessment. The closer we can align processes the better but where conflicts do occur, we will need to avoid a situation where locally determined priorities appear to be over ridden by the national methodology.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

Greater emphasis should be placed on the voice of the infrastructure user (which is clearly different to the public voice already identified), including the recognition of. Clearly this is particularly important in respect of transport infrastructure, and the INA should recognise that the current user experience is different across the UK.

# THE NATIONAL INFRASTRUCTURE ASSESSMENT CONSULTATION – RESPONSE BY THE TRANSPORT PLANNING SOCIETY (TPS)

The Transport Planning Society (TPS) is an independent institutional body in the UK, established to facilitate, develop and promote best practice in transport planning and to provide a focus for dialogue between practitioners and others interested in the field. It is supported by four long established professional institutions –ICE, CIHT, CILT and RTPI -all of whom have an interest in transport planning as well as their own core activities.

The Transport Planning Society administers its own Professional Development Scheme for transport planners, leading to award of the Transport Planning Professional (TPP) qualification which is the only professional qualification uniquely aimed at transport planners. The Society has over 1200 individual members and 30 corporate member providers of transport planning services in the UK and elsewhere.

Our response (set out below in italics) has been drafted by the Policy Group within the TPS Board, all of whom were elected by the membership as a whole. The Policy Group is in constant dialogue with other members of the Society and the views expressed here may be taken as broadly representative of them.

Q1. The Government has given the National Infrastructure Commission objectives to:

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK's international competitiveness
- improve the quality of life for those living in the UK

What issues do you think are particularly important to consider as the Commission works to this objective?

*Looking at the consultation document overall it is clear that (a) this is incredibly ambitious (a plan for everything for a Government that so far has shown extreme reluctance to have a plan for anything, and (b) there is a very long process of consultation and engagement proposed stretching over the next 2 years. On both grounds any responses need to be high level – aimed at ensuring that TPS is fully engaged, for example in future round tables, expert panels, etc rather than trying to answer some of the more the more specific questions listed. We have however attempted to structure our response to the NIC's question format.*

*TPS considers that in general terms there is an endemic failure to place new infrastructure investment in the context of:*

- 1 *a framework which links transport provision (services as much as infrastructure) with housing, employment and industrial policy*
- 2 *recognition of the high value of non-motorised travel as a balance to the bias towards what Eddington called “grands projets”*
- 3 *a plan to manage use of infrastructure (in terms of overall demand) and to maintain it – building more when what exists is deteriorating or congested will achieve none of the above objectives*



4 a means of avoiding vague statements about quality of life (as above) and ensuring that environmental improvement and avoidance of climate change really influence decisions – neutrality of impact is not enough.

*It is clear that, for example, demand management or mode transfer will strongly influence the need for or the scale of new infrastructure.*

*A clear example is that, for far too long, governing bodies have excluded housing as a key, determining infrastructural component. In the NIC's Executive Summary to its consultation document it is stated "The NIC will consider the potential interactions between its infrastructure recommendations and housing supply". Given the abandonment of any rational and implementable housing strategy and indeed regional planning strategies, successive government bodies and agencies have relied on laissez-faire and market dominated policies. This, when combined with the lack of an effective industrial strategy has contributed to poor economic and productivity performance compared with our closest comparable competitors. This has all served to accelerate the regional disparities and imbalances now so apparent and serious. Just considering housing supply is not enough in taking key infrastructure investment decisions. What about housing occupancies and affordability, the reluctance of some local authorities to accept more housing, the stark imbalances of living conditions and infrastructure qualities even across our city regions?*

Q2. Do you agree that, in undertaking the NIA, the Commission should be:

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

*We would all agree with these aims but consider them to be too general to generate in-depth comment. There is a lot of activity relevant to these aims, for example TPS is currently engaged in an initiative to make modelling and forecasting more transparent and objective in a way which supports evidence based decision making both for clients and suppliers. We would be happy to keep the Commission in touch with this as it progresses over the coming months.*

*A way needs to be found to focus on the actual, evidence-based economic, social, and environmental impacts of delivering combinations of infrastructure investment. Taking just transport schemes, the TPS recognises that there are many interdependencies and cross-cutting impacts. Hence our suggestion of a clear set of frameworks within infrastructure should be considered (Q1).*

Transport

The Commission will adopt a multi-modal approach to the analysis of transport need, looking at how key road, rail, ports, airports and other transport arteries support the movement of people and freight into and across the country. A critical interdependency which the NIA will aim to better understand is the impact of future transport provision on the energy sector; in particular the potential implications of large-scale car, lorry and rail electrification.

The built environment:

The Government have decided that the Commission's remit will not include housing supply directly. However, infrastructure can affect the viability of housing projects both large and small, and housing supply is an important driver of infrastructure need. As such, the Government's remit envisages that "the Commission will consider the potential interactions between its infrastructure recommendations and housing supply. Information about the potential locations of strategically important housing allocations, such as new settlements and urban extensions when they come forward, will be an important component of the evidence base collected by the Commission, which it may use to assess infrastructure needs and make recommendations that co-ordinate the timing and delivery of new infrastructure with the delivery of new housing."

Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

*In terms of transport there is virtually no ports policy other than a market led approach, multi-modal assessment of passenger travel is weak (rail and road use different demand models) and virtually non-existent for freight, despite the clear possibilities for rail (see for example Strategic Rail Freight Interchanges). The Commission should recognise this and seek to improve its assessment processes to include demand management impacts on need and scale.*

*We also need to start with a bottom-up focus at the sub-regional and regional levels in order to build-up the National/UK-wide strategy. We need to look at the potential for achieving a synergistic/critical mass of infrastructures to underpin the re-balancing of the UK.*

Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

*Transport of course – as this fundamentally serves the basic and aspirational needs for the movement of people, goods and services and significantly relates to land-use planning. See reply to Q1 and 3 – defining demand from housing, employment, and other land uses is a key input to decision making as well as demand management.*

Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?

*The TPS considers that housing and industrial strategies must feature far more and that transport and energy strategies need to be particularly closely integrated. Demand management by means of price-signalling needs to be introduced more widely, both for passenger and freight.*

*Land-use planning, funding, pay as you go, pricing and project appraisals must be further integrated across the whole infrastructure landscape. Central funding at present is now too often regarded as "smoke and mirrors" with few LAs and even the new CAs not really knowing where they are going with considerable time and resource wastage resulting.*

Q7. Are there any other cross-cutting issues that you think are particularly important?

*Traffic management, demand management, the rapidly changing supply/delivery logistics practices that apply new pressures on local retailing offers and road networks. Ports and regional airports strategies need to be less London-focussed. Both could include demand management.*

## Stakeholder & Public Engagement

Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

*A multi-layered strategy is a sensible way forward, but direct engagement is preferable to social surveys, where the context and form of questions can strongly influence the answers. Translating stated preference, for example, into monetary values rarely gains widespread agreement even among practitioners (look at the value of travel time!). TPS is happy to be involved and if NIC feels it would be helpful, to host an event in due course.*

*The key to a successful consultation and engagement is that participants can see evidence of their input being recognised and understood, even when it is not agreed with.*

Responses to this consultation should be sent to

NIAEvidence@nic.gsi.gov.uk  
by 5 August 2016.

In exceptional circumstances we will accept submissions in hard copy. If you need to submit a hard copy, please send your response to the Commission Secretariat at the following address:

NIA Evidence  
National Infrastructure Commission  
1 Horse Guards Road  
London  
SW1A 2HQ

Are you satisfied with this consultation? If not, or you have any other observations about how we can improve the process, please contact us at:

National Infrastructure Commission,  
1 Horse Guards Road  
London  
SW1A 2HQ  
or by e-mail to:  
NIAEvidence@nic.gsi.gov.uk

## **THE TREES AND DESIGN ACTION GROUP'S RESPONSE TO THE NATIONAL INFRASTRUCTURE ASSESSMENT CONSULTATION.**

The third report of the Natural Capital Committee (2015) called for a 25 year natural environment plan to sit alongside a 25 year national infrastructure plan. Sadly Defra does not see the need to accept this recommendation and, indeed, there appears to be no one representing the environment/natural capital on the National Infrastructure Commission.

Surely a serious omission?

As set out in the Commission's remit, infrastructure has an impact on all aspects of our lives.

This submission from the Trees and Design Action Group is to support the intention for the NIA to be "comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks" and to emphasise that this should also include the role of natural capital.

Part of the role of infrastructure planning is to look beyond 'grey' (engineered) infrastructure and also consider 'blue' (water) and 'green' (natural capital elements) – in other words, to take an 'integrated infrastructure' approach.

Work already undertaken by Highways England in a pilot study on assessing the value of natural capital for the quantifiable services<sup>1</sup> that it can provide as well as the Highways England Environment Fund<sup>2</sup> led by Natural England (LINet – Linear Infrastructure Network) with partners including Network Rail all demonstrate the need to include natural capital infrastructure decisions for a number of reasons including economic benefits.

The Greater Bristol Bus Network (GBBN) found that there was a greater number of passenger journeys on bus routes with trees than those without.<sup>3</sup>

An integrated infrastructure approach would also, of course, include surface water management and environmental improvements such as air quality.

We may spend billions of pounds each year on maintaining and improving our infrastructure but this does not appear to be what we are seeing on the ground in many of our towns and cities where, for example, drains are often blocked causing difficulties during rain-storms and, in some cases, exacerbating flooding. Seeing these problems in high profile cities such as Oxford should be of concern in terms of the city's long term economic health!

Equally, we do not appear to be taking a 'multi-modal' approach to transport sufficiently including the need for major urban routes to also be recognised as 'places'. It is estimated that about 10% of the UK's population live on main roads with the many problems this can cause. Again, an integrated infrastructure approach taking advantage of the benefits of natural capital elements can contribute to improving the situation.

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<sup>1</sup> [https://www.itreetools.org/resources/reports/Valuing\\_the\\_Natural\\_Capital\\_of\\_Area1\\_UK\\_Pilot\\_Report.pdf](https://www.itreetools.org/resources/reports/Valuing_the_Natural_Capital_of_Area1_UK_Pilot_Report.pdf)

<sup>2</sup> <file:///C:/Users/user/Downloads/NIA%20best%20practice%20network%20February%202016%20%204a.Highways%20England%20Environment%20Fund%20Nick%20White.PDF>

<sup>3</sup> *Trees in Hard Landscapes: A Guide for Delivery* TDAG 2014 - [http://www.tdag.org.uk/uploads/4/2/8/0/4280686/tdag\\_trees-in-hard-landscapes\\_september\\_2014\\_colour.pdf](http://www.tdag.org.uk/uploads/4/2/8/0/4280686/tdag_trees-in-hard-landscapes_september_2014_colour.pdf)

We also do not appear to take an integrated approach to highways and utilities – why in the 21st century are utilities in urban areas not managed in shared corridors so that we are not digging up and relaying our roads and footways repeatedly. When the public realm for The Strand in London was improved using expensive paving etc, it was apparently dug up over 150 times in one year<sup>4</sup> - a non-economic approach to managing utilities and also a barrier to many natural capital improvements such as planting street trees for the many quantifiable benefits that they can deliver.<sup>5</sup>

The Trees and Design Action Group would like to make two simple requests:

1. Will the National Infrastructure Assessment include natural capital in its aims and apply an integrated infrastructure approach to its programme?
2. To support this, will the National Infrastructure Commission appoint a commissioner to represent the environment and natural capital?

[name redacted]

on behalf of the Trees and Design Action Group

Tel [telephone number redacted]

Mob [telephone number redacted]

Email [email address redacted]

Registered Charity no. 1152960

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<sup>4</sup> <https://www.questia.com/newspaper/1G1-112416970/west-end-street-dug-up-more-than-150-times-roadworks>

<sup>5</sup> <http://www.forestry.gov.uk/london-itree>

# NATIONAL INFRASTRUCTURE ASSESSMENT: UK-GBC CONSULTATION RESPONSE

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The UK Green Building Council (UK-GBC) is an independent, membership-based, not-for-profit organisation committed to radically improving the sustainability of the built environment by transforming the way it is planned, designed, constructed, maintained and operated.

## Summary

By 2050 the UK will have to reduce greenhouse gas emissions by at least 80% and in light of the Paris Agreement it is likely that the UK will have to go further and achieve net zero carbon emissions in the future. It is therefore crucial that National Infrastructure Assessments take full account of the sustainability impacts of infrastructure and align with the Climate Change Act.

In particular, ambitious emissions targets cannot be met cost effectively unless there is a significant improvement in the energy performance of the UK building stock. Energy demand reduction must therefore form part of a whole energy system infrastructure approach. The IEA has identified energy efficiency as the ‘first fuel’ which is often more cost effective than building new generating capacity. The Government’s own cost benefit analysis show also shows that an energy efficiency programme for homes could deliver comparable economic benefits to other infrastructure programmes<sup>1</sup>. Realising these benefits will require a coordinated national infrastructure programme which includes long term delivery targets and public investment.

## Q1. The Government has given the National Infrastructure Commission objectives to

- foster long-term and sustainable economic growth across all regions of the UK
- improve the UK’s international competitiveness
- improve the quality of life for those living in the UK

## What issues do you think are particularly important to consider as the Commission works to this objective?

It will be important to ensure that the infrastructure recommendations produced in the NIA are fully aligned with the Climate Change Act and the emissions targets for the carbon budgets. Along with general considerations of sustainability and environmental protection, emissions reductions should be explicitly set out as a criterion for the Assessments.

It is important to consider the role of building energy efficiency in balancing future energy demand and supply, reducing the cost of supply-side capacity and an assessment of the interventions needed to deliver a programme of improvements to the existing building stock to realise these benefits.

The final results of the UK Low Carbon and Renewable Energy Economy Survey for 2014<sup>2</sup> indicated that the “majority of businesses undertaking low carbon and renewable energy (LCRE) economy activity in the UK operated in the construction industry. This activity generated £12.4 billion LCRE turnover and employed 96,500 FTE employees.” It is clear that the Commission should support LCRE activity in infrastructure, where possible. This will increase the

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<sup>1</sup> Frontier Economics, Energy Efficiency: An Infrastructure Priority, 2015. <http://www.frontier-economics.com/documents/2015/09/energy-efficiency-infrastructure-priority.pdf>

<sup>2</sup> Low carbon and renewable energy economy, final estimates: 2014, ONS, <https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/finalestimates/2014>

international competitiveness of these businesses by securing the UK's current position as an international leader in low carbon and sustainable construction.

Q2. Do you agree that, in undertaking the NIA, the Commission should be:

- Open, transparent and consultative
- Independent, objective and rigorous
- Forward looking, challenging established thinking
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?

Are there any principles that should inform the way that the Commission produces the NIA that are missing?

We agree with the principles set out, and would emphasise that a forward looking approach which challenges established thinking will be particularly important for transitioning to a low carbon economy. The NIC will be uniquely placed to highlight the long term resilience of new infrastructure alongside shorter term motivations for investment returns. Taking this long term approach will help to ensure that current projects do not become obsolete ahead of time and can form part of the UK's low carbon future.

“Taking a whole system approach” should include consideration of whole life asset management, including whole life carbon impacts. In particular, embodied impacts of new infrastructure (including upgrades) should be considered not only because there is only a single opportunity to minimise the effect but also because the decisions taken at the capital expenditure stage will have an irreversible influence on the operation of the infrastructure assets.

Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?

We agree with the proposed sectors to be covered in the NIA, and welcome the focus on energy systems in helping deliver our environmental objectives and the important role energy efficiency will play in this. A whole-systems approach to energy must include dealing with energy demand and investing in energy efficiency is often more cost effective than bringing new generating capacity onto the grid. It therefore represents a vital opportunity to minimise costs of meeting the UK's energy needs and ensuring our security.

Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

Buildings are one of the largest energy using sectors, and therefore any robust long-term infrastructure plan for the future energy system must include investment in energy efficiency to reduce demand and increase energy security. We therefore welcome the NIC's reference to 'the importance of looking at the future of heating and the shift to low carbon solutions in the context of the UK's carbon targets, and the important role that increasing energy efficiency could potentially play.'

Progress in improving the UK's existing building stock has so far been slow and driven by piecemeal government policies. Delivery of home energy efficiency in particular has become overly-reliant on subsidies through the Energy Company Obligation, which is funded through household energy bills and has faced significant cuts in recent years. The only way to deliver the scale of improvements required is through a comprehensive national infrastructure programme with long-term delivery targets and Government capital investment. This can provide certainty to homeowners, investors and the supply chain, and stimulate private investment into the energy efficiency market.

The International Energy Agency<sup>3</sup> have framed energy efficiency as the “First Fuel”, and emphasise the importance of viewing building energy efficiency as an infrastructure priority. Authoritative research by Frontier Economics in 2015<sup>4</sup> showed that a national programme of investment in the energy efficiency of the building stock is capable of delivering major economic and social benefits (in the order of £8.7 billion). This net benefit is comparable to other major infrastructure road and rail projects, including HS2 (Phase 1). The report concluded that there is a strong case for Government to make home energy efficiency an infrastructure investment priority and to develop an infrastructure programme to deliver it.

We agree that the work on energy should build on the “Smart Power” report. We urge the Commission to focus strongly on energy storage at both micro and macro levels. Although there has been significant progress in this area in recently, a cohesive strategy is required to ensure the full benefits of the opportunities are reaped. For example, ensuring that low carbon energy generation techniques are optimised to contribute in meeting the energy demand at both national and local (building) levels.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

As the focus of the NIA will be on long term needs, a key piece of analysis should be to investigate in detail how high levels of energy efficiency in buildings affect energy demand profiles over time, and as a result, how much supply-side capacity could be freed up. Specifically, it should be possible to estimate the savings on future energy supply infrastructure costs by raising the energy performance of buildings across the country, regardless of the mix of low carbon heating solutions chosen. How peaks in daily demand could be smoothed out by the interaction between energy efficiency and smart meters is also an important area to explore further.

Resilience needs of infrastructure assets should reflect the increasing interconnection of infrastructure systems. Even if individual assets are more resilient is there an issue around the vulnerability of the infrastructure systems due to their interconnected nature? If so, what can be done about it? The Commission could identify the role of individual asset systems providers and opportunities for collaboration between different providers.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

We welcome the prominence of sustainability as one of the cross-cutting issues and the need to align infrastructure priorities with the UK’s environmental targets. However, we believe that the NIC could go further and explicitly integrate the requirements of the Climate Change Act into the NIA. This will be vital to ensure that the carbon budgets frame the Assessment from the outset and help to deliver the most cost-effective route to a low carbon economy.

The Commission could use the cross-cutting themes as an opportunity to identify where Government can play a role in improving the sustainability performance of the industry. For example, the Government played an important role in setting an expectation for the uptake of BIM, which led to a step-change in the industry. Sustainability performance within infrastructure could be improved by Government setting a similar aspiration/target for industry to unite around and deliver.

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<sup>3</sup> IEA, Energy Efficiency Market Report 2014  
<http://www.iea.org/publications/freepublications/publication/energy-efficiency-market-report-2014.html>

<sup>4</sup> Frontier Economics, Energy Efficiency: An Infrastructure Priority, 2015. <http://www.frontier-economics.com/documents/2015/09/energy-efficiency-infrastructure-priority.pdf>



Q7. Are there any other cross-cutting issues that you think are particularly important?

No response

Q8. Do you agree with this methodological approach to determine the needs and priorities?

No response

Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?

No response

Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?

Within the climate change and environment driver, embodied impacts of new infrastructure (including upgrades) should be considered not only because there is only a single opportunity to minimise the effect but also because the decisions taken at the capital expenditure stage will have an irreversible influence on the operation of the infrastructure assets.

In order to adapt to climate change infrastructure must become more resilient. The Commission may want to include consideration of the impact these changes have on “liveability”? For example, if flood defences are more substantial or services and transport routes are raised what impact does this have on urban areas as a habitable environment?

Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?

No response

Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

No response

Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?

We suggest that the Commission actively engages with industry bodies, trade associations and professional institutions. This will be an efficient way for the Commission to interact with a wide audience by using existing communication channels that these organisations have.

For further information, please contact:

[name redacted], [job title redacted]

[email address redacted]



## **UK HFCA response to National Infrastructure Commission 'National Infrastructure Assessment plan'**

### Introduction

This response to the Call for Evidence is submitted by the UK Hydrogen and Fuel Cell Association (UK HFCA). The UK HFCA works to ensure that fuel cell and hydrogen energy can realize the many benefits offered across economic growth, energy security, carbon reduction and beyond. Through the breadth, expertise and diversity of our membership, we work to trigger the policy changes required for the UK to fully deliver the opportunities offered by these clean energy solutions and associated elements of the supply chain.

Fuel cells and hydrogen are 'game changing' technologies providing low-carbon solutions across transport, stationary power and beyond. The growing industry is bringing benefits across the UK: creating new jobs, supporting UK economic growth and improved competitiveness in energy markets globally.

This response aims to ensure that the National Infrastructure Commission is aware of the benefits of hydrogen and fuel cells in balancing the intermittency of renewables and delivering low carbon heat, power and transport whilst supporting low carbon economic growth and creating green jobs.

In particular, the UK HFCA urges the Commission to include recommendations on provision for nationwide hydrogen infrastructure in its 'National Infrastructure Assessment plan'. A UK Hydrogen and Fuel Cell Roadmap is due for publication in August 2016 and could provide a useful resource for the Commission; a copy is available on request.

### General Comments

One of the main challenges facing today's energy infrastructure is to decarbonize the electricity grid and, while simultaneously continuing to generate affordable and reliable heat and power for consumers. Renewables are often blamed for grid instability and higher electricity prices, and the financial risk around nuclear power is continuing to hamper progress.

Hydrogen and fuel cells can address the challenges faced by our energy infrastructure by delivering low carbon, affordable and reliable electricity and heat. Various independent reports (such as the Roland Berger study from 2015<sup>1</sup>) show how fuel cells can and will support further deployment of renewable energy sources and stabilize and optimize grid performance. Fuel cells powered by natural gas or hydrogen are commercially available now, and hydrogen production matches current demand. Whilst the scope for these options to address the resilience of electricity infrastructure is, at present, relatively small at the DNO level, there are substantial system level opportunities, which are likely to impact the distribution network.

All demand for hydrogen (for stationary, transport and other applications) could be easily met by 2020 – through a mix of conventional steam methane reforming, electrolysis and other alternatives. Over time, demand is expected to double, with an increasing role for 'green hydrogen' (see below). Utilisation of

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1. [https://www.rolandberger.com/media/pdf/Roland\\_Berger\\_Fuel\\_Cells\\_Study\\_20150330.pdf](https://www.rolandberger.com/media/pdf/Roland_Berger_Fuel_Cells_Study_20150330.pdf)

'brown hydrogen' in the early days ensures a cost effective pathway to a mixed and, increasingly, low carbon portfolio of sources.

A key point we wish to make regarding future national infrastructure is that the answer lies in developing a cost effective, low carbon, energy resilient system across heat, transport, industrial processes and power sectors

As a cross sector energy vector, hydrogen is capable of:

- replacing natural gas at a local distribution level for heat and local fuel cell CHP or power supply - a more practical, efficient and lower cost approach than electrification of heat;
- delivering energy security and time shifting of energy from renewables and nuclear power - arising economically from hydrogen storage;
- allowing continued use of natural gas in a low carbon future through the application of CCS to produce hydrogen – further contributing to energy security;
- empowering innovation in industrial processes, new physical products and in services; and
- delivering zero emissions at point of use for transport, heat and power.

Storage is critical to guaranteeing the 'resilience' of the energy system, particularly given that the main indigenous energy sources left to England, Wales and Northern Ireland are renewable sources such as wind, solar and waves. Thus, a key factor in system resilience is the development of these sources and the means of integrating them into the energy system. Hydrogen can play a key role in maximising the benefits for the national economy of local energy sources.

Hydrogen represents an excellent storage option and, therefore, route to delivering resilience, as it can act as both a short and as a long-term energy store to balance supply and demand at different scales, geographies and weather conditions. As the UK moves to a low carbon economy, hydrogen is a cost-effective and technically proven solution to distributing energy between sectors, addressing the intermittency of renewables and managing variation in demand.

The technologies required to enable the use of hydrogen as an energy vector across all applications are technically developed and demonstrated, albeit that many are not fully commercially deployed, nor necessarily at scale for economic implementation.

When considering the decarbonisation of the gas grid, a recent evidence based report showed that a UK-wide conversion to hydrogen gas will reduce carbon emissions associated with heat by a minimum of 73%.<sup>2</sup> According to the report converting the natural gas distribution network in a city the size of Leeds to hydrogen would reduce by over 0.9million tCO<sub>2</sub>/year the emissions from present consumers, as well as enabling hydrogen supply for transport with both low CO<sub>2</sub> and with ultra-low air quality emissions. Scenarios produced for the Committee on Climate Change show that by 2050 around 60% of heat demand in domestic, commercial and industrial applications could come from hydrogen, reducing GHG emissions from the residential sector from 29 MtCO<sub>2</sub>/yr in CCC's central scenario to 3 MtCO<sub>2</sub>/yr.<sup>3</sup>

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2.

[http://www.kiwa.co.uk/uploadedFiles/Our\\_Services/Energy\\_and\\_Carbon\\_Advice/H21%20Report%20Interactive%20PDF%20July%202016.pdf](http://www.kiwa.co.uk/uploadedFiles/Our_Services/Energy_and_Carbon_Advice/H21%20Report%20Interactive%20PDF%20July%202016.pdf)

3. <https://www.theccc.org.uk/publication/e4tech-for-ccc-scenarios-for-deployment-of-hydrogen-in-contributing-to-meeting-carbon-budgets/>

Finally, hydrogen represents the most efficient route for connecting, and building on synergies between the transport and power and heat sectors, as it can help decarbonize the transport sector using the existing gas infrastructure (see paragraph above). By comparison, electric vehicles place an additional burden on the already stretched electricity network.

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK**
- **improve the UK's international competitiveness**
- **improve the quality of life for those living in the UK**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

The UK HFCA is supportive of the Commission's approach and would like to emphasize the role of hydrogen and fuel cells in delivering these objectives.

- *Fostering long-term and sustainable economic growth*

The global fuel cell market could be worth over £16.13 billion in 2020 and over £111.70bn in 2050. The UK share of this market could be £0.62 billion in 2020 rising to £11.79 billion in 2050. This would be accompanied by thousands of 'green jobs' with appropriate tax income and tons of CO<sub>2</sub> reduction.

In terms of addressing greenhouse gas emissions, fuel cells offer considerable benefits over other technologies. For example, if 5.6 million homes had micro-combined heat and power (mCHP) units fueled by natural gas by 2020, the saved CO<sub>2</sub> emissions would be equivalent to the emissions from eight new 750MW Combined Cycle Gas Turbine power stations. Similarly, 6,000 fuel cell CHP units, commercially available today and rated at 400kWe (sufficient to power a supermarket or school), would deliver the same level of CO<sub>2</sub> reductions as the proposed Severn Barrage, and could be in place in 5 years at more than 3 times lower capital cost. In the transport sector, fuel cell cars powered with renewable hydrogen have zero well-to-wheel emissions and produce between 0g (for hydrogen produced from renewable sources) and ~85g (for hydrogen produced from fossil fuels) of CO<sub>2</sub>/km, compared to a gasoline internal combustion engine, which produces approximately ~170g of CO<sub>2</sub>/km.

Notwithstanding the key role for hydrogen and fuel cells in providing environmental, financial and job creation benefits, the UK needs to maintain its international competitiveness in this field to take advantage of the growing global market (see above) and build on world leading UK expertise and technology .

- *Improving the UK's international competitiveness*

The UK has been a leader in hydrogen and fuel cells across Europe and beyond, and is recognized for its home-grown innovative solutions across the world. Recently, we are increasingly being met with strong competition from other European and Asian markets.

Germany has long been a pioneer in the field of renewable energy, generating a record 95 percent of its power generation from renewables in May 2016. As a consequence, it is one of the first countries in the world to face issues due to the resulting growing mismatch between supply and demand.

To help overcome the challenge of renewable intermittency, Germany has turned to hydrogen as an energy storage medium. In particular, Germany has been using 'power to gas' technology to convert excess electricity into gaseous energy and, thus, produce a zero carbon hydrogen gas. This gas can then be used to generate electricity via fuel cells, or converted into renewable methane. It should be noted that the hydrogen limits for injection into the gas grid differ significantly among various countries, with the UK currently allowing only 0.1% and Germany 10%.

Other countries, in their effort to decarbonize their electricity grids, are also supportive of hydrogen and fuel cells. For example, in South Korea, the '1 Million Green Homes Programme' is supporting the deployment of various new and renewable energy technologies in residential areas in the period to 2020. The Government has a target of 100,000 1kW fuel cell units by that date, and provided subsidies of up to 80% of installation costs between 2010 and 2011, decreasing to 50% from 2013 to 2015.<sup>4</sup>

In another example, Japan has set a goal of fuel cells powering 2 million homes by 2020. Fuji-Keizai Group research firm has estimated a 99-fold increase in the Japanese domestic fuel cell market between fiscal year 2009 and fiscal year 2025.<sup>5</sup>

There is potential for the UK to be among the world leaders in the hydrogen and fuel cells arena, bringing economic growth and investment. However, with the growing competition from the USA, Japan and Germany, a National Infrastructure Plan which acknowledges the role of hydrogen and fuel cells, combined with appropriately supportive policy frameworks, will help to make the UK an attractive place to manufacture and, thus, grow and retain current capability. High level long term, and visible Government commitment to the sector will be invaluable in building confidence and reducing risk.

- *Improving the quality of life for those living in the UK*

A major health issue challenging the quality of UK citizens is air pollution. Hydrogen and fuel cells can help improve air quality in transport, buildings and industrial sectors.

As mentioned above, FCEVs powered with renewable hydrogen have zero well-to wheel emissions. With increasing FCEV vehicle deployment, the total annual projected CO<sub>2</sub> abatement from FCEVs in the UK is 3 million tonnes in 2030.<sup>6</sup> In addition to CO<sub>2</sub> reduction benefits, FCEVs running in transport operations significantly improve general air quality by eliminating all oxides of nitrogen and particulate matter from vehicle exhausts.

True cost of Air Pollution to the NHS each year could be £53.58 billion<sup>7</sup>. Using DEFRA's Air Quality Damage Cost Guidance, it is possible to quantify the benefit of replacing diesel vehicles with FCEVs emitting only water vapour. The cost saving that accrues from reduced damage to human health and the environment

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4. <http://hydrogenius.kyushu-u.ac.jp/cie/event/ihdf2013/pdf/2-3kim.pdf>

5. <https://fuelcellsworks.com/archives/2010/03/10/japans-fuel-cell-market-estimated-to-expand-nearly-100-fold-by-fy-2025/>

6. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/192440/13-799-uk-h2-mobility-phase-1-results.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/192440/13-799-uk-h2-mobility-phase-1-results.pdf)

7. <http://cappi.org.uk/true-cost-of-air-pollution-to-the-nhs-each-year-could-be-53-58-billion/>

is £100-£200 million annually by 2050 (depending on the rate of growth of FCEVs in the total fleet after 2030).<sup>8</sup>

As well as FCEVs fueled by hydrogen, adapted conventional engines can also run on hydrogen. In air, particulates and many other bi-products of combustion with hydrocarbon fuels are reduced significantly (bi-products of the presence of nitrogen (e.g. NO<sub>x</sub>) can be prevented through control of the combustion process). If emission control strategies are implemented and the combustion is carefully optimized, it is possible to gain the benefits of very low carbon and improved air quality from hydrogen within conventional engines.

Similarly to fuel cells for transport, stationary fuel cells produce low carbon heat and power through an electrochemical reaction. This combustion-free power generation process creates electricity that is virtually absent of pollutants. As discussed above, generating ultra-clean energy while producing virtually no pollutants can help improve public health across the UK.

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8. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/192440/13-799-uk-h2-mobility-phase-1-results.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/192440/13-799-uk-h2-mobility-phase-1-results.pdf)



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2 August 2016

Dear Sir

**NATIONAL INFRASTRUCTURE ASSESSMENT: CONSULTATION**

Please find attached the consultation response submitted on behalf of the UK Major Ports Group.

If you require any further information or clarification, please do not hesitate to contact me.

Yours faithfully

[name redacted]  
[job title redacted]

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THE UNITED KINGDOM MAJOR PORTS GROUP LTD

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# NATIONAL INFRASTRUCTURE ASSESSMENT – CONSULTATION

## Response from UK Major Ports Group

### Introduction

The United Kingdom Major Ports Group Ltd (UKMPG) is the trade association representing most of the larger commercial ports in the United Kingdom. It has nine members who, between them, own and operate over 40 ports, accounting for more than 70% of the total tonnage handled in UK ports. The top 20 ports account for 88% of the total freight traffic handled in the UK (about 500 million tonnes of freight per year).

Some 118,000 people are directly employed in UK ports, which, in addition to being important modal transport hubs, are also often centres of local economic activity. In 2013 the ports sector paid £2 billion in taxes into the UK exchequer and generated £7.7 billion in gross value added for the UK economy, according to a study by Oxford Economics.

### General Comments

UKMPG welcomes this opportunity to contribute to process of identifying future infrastructure needs and priorities in the UK.

From a ports perspective, the National Policy Statement for Ports, published by Her Majesty's Government in 2012, sets out the policy and planning framework for the sector in England and Wales. This policy is characterised by a competitive, market led approach. Alongside this, the Department for Transport and the port associations (UK Major Ports Group and British Ports Association) have created a "Ports Sector Strategic Partnership", bringing together ports and a range of Government Departments, Agencies and organisations which impact on industry.

As an essential part of the UK's critical economic infrastructure, ports appreciate this stable framework, which enables them to operate within a competitive, independent and market-driven sector, providing wide choice to users and making a significant contribution to the UK economy. It is important that this framework, which has generally worked well and was the result of a long process of discussion and negotiation between Government and industry, is not needlessly changed or overturned. Any proposals for change should be the subject of extensive consultation with the ports industry and should take place under the aegis of the Department for Transport.

However, ports are major gateways for road and rail traffic and connectivity at the UK's major ports is a key issue for importers and exporters. Maintaining and improving accessibility to markets with more direct routes and integrating the UK's rail and road network will lead to greater trade with all the associated benefits. We hope that the National Infrastructure Assessment will recognise the importance of transport links to ports, as part of its wider scrutiny of infrastructure needs and, in particular, connectivity between and within regions.



## Responses to Specific Questions

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **Foster long-term and sustainable economic growth across all regions of the UK**
- **Improve the UK's international competitiveness**
- **Improve the quality of life for those living in Britain**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

A1. Connectivity between and within regions is a key factor in maximising the contribution that the ports industry can make to the UK economy across the UK regions. As the Brexit negotiations get underway, industry is being urged to look for, and capitalise on, any business opportunities that may arise. In order for this to happen, it will be important that the Government continues to invest in infrastructure projects that will support and facilitate this eg strategic road and rail links.

The impacts of climate change will also be significant. The resilience of infrastructure in the face of extreme climate events (eg flooding) will become increasingly important in ensuring the flow of essential goods to and within the UK.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

A2. Yes, but we would like to see the “consultative” element expressed more strongly. In order to really understand the country's infrastructure needs, the NIC should proactively engage with stakeholders, including those industry sector's whose contribution to the UK's sustainable economic growth, international competitiveness and quality of life depends on strategic national infrastructure planning and investment.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

A3. Up to a point, but it is also important to look at some of the inter-dependencies between and within these sectors. For example, ports do “support the movement of people and freight into and across the country”, but they also need the support of other parts of the transport infrastructure, such as road and rail links, to do that efficiently and effectively. They are also important because of the type of goods that are imported through them and the need to ensure that those goods can be moved to where they are needed – think of the chaos caused in recent hard winters, when road salt was in short supply and was only available through one or two ports.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

A4. The NIC should look at how private and public sector investment is used to facilitate major infrastructure projects eg the requirement for ports companies to pay for the “last mile” of road provision to the port gate. It should also take account of the interaction between “national” (eg Highways England, or Network Rail) and “local” (Local Enterprise Partnerships, local authorities) infrastructure planning.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?**

A5. From a ports perspective, interdependencies with the transport sector have been outline in previous answers. Between the sectors mentioned, the following interdependencies have been identified:

- Transport and energy – ports are important for national energy security in relation to both fossil fuels and renewables.
- Transport and Digital and Communications – ports sit at the centre of a logistics web and much investment has been made in digital communications for the logistics side of the business.
- Transport and Water and Drainage – some ports have to undertake water abstractions and are subject to the water abstraction license regime.
- Transport and Flood Defences – ports can also be vulnerable to extreme weather events, such as flash flooding. In recent flooding incidents, some ports (eg Grimsby) came close to being overwhelmed, with the potential disruption to the supply chain for key commodities.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

A6. It depends how widely these cross-cutting issues are defined. Specific comments are as follows:

- Geography and local growth – the impact of infrastructure provision is often felt outside of the area local to that provision. For example, ports do not just serve the area local to them – as an integral part of the logistics chain, their economic impact may be felt in other areas of the country.
- Funding and Financing – please see the answer to Q4.
- Sustainability – the NIA will need to take account of the “natural capital” approach to environmental policy being taken in the Defra 25 year plan, currently being drafted (a Conservative party manifesto commitment).

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

A7. Security – of energy supply, of key distribution networks, of infrastructure of national significance. It will also be important for the NIC to keep an open mind, as issues may emerge during the course of the NIA's development.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

A8. Undertaking an assessment of this scale will be a huge task, so the approach proposed seems sensible. As previously stated, the NIC will need to keep an open mind, in case the approach needs refining further.

**Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

A9. No.

**Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?**

A10. It is not clear how private infrastructure investment will be taken into account (the ports sector in the UK is entirely financed by private investment).

**Q11. The NIA will aim to set out a portfolio of interventions that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

A11. The NIA will have to consult widely, including Government Departments with specific sectoral responsibilities, to determine the complex interactions between different demands and avoid unintended consequences.

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in this methodological approach?**

A12. As previously stated, the role of private investment in meeting the UK's current and future infrastructure needs to be an integral part of the NIA.

***Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?***

A13. The Commission should liaise with Government Departments with sectoral responsibilities, to ascertain the key players in various sectors, who can contribute to the Commission's deliberations. The various trade associations can also help provide insights and contacts.

**UKMPG/August 2016**

## **UK Power Reserve response to National Infrastructure Commission Consultation on the National Infrastructure Assessment**

5 August 2016

### **Introduction**

UK Power Reserve is a leading independent operator of smart, clean electricity generation assets. It has developed, built and acquired 14 power stations, or a total of 185 megawatts of capacity, and is building nearly 30 additional gas-powered stations. This will take its portfolio to almost 700 megawatts within two years. These small, flexible and rapid response power stations help the UK achieve its energy security of supply, affordability and decarbonisation ambitions.

UKPR helps the network operators such as National Grid and the Distribution Network Operators manage the increasing challenges of balancing UK electricity supply and demand. The company's power stations – operated from its virtual power plant in its Solihull head-quarters - are situated close to sources of high demand across the UK and provide efficient and effective energy to the market when its needed the most. This distributed capacity provides helps to counter supply issues or system volatility and keep the overall system balanced so that the lights stay on.

UKPR is an active participant in the UK's Capacity Market Auctions which are designed to incentivize and guarantee a secure and clean UK energy supply. UKPR also provides additional energy services by participating in National Grid's ancillary services for energy and system balancing actions to address energy shortfalls that occur in real time either as a result of a renewable forecast error or a large power station suffering an unexpected fault. It has developed the iGridUK smart grid app which is used widely across the market to help predict supply and demand.

The company's highly skilled staff of 100 provide services to other businesses including control and monitoring and maintenance of power generation assets, and advice on site acquisitions, demand side management and trading optimisation. UK Power Reserve was founded in 2010 and is majority owned by two private equity backers, Equistone and Inflexion.

### **NIA Process and Methodology Consultation**

**Q1. The Government has given the National Infrastructure Commission objectives to:**

- **foster long-term and sustainable economic growth across all regions of the UK;**
- **improve the UK's international competitiveness;**
- **improve the quality of life for those living in the UK.**

**What issues do you think are particularly important to consider as the Commission works to this objective?**

A1. It is critical that the NIC supports pursuit of a secure, affordable and clean UK energy system in order to safeguard economic activity and protect commercial and domestic consumers from supply disruption and the potential for energy costs. The electricity supply picture is changing rapidly as ageing coal infrastructure comes offline and conversely, intermittent renewables generation comes online. The challenge facing the sector is to balance this new mix of generation while protecting consumers from the potential of rising costs, poor investment decisions, and poor interrelation between transmission and distribution systems.

UK electricity supply is increasingly decentralized and requires new and innovative forms of generation to help support renewables and supply customers with power when and where they most need it. The introduction of the Capacity Market in 2014 has made some inroads into ensuring security of supply from 2018 and onwards, but has also had significant unintended consequences which need to be addressed carefully and transparently through the various consultations which are ongoing across Ofgem, BEIS and Defra over the coming months.

Amid the broader context of the Brexit vote and recent surprise decision by the government to review Hinkley Point C, the investment environment is more unstable and challenging than ever, and the sector must now work harder to attract international partners to help us develop a robust system. The NIC can play an important role in achieving this by helping to ensure that UK energy, climate and industrial policy are as long-term and joined up as possible.

**Q2. Do you agree that, in undertaking the NIA, the Commission should be:**

- **Open, transparent and consultative**
- **Independent, objective and rigorous**
- **Forward looking, challenging established thinking**
- **Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?**

**Are there any principles that should inform the way that the Commission produces the NIA that are missing?**

A2. It is imperative that the NIC operates in an open, transparent and consultative manner. UK Power Reserve welcomes the opportunity to respond to this consultation and represent the views of a small but important independent power generator. We are keen to work more closely with the Commission in future and intend to reach out to facilitate meetings in future in order to give a more detailed overview of the company and its operations and growth, and in particular how this fits in with the Commission's strategic energy sector goals.

The energy sector has long suffered from the clash between the relatively short-term government cycles in comparison to the long-lead investment cycles required for large-scale infrastructure and, more importantly, a holistic, strategic approach to energy policy. The NIC can play an important role in ensuring collaboration between relevant government departments, corporates and independents and all other relevant stakeholders across the whole country in particular in relation to the interdependencies between different parts of the energy system. An example of

this is seeking better oversight of the interrelation between the electricity transmission and distribution systems.

**Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

A3. We agree that the energy sector should be viewed holistically, particularly given the major shifts in supply and likely shifts in demand in the next decade. As the UK shifts towards a more decentralized electricity system, the NIC should consider how innovation around storage and electrification of vehicles could significantly alter the infrastructure requirements in support of these developments.

As a member of Energy UK, UK Power Reserve supports the assertion that the most appropriate way to ensure a “whole systems approach” in specific topic areas is to establish a taskforce to consider key interactions within specific remits. With Energy UK, we continue to call on the establishment of an Energy Taskforce to sit within the NIC framework to deliver expert advice on the interactions of low carbon heat, power and transport and the requirements for successful delivery.

**Q4. Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?**

A4. UK Power Reserve believes that the UK needs a balanced cross section of electricity generation types in order to safeguard its security of supply, decarbonisation and affordability ambitions. However, the shift away from transmission connected distribution towards increasing quantities of distributed generation of the sort UKPR produces is something the NIC should be more aware of.

Currently there is a significant review of distribution (or embedded) charging being undertaken by Ofgem. While we believe that the current charging regime is unsustainable, we would be keen to see any review undertaken in a more holistic and transparent fashion to ensure that a level playing field is sought between all areas and players in the market.

We also believe there are issues around the overall independence of the Transmission System Operator and its participation in government consultations, and see a lack of connectedness with their data and that overseen by the Distribution Network Operators. As distribution level generation and turn-down demand side response (DSR) play a growing role in the overall system, it is crucial that there is adequate oversight of the full picture which is not currently the case. As the UK enters Winter 2016-17 with extremely tight margins, this kind of oversight is more important than ever.

While the system operator role has worked well to date, to achieve optimal performance and minimal cost to consumers, we believe further attention is needed on the actions and costs incurred by the system operator. We have seen an increase in the complexity and number of commercial balancing services on offer from National Grid in 2014 and now in 2016. While we are seeing the positive development of innovation in balancing services, consumers are bearing

the rising costs and there are instances that suggest the system operator has not effectively procured balancing services at the optimal cost. We have previously submitted suggestions for improvements in this area to the NIC (National Infrastructure Commission call for evidence: Electricity interconnection and storage – 8<sup>th</sup> January 2016). These included great scrutiny from the regulator, particularly on how National Grid procures balancing services; greater transparency on National Grid's methodology in procuring balancing services; simplification of commercial balancing services frameworks to create a seller's market to ensure the end consumer is getting value for money.

The role of distributed gas generation in the UK has been overlooked to date, both in terms of the crucial reserve and balancing services it provides, helping keep the lights on, but also in terms of the value it delivers to the consumer. UK Power Reserve is building out a 500MW portfolio of gas-fired reciprocating engine power stations which are located across the UK near and in centres of high demand. Its existing portfolio and new power stations will help counter renewables intermittency while providing a relatively low cost and clean solution for consumers. The company secured the largest amount of capacity in the 2014 and 2015 Capacity Market Auctions by an independent reserve power operator.

**Q5. The NIA will seek to pull together infrastructure needs across sectors, recognizing interdependencies. Are there particular areas where you think such interdependencies are likely to be important?**

A5. As mentioned above, it is important that the Commission's approach to UK energy policy and its connection with other sectors including transportation is holistic and strategic. The potential for significant electrification of heat and transport will require careful consideration by the NIC of the long term implications of major shifts in geographic and temporal needs.

**Q6. Do you agree that the NIA should focus on these cross-cutting issues?**

A6. Yes, absolutely.

**Q7. Are there any other cross-cutting issues that you think are particularly important?**

A7. See above – interconnection between energy and transport is particularly important.

**Q8. Do you agree with this methodological approach to determine the needs and priorities?**

A8. We agree with the Commission's approach.

**Q9 Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

A9. Energy UK's *Pathways to 2030 for the GB Electricity Sector* looks at the future shape and structure of the UK's energy system and provides recommendations to policy makers as to how this can be achieved. We would encourage the Commission to look at this report.



**Q10. Do you believe the Commission has identified the most important infrastructure drivers? Are there further areas the Commission should seek to examine within each driver?**

A10. UK Power Reserve urges the NIC to promote gas generation at the distribution level, in particular the role of gas reciprocating engines as a real and viable alternative to larger-scale and high capex CCGTs to plug the looming UK supply gap and better meet the energy trilemma.

Gas reciprocating engines is “Best Available Technology” (BAT) (see DECC’s recent reference paper on BAT and the working group which has focused on ensuring that reciprocating engines are recognized by the Environment Agency as BAT). The energy world of the future, with an increasing share of renewables requires gas plant which is not only efficient but highly flexible, with nimble ramp profiles that maintain efficiency and low overheads. UK Power Reserve’s ‘Virtual Power Plant’ approach to running its 14 installed power stations – with a further 26 power stations to come – represent an innovative and highly flexible approach to addressing the realities of this future energy world. We envisage that the future development of a distributed generation gas hybrid with energy storage may deliver the best flexibility with the highest overall benefit to end consumers.

It is important that NIC promotes distribution system operators (DSOs) ahead of Demand Side Response – if we get DSO right, it follows that DSR will naturally be better facilitated.

Technological development should be given due weighting, particularly in the areas of electrification of cars, role of DSR and innovation around storage and batteries which have the potential to play a huge role in making secure the growing renewables generation share. While the future role of energy storage is important it needs to compete on a level playing field with all other generation technology.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

A11. N/A

**Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?**

A12. The Commission’s approach seems fairly comprehensive. We look forward to reading the fuller responses to the consultation and seeing the output in practice.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

A13. UK Power Reserve supports Energy UK's assertion that engagement and communication is the key to delivering a robust proportional representation and evidence base. With Energy UK we continue to call on the establishment of an Energy Taskforce to sit within the NIC framework that delivers expert advice on the interactions of low carbon heat, power and transport and the requirements for successful delivery. We would also welcome the opportunity to represent the energy sector in the proposed Expert Roundtables, and Panels of Experts where relevant.

## A response by United Utilities

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United Utilities is the statutory water and wastewater service provider for the north west of England. We are responsible for planning for, delivering, operating and maintaining vital water and wastewater infrastructure as well as providing water and wastewater services to more than 3 million households and businesses.

We welcome the proposals contained in this consultation paper for an on-going collaborative, long-term, cross sector and holistic assessment of the country's infrastructure needs and the development of coherent recommendations for addressing them. We welcome the focus on transparency, so that everyone can understand the impact of investment decisions on customers' bills, and the recognition of the role of the private sector in financing and delivering most of this investment.

Of particular interest to United Utilities is the requirement to ensure that water and wastewater services for customers in the North West remain resilient to hazards including a changing climate. Flooding of our major treatment works is of particular importance in this regard. Management of our infrastructure to ensure that sites are protected, or can be recovered quickly, in the event of impacts is at the heart of our business planning processes. The level of protection and acceptable risk to services should be aligned to national requirements or policy guidance and we see the formation of the National Infrastructure Committee as an opportunity to provide clarity around this at a national level. In addition, it should provide a mechanism whereby risk management authorities, regulators and other utility and service providers can ensure they undertake joined up resilience planning within a defined geographical area.

### **Q3. Do you agree that the NIA should cover these sectors in the way in which they are each described?**

*We agree that the NIA should cover all of the sectors referenced in the consultation.*

*With respect to the proposed descriptions for 45. Water and Drainage and 46. Flood Defences, it is important that drainage is understood to be a component in the management and mitigation of flood risk and that the pressures on this infrastructure are considered in the assessment of flood risk to 2050 as well as being considered alongside it. We are supportive of the work completed by Ofwat and the Environment Agency in developing their Drainage Strategy Framework and would wish to promote the use of the principles proposed as part of the development of the NIA when considering both drainage and flood risk.*

*With regards to 45. Water and Drainage, it is important to recognise, however, that the wastewater sector accounts for only a proportion of the national drainage infrastructure. Highways drainage, sustainable urban drainage and land drains all play a key role in ensuring that areas are effectively drained and flood risk is managed and should, therefore, be considered alongside the description of these sectors as well as being factored into any assessment.*

### **Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there are particular areas where you think such interdependencies are likely to be important?**

*We would expect the interdependencies between drainage and flood risk sectors to be of particular importance both in terms of understanding the priorities and the resilience of these sectors to climate change.*

*We have previously been involved through the Association of Greater Manchester Authorities (AGMA) in a Future Cities Catapult project which recognised the benefit of understanding all the interdependency of capacity, or headroom, of each sector to accommodate growth at a level which was most affordable to society and promoted the prioritisation and selection of the most cost-effective locations for development. We support the Commission in collecting an evidence base of new settlements and urban extensions and using this information to assess infrastructure needs and make recommendations that co-ordinate the timing and delivery of new infrastructure with the development of new housing.*

### **Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?**

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We believe the Water Resources Management Plan (WRMP) process is a good example of exploring long-term strategic prioritisation of investment against a backdrop of deep uncertainty. WRMPs as a minimum cover a 25 year planning horizon. The assessment of supply-demand, and the appraisal of appropriate options, needs to deal with long-term uncertainties such as future climate change, demand patterns, and legislative impacts on the availability of water (e.g. to protect the environment). Inherent uncertainties within forecasting components are incorporated through appropriate headroom allocations in planning, which are defined in a risk-based manner.

In our 2015 WRMP, we identified the need to address a forecast deficit of supply over demand in part of our region. Through the options appraisal process we considered a range of aspects in order to define the best-value long-term solution, rather than simply that defined as “lowest-cost” through a narrower lens of the baseline deficit. As part of this process, we completed scenario testing of the plan to potentially higher demand, reductions in the availability of water driven by environmental legislation and more severe climate change in order to test how different alternative plans performed. This process demonstrated the benefits of taking a more long-term strategic view, both to deal with future uncertainty and risk, and to provide additional benefits (e.g. environmental, resilience) that would not have been realised if taking a shorter-term view of water resources need.

In our next WRMP, we are planning to build on this approach by using decision-making techniques/models that further integrate and systematically test the performance of option portfolios under a much wider set of potential future combinations of uncertainties or risks. Related techniques have been recently applied successfully at a national scale to explore resilience and strategic water resources needs within a soon to be published Water UK project, which will also, in turn, help inform our own plans.

**Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?**

We are encouraged by this aim and would advocate that detailed analysis of specific issues is comprehensive and considers all available options to address particular needs. For instance, when considering what infrastructure might be needed to meet future water demands in a particular region, all options should be robustly and comparably considered to ensure that any investment is in the UK’s long-term economic and environmental interest. These could include making use of existing water sources, the opportunity to bulk transfer water between regions, as well as the creation of new resources.

**Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?**

We support the Commission’s intention to engage with different parts of society to test its conclusions but we note that the timeline is to complete this by 2018. In our previous consultation response, we noted that different sectors work to different investment periods. If the conclusions of the National Infrastructure Assessment are not shared until later in 2018, this would be after the water industry has submitted its business plans to Ofwat for the price review period 2020- 2025. Similarly, the preparation of WRMPs is well underway, with publication brought forward to December 2017 to enable alignment with the price review and ensure they are able to inform that process. We encourage the Commission to consider opportunities to accelerate the sharing of its conclusions, or recognise that opportunities to significantly influence the water sector could be delayed until the next review period for 2025-2030.

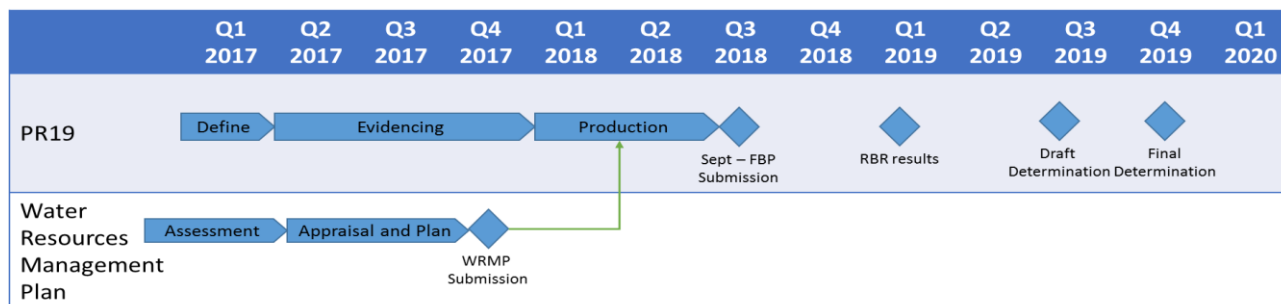


Figure 1 – Summary of water sector planning timeline

# USS

INVESTMENT  
MANAGEMENT  
LIMITED

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National Infrastructure Assessment Evidence  
National Infrastructure Commission  
1 Horse Guards Road  
London  
SW1A 2HQ

Our Ref: GM01  
Date: 5<sup>th</sup> August 2016

Email: [niaevidence@nic.gsi.gov.uk](mailto:niaevidence@nic.gsi.gov.uk)

To: Whom It May Concern

## ***Consultation on the process and methodology of the National Infrastructure Assessment***

Universities Superannuation Scheme Ltd (USS) is pleased to respond to the *Consultation on The National Infrastructure Assessment* ("Consultation") issued by the NIC.

### **Background**

Established in 1974 and now one of the largest pension schemes in the UK, USS is an experienced British investor in major UK infrastructure projects. It provides a retirement saving arrangement to more than 370,000 university lecturers and other senior Higher Education staff. USS has £53bn of assets under management, and has invested £3bn in infrastructure across 105 countries (often working in partnership with international pension schemes, sovereign wealth fund and overseas insurance companies). Despite our global reach and expertise, we have a strong preference for making investments in the UK, and particularly in infrastructure, because this provides long-term, predictable, inflation linked cash flows that broadly match our inflation linked long dated pension benefit commitments.

We have invested over £1bn to date in the UK, with high-profile investments including:

- A 10% equity interest in Heathrow Airport
- Around a 20% equity interest in NATS
- Around £300m portfolio of renewable energy loans backed by UK wind farms
- Notable investments in UK water, including in Affinity Water, South East Water and Kelda

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Authorised and regulated by the Financial Conduct Authority

## Overview

USS strongly welcomed the establishment of a National Infrastructure Commission last year, because this will help ensure swifter decision making on national infrastructure, encourage greater inward investment and reduce the risks often associated with these kinds of investments. The NIC has made good progress since it was formed and we welcome the reports delivered to date. We look forward to seeing the NIC put on an independent and statutory footing in the Neighbourhood Planning and Infrastructure Bill.

We are grateful for this opportunity to contribute to the process and methodology of the annual National Infrastructure Assessment (NIA). The NIA will play an important role in supporting government to "take stock" of the UK's infrastructure needs and plan for the future. It will be a useful tool to help ensure UK plc has what it needs to thrive in the decades to come.

## Responses to Specific Consultation Questions

*Q1: The Government has given the National Infrastructure Commission objectives to:*

- foster long-term and sustainable economic growth across all regions of the UK*
- improve the UK's international competitiveness*
- improve the quality of life for those living in the UK*

*What issues do you think are particularly important to consider as the Commission works to this objective?*

You have identified all the key issues here. One point of consideration as you formulate this should be the role of different incentives (financing, grants etc) and the practical role the government could play in encouraging the development of key infrastructure assets which the market cannot fund itself.

Currently there are only limited references to incentives in the consultation, and all of those references refer to 'financing' support. In our view this is only one form of support that government can offer. Financing support mechanisms have at times been less successful in encouraging the participation of private capital so we would recommend a package of practical support of which financing will be a crucial part.

Other incentive and support mechanisms that could be considered include (i) government grants and tariff support mechanisms such as those seen in the renewable energy sector, or (ii) government support packages for construction projects that are designed to reduce downside risk and to provide support to the maximum amount that a private investor might be required to commit to a particular project. Such a package was provided by the government to bidders on the recent Thames Tideway Tunnel, which was highly successful in encouraging financial investors to participate in the funding of a large and complex greenfield project. As a former participant in the Thames Tideway Tunnel tender process, we would be pleased to share further views with you on the support offered for this particular project.

*Q2: Do you agree that, in undertaking the NIA, the Commission should be:*

- Open, transparent and consultative*
- Independent, objective and rigorous*
- Forward looking, challenging established thinking*
- Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks?*

*Are there any principles that should inform the way that the Commission produces the NIA that are missing?*

We agree that the NIC should adopt all the characteristics listed. The NIC should also consider the customer/end user impact of its suggestions in drafting the NIA, which is something that is not referred to in this consultation. Many of the needs identified by the NIA will come at an ultimate cost to the end user (be it directly or indirectly); the financial implications to customers of these proposed investments should be considered relative to their benefits.

*Q3: Do you agree that the NIA should cover these sectors in the way in which they are each described?*

Yes we agree with the sectors listed.

*Q4: Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?*

We agree with the range of sectors listed, however the Energy sector as you have defined it is very broad. We view the future development of electricity generation and the development of energy efficiency measures for households as two key sectors of development and change over the next 20 years. These should both be given significant focus.

This suggestion of increased focus reflects an earlier comment we made in the consultation regarding the need to give consideration to customer impact (see our response to Q2). Without appropriate incentives and methods to save on energy use, customer bills are likely to be negatively impacted by future changes to energy infrastructure. The report should identify ways in which to help consumers to minimise the impact of increases in power prices. The 'Green Deal' did not succeed in incentivising customers to implement the required energy saving measures so we would urge the Commission to consider this at an earlier stage.

*Q5. The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?*

None we would view as materially important.

*Q6. Do you agree that the NIA should focus on these cross-cutting issues?*

Yes.

*Q7. Are there any other cross-cutting issues that you think are particularly important?*

No.

*Q8. Do you agree with this methodological approach to determine the needs and priorities?*

Yes, we agree with the approach suggested. We would recommend that you model a number of different cases (as you suggest you will in Paragraph 71) and share these proposed cases in advance as part of your initial findings publication in 2017.

*Q9. Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?*

No.

*Q10. Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?*

We agree with those listed, but would suggest one additional driver – the availability of natural resources. Over the next 30 years we are likely to experience material declines in the availability of fossil fuels, which will materially impact a number of sectors you intend to assess and the rate of change of development of infrastructure in each. Much of the report is focused on what should be built; the decline of fossil fuels will contribute to determining what must be built.

An area of focus not mentioned within 'population and geography' (or indeed anywhere in the consultation) is the impact changes to technology will have on how people work, and therefore where they will live. Technological advancement will make working from home/virtual office working much more commonplace, particularly as housing stock shortages and the costs of living centrally in large cities continue to rise.

*Q11. The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?*

We agree with those investments outlined.



*Q12. In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?*

No, we believe the relevant factors have been considered and welcome that this has been a through and transparent process.

*Q13. How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?*

We would urge the Commission to continue being open with consultation as it has been to date. We encourage you to consider providing regular updates on your work, including open workshops for stakeholders where you can provide updates, share evidence received, and give interested parties a steer on the direction of travel in key areas.

Should any further information be required, please do not hesitate to contact me.

Yours sincerely

[Redacted signature]

[signature redacted]

[Redacted name]

[name redacted]

[job title redacted]

**USS Investment Management Limited as agent for and on behalf of Universities  
Superannuation Scheme Limited (acting as sole corporate trustee of the Universities  
Superannuation Scheme)**

[job title redacted]

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NIA Evidence  
National Infrastructure Commission  
1 Horse Guards Road  
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5<sup>th</sup> August 2016

[NIAEvidence@nic.gsi.gov.uk](mailto:NIAEvidence@nic.gsi.gov.uk)

Dear Sir/Madam,

**RE: University of Oxford Submission to National Infrastructure Commission (NIC)**

As a crucial component of Oxfordshire's economy and a major contributor to the UK's knowledge economy, the University of Oxford welcomes the opportunity to respond to the NIC investigation of the Oxford - Cambridge corridor.

The University is a very large engine of innovation, placed within the top 5 in the world according to a recent MIT Skoltech report. Improved transport connectivity between Oxford and Cambridge is likely to help make the Golden Triangle a more effective research and innovation region.

However, there are more pressing local priorities for the University which adversely impact on the University's operations and its future standing:

- a lack of affordable housing and the incumbent problems of recruiting and retaining the highly skilled people and key workers the University and its associated spin-out businesses need to retain its position at the forefront of the knowledge economy;
- poor physical connections between the labour market and an increasingly geographically dispersed housing supply; and
- chronic congestion on the highway and public transport networks with related negative consequences for air quality and carbon emissions. Oxford suffers from poor air quality and currently exceeds safe levels of NO<sub>x</sub> and Particulates primarily due to emissions from road transport.

More than half of the University's staff live beyond the ring-road and many are affected by traffic congestion, delays and unreliable journey times between Didcot, Bicester, Witney, Banbury and Oxford on their commute to work whether by car, bus, train, Park & Ride or bicycle. Critically, the poor resilience of the local transport networks to the travel demands placed upon it, impacts on the ability of the University to access sites outside the City including Begbroke Science Park and the STFC's Harwell Campus for business travel. These journeys will grow in frequency and volume as the University develops assets outside the City.

Transport and accessibility is such a crucial issue that the University has adopted its own Transport Strategy<sup>1</sup> in 2014 and is proactively implementing a number of measures, including the Science Transit Strategy<sup>2</sup>, to solve some of these issues.

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<sup>1</sup> Available to download at <http://www.admin.ox.ac.uk/estates/ourservices/travel/>

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The University has a strong interest in the work of the NIC. To summarise its position in terms of transport it contends that:

- Delivering both road and rail strategic connections appear unaffordable.
- The rail corridor presents a better strategic solution, having the ability to directly connect City centres and meet cross corridor travel demand such as it exists;
- Targeted pinch-point upgrades to the local highways network and bus priority/rapid transit to connect the local labour and housing market would represent a cost effective approach to solving these problems; and
- The University would be disinclined to support a strategic expressway if it was to be delivered at the expense of investment in solving more urgent local transport priorities and was not accompanied by sustainable transport interventions and demand management measures to lock in the benefits of new infrastructure and avoid simply inducing demand to travel.

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<sup>2</sup> A substantial financial investment to connect the Science Area with Harwell Campus and Old Road Campus in response to wholly inadequate public transport. Details at <http://sciencetransitshuttle.co.uk/>

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## **Our response to the National Infrastructure Commission (NIC)**

**Q1. Many places across the Cambridge – Milton Keynes – Oxford Corridor have very successful local economies and are perceived as highly desirable places to live.**

- **What have been the key drivers of that success?**
- **What is holding back further growth and greater productivity?**

Continued growth depends on continued recruitment of talent in an internationally competitive market, and this is hampered by the increasing challenges of congested infrastructure and unaffordable housing. This pressure on the housing market has increased the size of commuter zones in turn placing more pressure on the local transport infrastructure. In this context, it is true that the corridor desperately requires better connectivity to the growth centres along the route, but this will only have the desired effect if there is a commensurate improvement in the connectivity into the heart of those key growth engines i.e. the centres of Oxford, Cambridge and Milton Keynes centre. Connecting each node of the corridor to their commuter hinterlands is the first priority.

Improving links between Oxford and its satellite towns is critical to the University for enabling its 12,500 staff to commute conveniently to work, especially as the majority of staff do not live within Oxford. This means that staff who cannot afford to live in Oxford due to high house prices also have the inconvenience, wasted time and cost of having to undertake an often lengthy journey on the congested local road and rail network to get to work whether travelling by car, bus or train. Specific problems for the University which hold true for other local employers and businesses in the City include:

- Connecting Oxford with its outlying centres of population and housing market, especially Didcot, Abingdon, Witney, Bicester and Banbury.
- Poor access and unreliable journey times from these settlements continue to present recruitment and retention problems, especially for the University's world leading clinical research at the John Radcliffe and Churchill Hospitals and the Old Road Campus in Headington.

**In particular, what planned or new infrastructure improvements would best support growth and promote innovation over the long term?**

Given that currently just 1-2% of journeys on the highways corridor are the full length from Oxford to Cambridge, the East-West rail project would be the logical focus of investment for delivering a strategic link between each City centre.

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This would have the great advantage of delivering business travellers direct from one City centre to the next. In addition, East-West Rail could potentially offer substantial future benefits for rail-freight to connect the ports of Felixstowe and Harwich into onward rail-freight distribution centres, removing freight and HGVs from the road network.

However, this corridor level investment needs to be accompanied by localised investment on numerous smaller scale schemes:

- focussed investment to target critical pinch points in the Highways Network at key junctions around the key Cities of Oxford, Cambridge and Milton Keynes, to better connect them with their local housing-employment market;
- Traffic management controls within the City centres to reduce congestion by discouraging through traffic;
- sustainable transport solutions including Mass transit, new rail stations, guided busways, bus priority and junction improvements within the local labour market hinterland of Oxford, Milton Keynes and Cambridge which will offer good value for money and high benefit:cost ratios;
- Serious investment in sustainable, active travel modes within the City regions of each corridor, particularly connecting parkway rail stations and Park & Rides to the centres of each City. Specifically this means a wholesale change in funding for traffic segregated cycle routes. Cycling has huge potential to replace short car trips within the Cities and their hinterlands. Both Oxford and Cambridge already have a well-established culture of cycling which provides strong evidence that cycling can enable cities to deliver high economic value and meet travel needs sustainably;
- Integration of demand management and smart technologies into all highways projects so that traffic flows can be controlled using pricing signals and the future benefits of autonomous vehicles can be realised;
- Embracing zero emission fuel technologies through the provision of recharging/fuelling infrastructure; and
- Measures to reduce the emissions of both carbon and harmful air pollutants arising from any new transport infrastructure and mitigation of environmental impacts including noise, visual amenity and biodiversity. The unique urban and rural character of the corridor must not be undermined by transport infrastructure.

### **Does the Corridor require better connectivity to the other major centres of growth?**

There has been no strong evidence presented to date that the economies of Oxford, Milton Keynes and Cambridge have a clear interaction; whether this is due to poor connectivity or simply because they operate efficiently as separate markets largely independent of each other is unknown. The question more usefully asked would be to understand how economic growth can best be unlocked in Oxford, Cambridge and Milton Keynes, either within local markets or across the corridor. At the present time, local upgrades would be beneficial which better connect the local housing and employment markets. Major new road capacity on the corridor, perhaps in the form of an expressway or motorway, needs to consider the risk of it merely becoming an alternative through

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route for the M25, which by providing good cross corridor connections to London-bound rail nodes could inadvertently enable London to consume more of the labour market, further worsening affordability for those on non-London salaries.

**Q2. Does the Cambridge – Milton Keynes – Oxford area, including Northampton, form a recognisable economic corridor? If so: What factors unite the area? Would greater emphasis on corridor-wide planning and decision making benefit local communities and local economies?**

- **Would the same emphasis on coordinated planning and decision making provide wider benefits for the UK economy?**
- **Should adjacent towns and cities be incorporated into the corridor in terms of growth and infrastructure planning?**

Oxfordshire does not have the necessary flexibility in its labour pool to support employment growth locally and will rely on population growth and in-commuting to provide it with required workforce. Travel to work patterns (2001-2011) show an increase in inbound commuters from outside the district mainly by car. Within Oxford commuting by bicycle and on foot has increased by almost a third and bus use increased by 11%. Outbound commuters from Oxford to other destinations, such as London, have increased by train and bus. This combination further compounds networks with congestion and high levels of demand.

The Innovation Engine also lists a number of measures that could significantly improve the rate of growth in the area if better supported with infrastructure and a collaborative approach, including:

- Accommodating additional growth in the Knowledge Spine running between Harwell, Oxford and Bicester to accommodate high tech business and employment.
- Improving the capacity of the strategic and local transport infrastructure, including fast public transport services, growth and developing business networks.
- Encouraging increased institutional investment building upon Oxford's strong, and nationally significant, sector propositions including life sciences, advanced engineering, satellite and space related technology and the creative and digital sector.
- Meeting the demand for housing and commercial premises to respond to the urgent needs of the growing business base and economy.
- Providing strong public and private sector leadership to realise Oxfordshire's potential through a new and agreed governance structure.

Collectively we have made progress against of a number of these measures over the last 3-years and delivered strong economic growth in Oxfordshire. There are currently 37 strategic sites proposed by districts across Oxfordshire which in total will deliver more than 42,000 new homes. However, sustaining this level of increase will not be possible without greater investment and flexibilities to support delivery of the programme of infrastructure investment; unlock land and ensure that local authorities have the levers and capacity to bring forward sites for development.

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Key transport infrastructure challenges are:

- Oxford's transport networks have historically been developed to provide access to the city centre. As a medieval city, Oxford's often narrow streets are, in many areas, unsuited to motorised vehicles. Peak period congestion is a persistent problem, with traffic building at bottlenecks which cannot realistically be entirely removed. Our priority therefore is to ensure there is a concurrent and equally important need placed on local infrastructure needs as part of a corridor wide-approach (the last mile) to support existing residents and businesses. Our partner cities across the corridor share similar challenges
- The current rail and road connections do not support close physical connections between the key areas of Bicester, Oxford and Science Vale Oxford, and this is important in reducing the travel-time between and across these investment locations. Demand forecasts undertaken for Oxfordshire's 2013 Rail Strategy suggest that trips to Oxford Station could grow by as much as 70% by 2026, largely as a result of the improved connections and infrastructure proposed by Network Rail and the operators. Catering for this level of growth will require a marked improved in access to the station from across the city, as well as major improvements to Oxford Station itself. Similarly, the A34 is at capacity and suffers from severe journey time reliability problems which in turn cause major delays to users.
- We recognise that influence and planning for transport does not stop at the city or county boundary. Transport strategy relies on public transport being attractive enough to offer an alternative to the private car on journeys across Oxford outside of the city centre; for travel within other towns; and on inter-urban journeys. To achieve this, it will need to be very high quality, easy to use and offer seamless integration on journeys involving different types of transport.

**Q3. Describe your vision to maximise growth, maintain a high quality environment and deliver more jobs and homes across the corridor over the next 30 years:**

- **What does that mean for growth and infrastructure investment in your area?**
- **What steps are currently being taken to realise that vision and what more needs to be done?**
- **What value could new cross-corridor intercity road and rail links bring? How do these compare to other transport initiatives e.g. Intra City links or under infrastructure priorities?**

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The University is of the view that Intra-City and local links to the city nodes should be given greater priority for infrastructure investment than cross-corridor intercity links. The focus for investment has been suggested by The University in question 1; a mix of targeted pinch point road capacity upgrades, local rail upgrades, mass transit, bus priority and localised traffic management measures, Park & Ride, cycling and future proofing infrastructure for autonomous vehicles and alternative fuelling provision. Investment in highways capacity must be accompanied by demand management

East-West rail is clearly the preferred inter-city solution offering rapid city door to door connections.

Expressway investment as the sole inter-city solution would be unbalanced and likely encourage more longer distance car-borne trips, causing more gridlock further out on the approach to Oxford and exacerbate existing air quality problems and lock the area into a carbon intense transport system. In this case demand management would need to be deployed as part any scheme to reduce the risk of induced demand.

The NIC might well consider that the solutions to poor connectivity and transport networks at capacity are also to be found in non-infrastructure interventions such as demand management, including road user charging and parking controls and behaviour change. These can be very effective controls; The University charges staff 1.25% of salary to park at their workplace, rising to 1.75% by 2018 to equalise the cost of parking with using the City's Park & Ride services. This has enabled the University to reduce parking spaces by 50% in the last ten years, freeing up valuable land for the University's development in the City. Demand management is therefore also part of the solution to dealing with Intra-city congestion; evidenced by the fact that both Cambridge and Oxford are proactively committed to workplace parking levies in their Local Transport Plans with the latter aiming for implementation by 2020.

Behaviour change interventions such as personalised travel planning and effective marketing and promotion of all travel options have proven very effective in managing travel demand and shifting trips to sustainable modes. The DfT has assembled comprehensive evidence and case studies in this field.

All transport infrastructure proposals should contain the objective to reduce the transport emissions of carbon and air pollutants; these should be given equal weight to the modelled benefits of the infrastructure measure on economic growth. This is essential to transition the corridor to a low carbon economy and provide a healthy place where people continue to want to live and work.

#### **Q4. Are there lessons to be learnt from previous initiatives to maximise the potential of the corridor?**

Today we find ourselves in a much changed environment with growth in some parts of the Corridor in danger of grinding to a halt because of shortage of housing, high land values, damage to the quality of life, skills shortages etc. Other parts of the Corridor have land available for housing and commercial development and a high skilled workforce. By linking these areas together to form a cohesive and powerful economic geography of scale and the key to this is the investment in



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infrastructure including broadband. However, we do not suggest that we see some areas as housing supply for other areas, rather that the connectivity can bring high knowledge jobs into more parts of the corridor, and longer distance travel can be a supplement to local transport enhancements around innovation hotspots.

**Q5. Are you aware of any examples of UK or international good practice for example in respect of new technology local frameworks or the built environment that are relevant to this review?**

Yes of course there are examples of such good practice. Here in the Corridor itself we would point to the innovation ecosystems around Oxford and Cambridge as internationally leading good practice. However we would also point to innovation districts such as:

- Boston, Massachusetts: the co-location of world-leading institutions such as Harvard, the University of Massachusetts, Boston University and MIT has underpinned the region's competitiveness in several fields (e.g. the Boston Biotech Cluster is often cited as the leading biotech cluster in the world).
- Eindhoven-Leuven-Aachen triangle (ELAt): ELAt is a cross-border network which links the knowledge regions Eindhoven, Leuven and Aachen with one another, forming a European technological top region. ELAt aims to promote a knowledge economy via cross-border and interregional cooperation. The partners in the ELAt project are three cities (Eindhoven, Leuven and Aachen), two regional public authorities (the Eindhoven Regional Government (SRE) and AGIT, the regional development agency of the Aachen region) and one university (KU Leuven Research & Development - LRD).

The evidence for the successful development of economic areas strongly indicates that three factors are required:

- i) Strong, research based universities.
- ii) The presence of significant amounts of venture capital.
- iii) Effective and coordinated local government with 'enterprise and innovation' friendly policies, including appropriate and effective plans to develop infrastructure.

These are areas that drive their economy through close physical and intellectual connections to knowledge institutions and universities. These clusters are characterised by high densities of business and research activities at their core, but their benefits are felt throughout a wider hinterland. They are enhanced by both effective local connectivity *and* international reach. Elements of the corridor already drive our global competitiveness, but we seek to extend this.

In conclusion we have offered a vision for the Corridor that would establish a globally competitive knowledge-based economy of a scale that would deliver sustainable success for the area and the country. To achieve this we need the Commission to recommend and successive Governments to implement a package of investment measures in providing the requisite infrastructure. We believe that there is a need to start to use the Corridor in this way as a matter of urgency given the recent

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economic impact of Brexit. For this we need investment in schemes that have already been developed or are in the process of development to avoid delay and build upon the local appetite for growth. In particular, the delivery of East West rail and the rail and mass transit connections around Oxford and other local hubs should be seen as a priority. We look forward to seeing the findings of the Commission following this first consultation exercise and to working with the Commission prior to it producing its second report next autumn.

# NATIONAL INFRASTRUCTURE ASSESSMENT

## Towards a robust framework

### Evidence from [name redacted]

1. The National Infrastructure Commission has a vital task, especially given the need to speed up investment in infrastructure to avoid a deep recession. This response briefly considers questions 4, 8 and 9 in the light of the national importance of linking new development, especially housing, to available and planned infrastructure. It is based on the research and experience of URBED in planning major developments, which helped win the 2014 Wolfson Economics Prize. The arguments are set out in recent articles on planning in London, and a new report from the TCPA on the need for an urban policy. Hence only the main points have been summarised here.
2. As an economist and strategic planner my work over the last 40 years has focussed on how to make better use of scarce resources, especially those of our towns and cities. However, though infrastructure investment is critical to the success of cities, and to attracting private investment, British cities have lagged far behind their European equivalents. Public investment has been both insufficient and misapplied. The arguments are well set out in *Good Cities, Better Lives: how Europe discovered the lost art of urbanism*, which I helped Sir Peter Hall write. France, in particular, has far outstripped the UK not just in building High Speed Rail but in integrating development with local rail systems, so that provincial cities such as Montpellier and Bordeaux have grown much faster than Paris.
3. A considerable part of the differences in terms of environmental performance and social wellbeing can be explained by the way investment decisions are taken in European cities, where there is far greater local autonomy and leadership, plus greater access to investment finance. Unfortunately not only are British investment projects assessed in narrow terms, and against each other, but the benefits are dispersed, and the increase in land values not captured adequately. Benefit Cost Analysis has great limitations, and transport planners and economists have consequently argued for Multiple Criteria

Analysis, as the OMEGA 3 project sets out. The National Infrastructure Commission is therefore particularly well-placed to change the way projects are assessed so that we use limited investment resources more effectively.

4. LSE economists such as Paul Cheshire and Henry Overman have denounced the weight given to environmental constraints such as the greenbelts round many of our cities. In their book *Urban Economics and Urban Policy* they argue that it would be far better to build where demand is strongest, and where land values are lowest, rather than concentrating investment on brownfield sites. While their views are diametrically opposed by many who defend the countryside, such as the CPRE, there is consensus at least on the value of Transit-Oriented Development. Furthermore, as the Independent Transport Commission have shown, there is little value in building high speed lines if they are not joined up with local transport. In our prize winning Wolfson submission David Rudlin and Nicholas Falk showed how the costs of local infrastructure could be recovered from building on the edge of cities with real growth potential and high house prices.
5. These arguments have led on to proposals for **Swift Rail** based on the German Stadtschnellbahnen system, and the arguments are set out in the September edition of *Public Money and Management*. But, as with so many good ideas, we will only make real progress in Britain if we change the way we assess investment projects. Given the NIC's interest in projects as diverse as High Speed 3 and CrossRail 2, and the work that is underway on the Oxford/Milton Keynes/Cambridge corridor, the Commission is in a powerful position to encourage coordinated spatial planning, and to overcome 'silo' thinking.
6. So, in answer to Question 4, of course the NIC should be giving careful consideration to issues where transport and other investment come together rather than looking at transport projects in isolation. For example lessons could be learned from the transport proposals for Oxford Station, costed at some £400 million, in the light of options for extending the City at its edge rather than in the scattered way that is currently proposed, such as at Didcot. By increasing rail use, not only

could the position of Oxford as a World university and important location for innovation be secured at less cost, but considerable environmental and social benefits could be secured in the process. In answer to questions 8 and 9 the Commission should consider the way decisions are made in other parts of Europe, such as in Oxford's twin city of Grenoble, and ask what stops Britain applying elements of the French approach or model to transport and development planning in key strategic locations.

7. In conclusion, by supporting a more holistic and longer-term approach for areas where major transport investment is proposed, and where private investment in housing is expected, the NIC could enable out towns and cities to grow more sustainably, and counter the recessionary impact of the BREXIT decision, and its damaging effects on major investment projects and economic growth.

## Planning

[job title redacted] [name redacted]



**04 August 2016**

**Contact officer:**

[email address redacted]

[telephone number redacted]

Your reference: National Infrastructure Assessment

Our reference: PP/NIA/040816

### **National Infrastructure Assessment: Process and Methodology, A Consultation**

Response to questions given in the consultation document are set out below:

*Q1: The Government has given the National Infrastructure Commission objectives to:*

- Foster long-term and sustainable economic growth across all regions of the UK*
- Improve the UK's international competitiveness*
- Improve the quality of life for those living in the UK*

*What issues do you think are particularly important to consider as the Commission works to this objective?*

South Oxfordshire and Vale of White Horse as district councils are responsible for planning for housing and jobs in their areas. One of the key related challenges is understanding how housing supply and delivery of new jobs links with infrastructure delivery. Having greater certainty around the planning and funding for major economic and social infrastructure over future years would very much aid the planning for future homes and jobs in our area.

*Q3: Do you agree that the NIA should cover these sectors in the way in which they are each described?*

The district councils agree that the sectors quoted- transport, digital and communications, energy, water and drainage, flood defences and waste-will be important for review as part the assessment. However, when planning for housing and jobs in their areas through the planning and regeneration process, social infrastructure such as schools and healthcare facilities are also important considerations and need longer-term planning. The Councils' therefore consider that review of social infrastructure should not be excluded from the NIA work. However, we support that the Government has decided that the Commission's remit does not include housing supply directly.

*Q5: The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there particular areas where you think such interdependencies are likely to be important?*

The district councils agree that the links between housing supply and infrastructure delivery are key. Therefore the government remit quoted that 'the Commission will consider the potential interactions between its infrastructure recommendations and housing supply' is considered to be a very important element of the planned NIA work.

*Q10: Do you believe the Commission has identified the most important infrastructure drivers (set out below). Are there further areas the Commission should seek to examine within each of these drivers?*

The Councils agree that population and demography, economic growth and productivity, technology, and climate change and environment are important drivers of infrastructure need. It is also considered important to understand the spatial interdependencies of these drivers at a more local level, and how this relates to demand for further infrastructure.

*Q13: How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?*

The Councils consider it important that the commission understand plans for housing and jobs growth across the Country to identify those areas most in need of infrastructure investment. Ensuring appropriate representation from experts on housing and planning and from councils will be important to inform development of the NIA work, as will assessment of relevant evidence base submitted through the call for evidence stage.

4 August 2016



By email to:

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Dear Sir or Madam

[name redacted]  
[job title redacted]

### **Water UK response to NIC consultation on the National Infrastructure Assessment – process and methodology**

Water UK represents all major water and sewerage service providers in the UK. We are pleased to respond to this consultation.

The industry has welcomed the establishment of the Commission and its goal of a collaborative, long term, cross sector and holistic assessment of the country's infrastructure needs and the development of coherent recommendations for addressing them.

Some of our members operate in parts of the UK where devolved administrations are responsible for most aspects of infrastructure, including water and sewerage. They point out that it is for those devolved administrations to determine Government priorities and policies within their jurisdictions rather than the UK Government and Westminster Parliament. The trend is for more powers to be transferred away from Whitehall: for example, the Wales Bill currently progressing through Parliament will confer added responsibilities for sewerage onto the Welsh Ministers and Assembly.

In carrying out its future work programme, the Commission will need to be mindful of the roles of the devolved administrations, so that its advice to the UK Government is tailored to areas where it retains responsibility.

Water is an archetypal long term sector, with many assets of an extremely long life and often a long lead time, facing inter-generational challenges from factors such as climate change and population growth. We have a well-established statutory system of water resource management plans in which we look 25 years ahead to predict future demand, taking account of population trends, economic growth and the impacts of a changing climate, so that we can assess whether we will be able to meet future demand. Nevertheless, the sector will benefit from the greater clarity over the long term direction of travel that the Commission will be able to provide.



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Water UK recently presented two major pieces of work to the Commissioners which will provide robust scientific evidence that will answer many of the questions posed in the consultation document. We hope they will provide valuable evidence upon which the Commissioners will be able to base their conclusions.

The first, which will be concluded imminently, provides a long term analysis and detailed, technical information about how water resources might be affected by climate change, population growth and other pressures in future. Companies were also asked, if there were an overall deficit in the amount of water available to meet predicted needs in future, to develop options for the types of solutions that would be required to make water resources more resilient.

Produced at Defra's request, it has been written by an expert consortium including Atkins, Mott MacDonald and NERA, and overseen by a sector-wide steering group (including Defra and the Welsh Government) and an independent peer review panel. Jean Spencer (Anglian Water and chair of the project) has recently presented to the Commissioners on the report and its draft conclusions. We look forward to sending the full report to the Commission when it has been completed, and reviewed by Ministers, and to discussing the report's final draft conclusions over the summer with the Commission's Secretariat. Defra's publication *Creating a great place for living: Enabling resilience in the water sector* which covers the water industry in England anticipates that, as well as the project informing its policy decisions, the outputs will form a significant part of the evidence base for the National Infrastructure Assessment in relation to the water sector.

We are pleased to note that the Commission wishes to take a forward looking approach and challenge established thinking. For example, increasing resilience in one area of the country through large scale water transfers may lead to an effective decrease in resilience in another – a solution that might be politically unpopular, but that would nevertheless support the security overall of the country's water resources. Providing clear direction on the potential role of water transfers and other issues around resilience-driven investment would be most helpful.

The second project is the 21<sup>st</sup> Century Drainage Programme, which will provide the evidence base for future decision making to ensure our urban drainage systems are resilient and affordable across the UK. The work of this programme is building evidence on those specific aspects of the drainage system, such as drainage capacity planning, which are under the control of water companies. This reflects the sector's mixed ownership of drainage infrastructure as opposed

to its almost total control and ownership of those assets responsible for public water supplies. *Creating a great place for living: Enabling resilience in the water sector* highlights that relevant water companies are also working with Defra to develop an overview of the health of urban drainage systems, to inform the National Infrastructure Assessment, as well as carrying out work through the industry-led 21<sup>st</sup> Century Drainage programme to ensure that such drainage systems are fit for the future. The first phase of research projects that make up the Programme are not due to report until late 2017; however, as soon as information of relevance comes to light in the course of this research we will, of course, share it with the Commissioners.

When Tony Harrington (Dwr Cymru), Chair of the Programme Board, presented to the Commissioners, he made the point about the complexity of ownership and accountability of current drainage networks, with its many players responsible for different elements of the network. The Commissioners asked for an indicative map of drainage systems, which the industry is currently developing and reviewing.

Whilst the work of the 21<sup>st</sup> Century Drainage Programme is in its very early stages, it is clear that this is also an area that could benefit from the NIA challenging established thinking and processes, particularly the complexity of ownership and accountability for our urban drainage systems. Anything to simplify these arrangements would be most welcome, assuming it was affordable for water charge payers. For example: often in new development, sewerage infrastructure is one of the last, instead of one of the first, elements to be considered. A holistic approach to the development overall, with simpler clearer drainage arrangements at the heart, would allow proper capacity planning and the correct and appropriate use of SUDs. If this were combined with permeable paving, green spaces and rainwater harvesting, the impacts of too much, or too little, water could be mitigated significantly, and almost certainly at a lower cost to society overall; not just on the new developments in question, but on established communities across the country that could otherwise suffer from the knock-on effects of displaced water.

A transparent approach to the water sector elements of the NIA is not only desirable, but fundamental for the industry. The sector as a whole will face an increasingly challenging need to balance resilience with customers' ability and desire to pay. It's extremely important that everyone – policy makers and public alike -can understand the impact of decisions to proceed, or not, with investment on the level of service provided to customers and society and on the affordability of consumers' bills.

We welcome the Commissioners' commitment to consider long term sustainability and environmental impacts including climate change when undertaking the NIA. Our sector is totally reliant on the aquatic environment, so it is in our interest that the water environment is protected. But other sectors must also play their part. For example, your consultation paper acknowledges that agriculture also has an interest in water supply.

We hope these comments are helpful and would be pleased to discuss them further.

More broadly, as well as the reports and documents already mentioned, water companies would be pleased to provide any information that the Commission might find helpful, and to work with the Commission to ensure that its assessments in relation to the water sector are recognised as robust and based on the best available evidence.

Yours sincerely



[signature redacted]



[name redacted]

[job title redacted]

The Welsh Government welcomes the opportunity to respond to this consultation.

Infrastructure development supports environmental and social wellbeing as well as underpinning growth and investment and, reflecting the nature of cross border relationships and the areas of infrastructure that remain reserved, it will be important for the UK National Infrastructure Commission to adopt an inclusive and integrated approach in taking into account Wales' needs and interests.

We therefore also welcome the statement in the consultation that the UK Government is considering options for it, the UK Commission and the Devolved Administrations to develop arrangements to allow for circumstances where their respective responsibilities interact.

It will be helpful to establish such arrangements as soon as possible. It would be particularly useful for Welsh Government to have input into the UK Commission's plans to run a large scale call for evidence in the Autumn, which will be focused on addressing gaps in the evidence base as well as providing a broader opportunity for interested parties to input.

We are planning to establish an infrastructure commission for Wales. As details emerge, it will be important for the Welsh Government to liaise with the UK Government and the UK Commission to establish strategic and working relationships between the two bodies.

There are a number of more policy and sector specific issues that will need to be reflected in assessing Wales-related infrastructure needs and priorities.

### **Decarbonisation and Natural sustainable resource management**

Through the Environment (Wales) Act 2016, the Welsh Government will develop and publish the National Natural Resource Policy (NNRP) in March 2017. It is important that this is taken into account as part of the development of the NIA.

It will set out the Welsh Government's priorities in relation to the management of natural resources and include actions that need to be taken in relation to climate change and biodiversity.

Under the Well-being of Future Generations Act 2015, the Welsh Government will also develop and publish a Future Trends Report. The report will help to better understand the long term challenges Wales is facing, and the likely future social, economic, environmental and cultural well-being trends affecting Wales' progress.

The first formal version will be published by 5 May 2017, but it is likely that the Report will be developed further in collaboration with other interested parties.

This should also be taken into account of as part of the development of the NIA.

## **Transport**

Transport systems are and will remain the backbone to achieving a prosperous economy and inclusive society for the whole of the UK, capable of catering for the needs and unlocking the potential of more rural and peripheral areas as well as urban regions.

Our focus is on the provision of sustainable, integrated and intermodal transport systems which improve Wales' connectivity with the rest of the UK and beyond, as well as connectivity within Wales, for both passengers and freight.

We note that the UK Commission's remit will extend to both infrastructure assets and infrastructure services. Supporting its objective of fostering long-term, sustainable growth and improving the quality of life across all regions of the UK, we welcome the Commission's intention of adopting a multi-modal approach to analysing transport needs.

The approach will need to recognise the complex framework of respective responsibilities between the UK and Welsh Governments in respect of ports, airports and, in particular, rail; as well as reflecting the importance of cross-border road connectivities.

Since rail infrastructure in Wales is not currently devolved, the planning and prioritisation process, which is currently underway for Control Period 6 (2019-2024), will need to consider the objectives and priorities of both the UK and Welsh Governments, as well as a fair allocation of funding across the network in Wales and England. The infrastructure schemes identified in Network Rail's Welsh Route Study (April 2016) for delivery in Control Period 6 have been identified by the industry to support economic growth and meet predicted demand.

## **Digital Infrastructure**

Should there be too sharp a focus on providing value for money then those areas of the UK which are rural and very rural risk being underserved by digital infrastructure. Such disparities are already observed in the provision of superfast broadband and reliable mobile connectivity to the final few per cent of premises across the UK. Indeed, this is an issue we are working hard to address in Wales.

The cost versus the economic return of providing infrastructure in rural and semi rural areas is not conducive to private sector intervention. In such areas, publicly funded infrastructure appears to be the only option. Similarly, the cost of providing connectivity to these areas is significantly higher than more urban

areas simply by virtue of the distances between settlements and very low population densities.

The value for money criteria used in an urban or semi urban area should not be the same as for those areas where infrastructure and digital infrastructure in particular are difficult to provide. Meeting the needs of rural and very rural areas need to be reflected in the objectives of the Commission or in the forthcoming vision.

The rate of development and introduction of new technologies in digital infrastructure is gathering pace. This pace of change can mean that it is no longer appropriate to think about the technology coming on stream in the next two to five years. The assessment should focus as much on future technologies as current ones. In particular the importance of 5G and ultrafast connectivity needs to be reflected in the assessment. These are likely to be the predominant technologies for the next three to ten years. However, attention needs to be paid to what may come after these, for example, gigabit broadband or mobile.

Digital infrastructure interacts with all of the other sectors and underpins much of what they need to achieve in the future. Further digital infrastructure will be near ubiquitous in supporting much of what happens economically and socially.

With the development of technologies like 5G and as concepts of smart cities and smart homes become a reality these interdependencies, particularly with regard to energy and transport infrastructure, will become more pronounced. This level of interdependency will only increase as more and more of our interventions objects become 'smart' and the internet of things expands.

Social demand should also be seen as a critical driver of digital infrastructure. Householders are increasingly viewing digital infrastructure as the fourth utility and serving residential premises is a strong economic driver for the network operators and the retail operators that use their networks.

The primary use within the home is usually entertainment, with householders using their digital devices to download or stream music and video content. Such digital infrastructure can directly address social isolation, because of distance from friends and family or a lack of mobility, through social media or other services such as Skype.

In addition to home entertainment and retail, households are using connectivity for online education, home working and information. All of these have obvious social and societal benefits that are drivers for digital infrastructure, as does the growth in delivering public services digitally.

## **Energy**

It is noted that one of the three initial studies by the National Infrastructure Commission contained energy innovation which included the Smart Power Report and supporting documentation. The Welsh Government has noted the contents of the report and wish to fully engage with any future work. It is essential that the devolved administrations are considered as their inputs are important in broadening the understanding of the UK commission.

In particular, we would wish to stress the importance of cross-border work. The Welsh Government notes the beneficial impacts the northern connectivity project could have on Wales, and it is important that cross-border impacts are considered as part of the assessment.

The Welsh Government supports the whole system approach rather than focusing on specific forms of energy, this will allow the Commission to gain a further understanding of the processes involved and therefore have a baseline to understand the possibilities for Smart energy usage.

The Welsh Government supports the NIC in gaining a greater understanding of the demand and supply network and spatially mapping them to include the information of transmission and distribution. The Welsh Government considers this essential could help inform the UK Government's decisions in future funding for the industry. It would be useful if the NIA could also consider the best locations for major energy projects especially those dependent on natural resources.

It is noted that the NIA will not cover upstream energy extraction and processing, but it is considered essential to gain a full understanding of the whole energy system to include the downstream energy processing including the onshore refineries.

Whilst the Welsh Government fully supports the National Infrastructure Assessment, it is considered important that this work supports and does not delay major infrastructure decisions which are currently in the pipeline.

## **Flood and Coastal Erosion Risk Management**

The NIA intends to include 'Flood defences' as set out in section 46, page 18. However, flood and coastal erosion risk management, including the provision of flood defences, is a devolved activity.

In section 90 (page 34) it states that the NIA will only cover areas of infrastructure under the UK Government's responsibility, however, it is considering options for the Commission, UK Government and the Devolved Administrations to develop arrangements where responsibilities interact. Flood risk management should be included in those later discussions as a devolved matter and not considered at this time.

## **Wales Infrastructure Investment Programme and the National Development Framework (NDF)**

The National Infrastructure Commission should be aware of the Welsh Government's National Development Framework (NDF) and the NDF's role in planning for and consenting infrastructure in Wales

<http://gov.wales/topics/planning/legislation/planning-wales-act-2015/development-planning/?lang=en>

The NDF will set out clearly the Welsh Government's land use priorities including areas of future growth and the infrastructure necessary to support this growth. It is important essential that the National Infrastructure Assessment is informed by and supports the NDF.

### **Waste**

Paragraph 23 states that "There can also be lost opportunities, for example, maximising the use of energy from waste." We would suggest that energy from waste should only be applied to non-recyclable wastes. Priority should be given to the establishment of local heat networks, to take heat from the incinerators. More broadly, waste is fully devolved and there are now very different policies in place across the devolved administrations. Each nation has its own waste strategy.

### **Water**

The Welsh Government has its own Water Strategy where it has set out its vision for the water sector for the next 25 years.

In terms of the NICs considerations, priority ought to be given to water quality; water supply; the recreational use of water in a safe and sustainable way, and ageing water and drainage networks.

Water supply should be considered in the context of all sectors. Water Resources Management Plans are prepared by all water companies which set out how they plan their water resources over the next 25 years and these should link in to any other work in terms of long term planning.

We look forward to having a close and productive relationship with the UK Commission.



## **National Infrastructure Assessment: Process and Methodology consultation**

### **West Sussex County Council officer response**

The National Infrastructure Commission (NIC) is preparing to undertake a National Infrastructure Assessment (NIA) to identify long-term economic infrastructure needs for the UK. The NIC is seeking views on the process and methodology for developing the assessment. This note sets out West Sussex County Council's officer response to the consultation on the NIA process and methodology. It highlights key issues to which the NIC is requested to give consideration. The consultation questions are set out below in italics with the County Council's response below each one.

#### **Remit and Plan**

*Q1. The Government has given the National Infrastructure Commission objectives to:*

- *foster long-term and sustainable economic growth across all regions of the UK*
- *improve the UK's international competitiveness*
- *improve the quality of life for those living in the UK*

*What issues do you think are particularly important to consider as the Commission works to this objective?*

The NIC should consider the role of the South East within the wider UK economy. A key consideration will be the relationship of the region with London, which has become increasingly interlinked. As London's population and economy has grown, the spill-over effect into neighbouring counties like West Sussex, East Sussex and Surrey has accelerated. The NIA should provide a framework that encourages a more balanced economy and ensure areas that have been disadvantaged in the past can be competitive.

When working to the objectives set out above, the NIC should consider the impact and opportunities of any devolution deals. West Sussex County Council is part of the Three Southern Counties (3SC) devolution proposal. As part of the offer there are plans to bring forward an infrastructure strategy, which will identify and prioritise the infrastructure needed to support sustainable economic growth.

As an infrastructure provider and commissioner, greater certainty regarding the timing and delivery of infrastructure would be beneficial particularly where it provides local authorities with the confidence to forward fund infrastructure to enable greater capacity for growth. It will be important to identify delivery mechanisms and consider opportunities for the planning system to deliver growth.

In addition to sustainable economic growth, there should also be a reference to 'sustainable growth' in general. In order to achieve all of the objectives, it is necessary for the NIC to think beyond economics and include wider environmental and social factors.

**Q2.** *Do you agree that, in undertaking the NIA, the Commission should be:*

- *Open, transparent and consultative – Yes*
- *Independent, objective and rigorous – Yes*
- *Forward looking, challenging established thinking – Yes*
- *Comprehensive, taking a whole system approach, understanding and studying interdependencies and feedbacks? - Yes*

*Are there any principles that should inform the way that the Commission produces the NIA that are missing?*

Yes – The NIA should set out a clearer definition of nationally significant infrastructure. This should be either in terms of its size and scale and also whether a smaller project can have national significance, for example for energy security.

**Q3.** *Do you agree that the NIA should cover these sectors in the way in which they are each described?*

Yes, although as the NIA develops there should be further clarity regarding its scope for each sector. This should provide certainty for local authorities and communities regarding the types of infrastructure that will be covered.

**Q4.** *Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?*

Transport: A 'multi-modal approach' is supported, particularly when designing transport projects that cater for a variety of journey purposes. In addition to the infrastructure that has already been identified for this sector, the NIA should focus on wider public transport provision including bus infrastructure as this can have national importance.

Digital and communications: The NIA should focus on Broadband connectivity for households and businesses. Better connectivity can improve quality of life for residents and assist with the delivery of independent living services. There also needs to be a focus on enabling businesses to keep up with technological advancements that allow them to be internationally competitive.

Energy: The NIA should provide greater clarity on the scope of what will be included in this sector. It is unclear why upstream energy extraction is excluded at this stage. For example, proposals for onshore hydrocarbon extraction are relatively small but nationally important with regard to energy security.

Waste: The NIA should focus on major waste management infrastructure (e.g. energy from waste plants) that would benefit from a larger than local (county) approach to achieve economies of scale and certainty of delivery.

**Q5.** *The NIA will seek to pull together infrastructure needs across sectors, recognising interdependencies. Are there any particular areas where you think such interdependencies are likely to be important?*

None identified

**Q6.** *Do you agree that the NIA should focus on these cross-cutting issues?* – Yes

**Q7.** *Are there any other cross-cutting issues that you think are particularly important?* - No

### **Methodology**

**Q8.** *Do you agree with this methodological approach to determine the needs and priorities?* - Yes

**Q9.** *Do you have examples of successful models which are particularly good at looking at long-term, complex strategic prioritisation in uncertain environments?*

N/A

**Q10.** *Do you believe the Commission has identified the most important infrastructure drivers (set out below)? Are there further areas the Commission should seek to examine within each of these drivers?*

Yes, these drivers broadly cover economic, environmental and social issues. However, it is important that the NIA is clearer on how it will build an understanding of what society will look like in the future and how it is likely to function.

Population and demography: This driver references ageing in general, but it should be more specific regarding how the NIA will consider the needs of particular demographics, for example an increasingly ageing population.

Climate change and environment: Whilst it is important to understand the infrastructure baseline in order to predict future needs, it is also worth noting that with climate change there is no 'as is' scenario. The environment of 30 years' time will be very different to today. All future models should therefore be developed against a changing baseline. There are a number of existing resources and models to aid in this.

**Q11.** *The NIA will aim to set out a portfolio of investments that best meets the demands of the UK in the future. Do you have a view on the most appropriate methodology to determine that portfolio?*

The NIA should provide clarity regarding prioritisation of infrastructure projects. A key consideration will be how the NIC balances competing demands from areas and between sectors.

**Q12.** *In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?*

Yes – It is clear that the Commission’s remit does not include housing supply directly and that the Commission will consider the potential interactions between its infrastructure recommendations and housing supply. However, it is not clear how housing growth will be considered in the methodology. The links between infrastructure provision and housing growth should be identified in the methodological approach.

### **Engagement**

**Q13.** *How best do you believe the Commission can engage with different parts of society to help build its evidence base and test its conclusions?*

The NIC should engage with individual local authorities, Local Enterprise Partnerships (LEPs) and area economic partnerships. There are also specific sectoral groups such as Local Transport Bodies, emerging Sub-national transport bodies and SE7 (South East waste group).

West Sussex County Council  
August 2016

# Response to the National Infrastructure Commission's Consultation on the "National Infrastructure Assessment – Process & Methodology" May 2016

## 1) Introduction

Wetherby Building Systems (WBS) welcomes the opportunity to provide a response to the above consultation. Our input is geared towards meeting fully with the National Infrastructure Commission's 3 Corporate Objectives:

**Foster long term and sustainable growth across all Regions in the UK.**

**Improve the UK's international competitiveness.**

**Improve the quality of life for those living in the UK.**

One of our industry's leading groups is the National Insulation Association, who has also provided a more 'industry wide' response, and we would ask that you consider their document as the overarching Energy Efficiency umbrella organisation. Their document details the real importance of the UK building stock's energy efficiencies with which we agree entirely. WBS specifically focuses within the Energy Efficiencies arena as the market leading designer and distributor of Solid Wall Insulation Systems. SWI consists of both Internal and External Wall Insulation, however over 97% of our market is currently with External Systems, and therefore our comments relate more directly to EWI.

Over 30% of the UK housing stock has solid walls (no cavities), this totals over 7.6m properties. Government figures show that just over 405,000 have EWI, leaving over 7m un-insulated. **45% of all Fuel Poor live in these solid Wall homes, and one fifth of families living in solid wall homes are in Fuel Poverty. Almost twice as many as families in Cavity Wall homes, (DECC 2013).** Government scheme initiatives introduced in the late 1990's (EESoP, EEC, CERT & Decent Homes) focused entirely on Cavity wall homes as lower cost insulation solutions are available for these homes. More recent schemes (CESP & ECO) have had variable levels of success at focusing on providing EWI to this severely neglected group. As recently as 2012 Government made declarations to our industry to deliver over 250,000 EWI installations annually from 2015. Major political decisions made later in 2013 completely changed the landscape and targets for this most vital measure. At that time one of our key partners Local Authority Chief Executive wrote: "It is striking that within just one year of the ECO being launched, with an explicit aim to substantially ramp up deployment of SWI, the proposed cut in support for this technology will see an 80% fall compared to the year before ECO was launched!"

The remainder of this response is to further detail EWI and how the transition of this specific measure to the NIC makes logical sense to your organisation by aligning with your three corporate objectives.

## **2) EWI (a different kind of insulation measure)**

EWI can be more realistically viewed as a construction refurbishment project generally requiring CDM, Health & Safety, Design, Planning, Site Offices, Logistics, Scaffold, Site storage for large quantity of materials. Various tradesmen will also be needed, electrician, heating engineer, joiner, BT engineer, TV technician, labourer and of course trained EWI installers. Dependant on weather conditions each individual home would take 2/3 weeks duration. Unsurprisingly, the measure cost is up to 15 times more expensive than a CWI installation. Economies of scale providing lower cost delivery can be achieved by running area based schemes; high fixed costs mean that the marginal cost of additional units in an existing programme is relatively low.

The real issue now is to effectively target the Fuel Poor as a priority for funded schemes, and make their home warmer, healthier and effectively move them out of fuel poverty.

## **3) Resident Health Benefits. (Example)**

Poor quality housing costs Government circa £760m a year through impacts on the NHS (Piddington et al 2014). Approximately £85 per capita is spent through the NHS on treating respiratory diseases and a further £147 on treating circulatory problems (NHS 2013). They also believe that up to 5% of people with these conditions nationwide are a direct consequence of low living temperature and damp conditions. If this is the case insulating the walls of those entire solid wall properties would provide a health cost benefit estimated at £183m per annum. This calculation also assumes that 'thermal comfort' is taken in all cases, (a higher than average heating temperature post install).

## **4) Job Creation**

Our industry believes that every 100,000 EWI installs creates and sustains over 29,000 direct and in-direct jobs. However in achieving this, our industry also desperately needs to be able to grow and manage this on a long term basis in order to deliver EWI at a competitive price, and with the requisite labour plan able to deliver over the long term.

## **5) Energy Bill & Carbon Savings**

Various estimates at Energy Bill savings have to take in to consideration the previously mentioned 'thermal comfort', residents having warmer than normal temperatures. Even allowing for this over £250 is a conservative average (Energy Savings Trust 2014) saving on annual bills. In 2015 WBS provided materials for over 16,000 EWI installs nationwide. This could provide energy Bill savings of £4m per annum and the associated lifetime carbon saving of 448,000 tons.

## **6) Area Regeneration**

Schemes also have an additional benefit in Re-generating an area by effectively refurbishing the exterior of all properties and providing 25 year guarantees for the Insulation System provided the exterior is regularly well maintained. In addition to the visual enhancement of individual homes residents also develop a better overall community feeling.

## **7) Home Increases in price**

An obvious benefit is an increase in property price due to this refurbishment, or major home improvement. After successful EWI installation the home meets current building regulations with regards to 'Thermal Efficiency'. This will also bring the property in line for improved mortgage considerations.

## **8) Summary & Conclusions**

We believe that EWI should transfer to the NIC because it aligns perfectly with your 3 Corporate Objectives:

### **"Foster long term and sustainable growth across all regions in the UK"**

The 7m solid wall properties are based nationwide, within this group the target 1.4m households who are living in Fuel Poverty must be prioritised to effectively take them, and any future residents living there, out of Fuel Poverty. Sustainable programmes can be introduced to provide these homes with EWI over the medium term (5 years).

### **"Improve the UK's International competitiveness"**

Developing funded programmes of this nature which provide all the previous mentioned benefits to the groups who need it most provides real proof of Infrastructure programme competitiveness, to our International colleagues.

### **"Improve the quality of life for those living in the UK"**

This is undoubtedly the main benefit, improving not only the quality of life for many of the most needy and vulnerable groups, but also their health and well-being.

## **Annex A**

### **Summary of answers to specific consultation questions**

Q1) what issues do you think are particularly important to consider as the commission works to this objective.

**It is important to consider the role of building energy efficiency especially EWI in balancing future energy demand and supply, reducing the cost of supply-side capacity and an assessment of the interventions needed to deliver programmes of EWI to the existing solid wall housing stock, especially to the Fuel Poor.**

Q3) do you agree that the NIA should cover these sectors in the way in which they are each described?

**Yes, we obviously welcome the focus on the need for the energy system to help deliver our environmental and carbon reduction objectives.**

Q12) in your view are there any relevant factors that have not been addressed by the Commission in its methodological approach?

**We can only re-iterate the importance of energy efficiency programmes, specifically of our housing stock to be implemented within the NIC. Solid Wall properties require a concerted and determined effort to rescue as many fuel poor families as possible over the coming decade.**



## Consulting on the National Infrastructure Assessment (NIA): Process and Methodology

A response from the Wildfowl & Wetlands Trust (WWT)<sup>1</sup> - July 2016

We welcome the Commission's consultation and the decision to include natural as well as man-made infrastructure assets as part of the National Infrastructure Assessment. We support the commitment by the Commission to ensure that recommendations are consistent with the UK's carbon and environmental commitments.

### Key points

- We recommend that the Commission's 2050 vision should include a set of quantifiable objectives for the extent and condition of national natural infrastructure assets. A thriving natural environment will support the three objectives of sustainable growth, international competitiveness and quality of life.
- Furthermore, investment in natural infrastructure is likely to be a highly cost-effective way to achieve the 2050 vision and should be included among the NIA's priorities.
- To understand our infrastructure needs and the impacts of infrastructure development, we need a better understanding of our infrastructure baseline – both in terms of engineered and natural infrastructure. A serious shortcoming for investment and maintenance of natural infrastructure is the lack of a systematic assessment of the condition of natural assets, the services they deliver, and the investment needed to maintain those assets. We recommend that each NIA report on the condition of natural assets and investment proposals for their improvement.
- Infrastructure projects do not need to come at a significant environmental cost. Minimising environmental impact, optimising environmental benefit and identifying opportunities for integrating natural infrastructure into engineered infrastructure to deliver multiple benefits should be considered at the outset of every project. Using natural infrastructure as part of engineered infrastructure can be very effective at mitigating risk such as climate change impacts and can enhance biodiversity and people's quality of life.
- Cost benefits should consider social and environmental as well as economic cost benefit, take a long term and whole life approach and consider cumulative impacts.
- Coordinating this work with the Natural Capital Committee; the Committee on Climate Change; and DEFRA's 25 year environment plan will be essential.

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<sup>1</sup> WWT is a leading wetland conservation charity which works to protect wetland habitats and their wildlife in the UK and globally, and the services and value that wetlands give to people. We manage nine Wetland Centres across the UK. Around one million people visit our centres each year to learn about the practical benefits of wetlands to their daily lives as well as to experience the enjoyment of being among wetlands and their wildlife. We provide formal learning about wetland wildlife to more than 60,000 school pupils each year. We respond to this consultation as experts in the field of wetland conservation and water management but also representing our 220,000 members who value wetlands and their wildlife.

### **The environment: driver, asset and objective**

We welcome the identification of environment as a driver. However, it is important to consider the environment not only as a driver of need (through climate change) but as an infrastructure asset (e.g. rivers) and as an objective (a thriving natural environment).

In this way the environment is unique. As an asset, natural infrastructure is uniquely interdependent. Each natural infrastructure service is most effectively delivered as part of a healthy, functioning system. For example, natural infrastructure assets like wetlands and woodlands can form part of a cost-effective flood mitigation strategy. However, they benefits they deliver may be compromised by degraded ecosystems, such as poor soil structures caused by intensive farming methods.

It is also important that the environment is not only considered in respect to climate change. The NIA should seek to improve biodiversity, water quality and air quality within their consideration of the environment as a driver.

The benefits of natural infrastructure are well documented, both within the National Ecosystem Assessment and reports by the Natural Capital Committee. Natural infrastructure can reduce flooding, decrease the urban heat island effect and soak up polluting air particles. It is important that we imbed the integration of natural infrastructure into engineered infrastructure. Thames Gateway Green Grid Network demonstrates the effectiveness of integrating multifunctional land use, connectivity, and accessibility using an ecosystem services approach early in the planning process.

### **Asset condition**

Unlike other national infrastructure assets, understanding of the asset base, condition and investment needs for natural infrastructure is severely lacking. The data coverage for metrics of land management is patchy, particularly in terms of farm management practices. With regard to environmental quality metrics, data is lacking for pests, diseases and pollinators, whilst data on habitat condition is poor outside of designated areas. There is even less reporting about how the quality of these assets affects the delivery of services.

This means that there may be serious risks (for example to agricultural production or flooding) that are under-appreciated because of lack of data. However, it is clear that many components of the UK's natural infrastructure are in decline:

- 60% of species we know about are in long-term decline.
- In England, only a fifth of waterbodies are in good ecological condition.
- Only a third of SSSIs are in good condition. In the uplands, only 14% of blanket bog and 10% of upland heath are in favourable condition.
- The current rate of soil erosion is 10-100 times higher than it has been in the past, and that 2.2 million tonnes of soil is eroded each year in the UK

Damage to these assets can be costly: soil degradation in England and Wales costs farmers and wider society an estimated £1.2 billion per year in lost productivity, flood damage, reduced water quality and other costs.

By contrast, investment in natural infrastructure can be extremely cost effective. The Natural Capital Committee concluded that there was a strong economic case for “Wetland creation on around 100,000 hectares... benefits cost ratios of 3:1 would be typical, with to 9:1 possible in some cases”. According to the Environment Agency, achieving “good” status for all water bodies could bring £21bn of benefits at a cost of £16bn.

Natural infrastructure improves people’s quality of life. It has a positive benefit to people’s physical and mental health and well being. Experiencing natural spaces can increase concentration, improves the local area and improves community dynamics. Natural England found that if every household in England were afforded equitable access to quality green space, then around £2.1bn in health cost savings could be achieved by the NHS each year.<sup>2</sup>

Like other major infrastructure investments, many of the costs of natural infrastructure are front-loaded. For example, WWT Steart Marshes is a managed realignment project in Somerset that cost £21million to create. The economic value of some of the benefits that 232 ha of the coastal wetland habitats will be between £491,000 and £914,000 a year from climate regulation, recreation and tourism, education, habitat provision and food provision. Substantial additional benefits are expected from flood risk mitigation and the reduced depreciation of conventional flood defence assets.

These costs are necessary to invest in our future and secure our wellbeing, quality of life and prosperity and should not be seen as an economic or administrative burden. Incorporating sustainability and resilience often reduces whole life costs by improving the efficiency of operation and maintenance, while optimising benefits for the community and environment. In many cases, the long-run costs of inaction will be far greater if we defer the necessary changes.<sup>3</sup>

## The sectors

**Water and Drainage** – we support consideration of the future needs of the environment in this sector. In this case, the environment is:

- **a driver of need** (because climate change will increase pressure on water supply and on waste water capacity),
- **an infrastructure solution** (because investment in natural infrastructure like sustainable urban drainage can help to tackle flood, drought and water storage), and
- **an objective** (because water scarcity will impact natural environments)

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<sup>2</sup> <https://www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report>

<sup>3</sup> [http://infrastructureaustralia.gov.au/policy-publications/publications/files/Australian\\_Infrastructure\\_Plan.pdf](http://infrastructureaustralia.gov.au/policy-publications/publications/files/Australian_Infrastructure_Plan.pdf)

Environmental impact is wider than the impact on water levels on in-river habitats and includes water availability in the wider environment more generally; surface and ground water dependent habitats and those that require regular/occasional flooding.

Under this sector the NIA should consider not only large scale waste water infrastructure but small scale community infrastructure such as septic tanks and package treatment plants. To take one example, private septic tanks could be contributing as much as 10% of phosphorous loading to our water courses. Natural England has developed a tool which prioritises areas where septic tanks could be causing a problem to our environment. However, as there is no registration requirement a better understanding of where they are, how old they are and how well they are working would ensure the Commission has the data it needs to fully assess our waste water infrastructure. We urge the Commission to consider septic tanks within the waste water remit and new developments / growth could mean existing small sources could sometimes be wrapped up with new sewerage systems.

**Flood defences** – We welcome the consideration of how new large infrastructure could be developed jointly with flood defence. This could be done effectively using natural infrastructure as well as engineered flood defence. For example, large scale natural infrastructure developments like wetland and woodland creation can contribute substantially to flood risk management.

It is critical that the Commission takes a holistic and catchment scale approach to flood defence and we recommend the Commission considers the value of ecosystem services in any value-for-money approach. We welcome the inclusion of the long-term aspect under this sector and urge the commission to review funding mechanisms which currently only run to six year projects.

The Commission could helpfully investigate the role that flood defence (both natural and engineered) could play in helping both water supply (for example creating on-farm ponds to capture water run-off which could be used later in the year to provide water) and waste water infrastructure (swales and green roofs not only reduce the flow of surface water into our struggling sewerage system but also improve the quality of water run-off potentially reducing the need for such intensive waste water treatment).

### **Infrastructure provision**

We urge the Commission to consider natural infrastructure alternatives where they are appropriate. For example the provision of water and disposal of wastewater is highly dependent on treatment.

- South West Water envisage that restoring peatlands on Exmoor and Dartmoor will avoid the need to upgrade treatment works and reduce the costs of energy and chemical intensive processes of water treatment. The Upstream Thinking project is estimated to cost £9.1 million with a benefit: cost ratio of 65:1 over 30 years; 65p per customer over the 5 year period.
- In New York a filtration system was estimated to cost almost \$6 billion, with over \$300 million in annual operating expenses. Instead they opted for a catchment management approach including land acquisition for a cost of \$250 million.

- The City of Seattle has committed to a \$90 million road decommissioning effort to improve water quality in a principal watershed and to avoid building a filtration plant or search for more pristine alternative watersheds,<sup>4</sup>
- The Congaree Bottomland Hardwood Swamp in South Carolina removes a quantity of pollutants from the watershed equivalent to that which would be removed by a \$5 million treatment plant (EPA, 2006).
- Approximately one-third of the world's largest cities obtain a significant proportion of their drinking water directly from protected areas.
- As water treatment infrastructure continues to age, particularly for larger cities, ensuring drinking water quality at the source is likely to be increasingly economically sensible.

The Housing and Planning Act 2016 mandated a review of the delivery of sustainable drainage systems in new developments. Sustainable drainage systems can provide significant surface water flood risk reduction also cleaning and reducing the amount of water flowing into our sewerage system and needs to be widely rolled out.

It would be useful for the NIA to include an audit of sustainable drainage systems in infrastructure. This should identify the potential for SuDS to be retrofitted into infrastructure during maintenance or renewal opportunities (as is advocated within the London sustainable drainage action plan) and the feasibility for new engineered infrastructure to be developed with integrated SuDS. If these are designed in from the outset it need not be more expensive than traditional systems. They can also be designed to benefit biodiversity and enhance the amenity of an area which will help deliver the Commission's third objective - to *improve the quality of life for those living in the UK*.

### **Interdependencies**

More than any other infrastructure asset, natural infrastructure relies on interdependent systems. Therefore, the NIA should focus on whole ecosystems, landscapes and catchments.

For example, a river catchment is made up of numerous natural capital assets, functioning as a single system. Allowing one aspect of the system to be degraded can erode infrastructure services in other parts of the system that are seemingly remote. For example, river catchments provide water for agriculture, support the soil structures and hold back flooding. If water quality is compromised, then biodiversity can suffer, reducing plantlife, which in turn impacts on soil quality and flood risk many miles away.

There are many opportunities for new infrastructure to deliver for more than one sector, and many sectors that rely on natural infrastructure. At a national scale the benefits could be considerable:

**Transport and flood infrastructure** – Incorporating natural flood management and sustainable drainage systems into our transport infrastructure such as green roofs on railway terminals, swales

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<sup>4</sup> <http://www.annualreviews.org/doi/pdf/10.1146/annurev.environ.022108.180216>

beside roads and increased green walking and cycle networks can significantly reduce the risk of surface water flooding (see case studies below). There are also links with water infrastructure.

**Water and flood infrastructure** - There is little joined up thinking around speeding up flows of water for flood defence and the need for water when water availability is low. Natural flood management can play a role in making the environment more resilient in times of lower water availability by slowing the flow of water and increasing infiltration. In addition there are a number of ways in which we can store flood water for use at other times rather than rushing it to the sea. New research looking at this interconnectedness would be valuable, with a focus on water supply from flood management.

**Transport/water infrastructure and energy infrastructure** – Solar panels on new buildings or wind turbines on water company land can help towards our energy infrastructure. New innovation around on site battery storage could be considered to enable greater resilience.

### Cross-cutting issues

We broadly support the cross cutting issues identified and the inclusion of sustainability (both regarding climate change and the environment) as a cross cutting issue. However, we are concerned that “funding and finance” and “cost, delivery and resilience” appear to be based on affordability and cost reduction without taking account of the benefits (economic, social and environment) and cost of inaction (such as the degradation of natural assets).

Where this narrow view of cost to business is taken without consideration of other benefits, economic damage and reduced quality of life can ensue. Putting a bias on affordability and cost reduction is more likely to support high profit, short term fixes rather than long term, more sustainable options. This has sometimes been the case in assessments such as the Red Tape Challenge and can lead to economically inefficient decision-making.

**Multiple benefits** - We recommend a cross cutting issue around optimising multiple benefits - this should include enhancing biodiversity, adapting and mitigating to climate change and minimising the risk of transferring invasive non-native species. This theme should also account for wider benefits. For example natural infrastructure regeneration in St Helens at Bold Colliery attracted investment of £75 million for new development and led to increases in property values estimated at £15 million.<sup>5</sup>

**Demand management** - We welcome the Commission identifying demand management as an aspect of considering how infrastructure needs are to be met, but recommend that it is considered a cross-cutting issue. Demand management has been identified as a valuable tool in the Australian Infrastructure Assessment. Examples of demand management include valuing water appropriately to discourage excessive use of water for low value crops or high water consuming crops; promotion of energy efficiency and renewable fuels to help address our carbon emissions and reduce air pollution.

We recommend the NIA considers national policy on demand management as well as environmentally beneficial infrastructure development. Infrastructure accounts for a large percentage of greenhouse gas emissions, mainly from the electricity sector and the transport sector.

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<sup>5</sup> Forestry Commission, 2005

Transitioning to a lower emissions economy will require reducing GHG emissions within infrastructure plans, construction methods and operational frameworks. It is important that the NIA also considers the importance of public transport and active transport in helping to reduce GHG emissions and that active transport networks should be considered as transport infrastructure.

**Other plans and policies** - The Commission should consider how plans for infrastructure fit in with spatial plans, such as the All London Green Grid<sup>6</sup>, the Birmingham Green Living Spaces Plan<sup>7</sup>, or the Manchester Green Blue Infrastructure Strategy, and how the NIA can complement and assist these plans.

### **Infrastructure drivers**

#### **Climate change and the environment**

It is important that the Commission sees the environment as an asset rather than as an obstacle. Infrastructure development often comes with environmental costs, but those costs can be mitigated through improving location and design.

Without attention to natural infrastructure and appropriate investments, unforeseen impacts of engineered infrastructure development can increase vulnerability and weaken resilience. Any rush to engineer infrastructure for adaptation such as barrages, dams, levees and sea-walls could be counter-productive.

The NIA should consider a whole life approach to environmental impact, including continued effective operation and maintenance to ensure that environmental safeguard measures are implemented. Infrastructure planning also needs to include decommissioning and restoration. Clear definitions for safety and economic liability, and/or a timeline for relicensing the infrastructure can often catalyze restoration or decommissioning activities. Evaluations by the International Finance Corporation and the European Bank for Reconstruction and Development demonstrate that projects which successfully take account of the environment do as well financially and economically as projects which do not.<sup>8</sup>

Environmental restoration should be planned into routine maintenance of infrastructure as well as new infrastructure. For example, bridge and highway repairs can often accommodate wildlife crossings or improved habitat connectivity with modest alterations in design or reconstruction plans.

The cost to the environment should not simply be considered as impacts on protected areas or of legislative importance, but to the wider environment more generally. The cumulative impact on the environment needs to be assessed rather than solely considering project impact or sector impact on the environment. In addition it is important not to underestimate the long term effects of the entire expanding infrastructure network on the environment and wildlife species<sup>9</sup>.

It is vital that in considering this driver the environment is not solely considered in relation to climate change. Improving biodiversity, water quality and air quality are all environmental drivers which can

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<sup>6</sup> <https://www.london.gov.uk/what-we-do/environment/parks-green-spaces-and-biodiversity/all-london-green-grid>

<sup>7</sup> <http://www.birmingham.gov.uk/greenlivingspaces>

<sup>8</sup> [http://siteresources.worldbank.org/INTOED/Resources/infrastructure\\_environment.pdf](http://siteresources.worldbank.org/INTOED/Resources/infrastructure_environment.pdf)

<sup>9</sup> <http://www.sciencedirect.com/science/article/pii/S000632070300048X>

be delivered both by natural infrastructure development and environmentally sensitive engineered infrastructure development.

**Technology** - It is important that technology includes smart infrastructure so that we can continue to learn, adapt and be more efficient. We urge the Commission to consider whether technological training/guidance is adequate, especially with respect to adapting to climate change. We also see a role for the NIA to identify possible areas for tool development to assist in sustainable development and in identifying where designing in multi-benefits may be most applicable.

### Case studies

- The new Canary Wharf Crossrail Station includes the creation of a sunken garden within a flood storage attenuation system, adjacent to the dockside promenade. In concert with Local Biodiversity Action Plans an integrated planting and weir system has been introduced. This helps the development provide additional habitat zones and improve water quality by aiding water flow in otherwise static dock waters.
- Green infrastructure in cities helps support urban tourism and shopping, making city centres more attractive and softening extremes of weather.<sup>10</sup> For example, investment in Glasgow Green cost £15m creating an attraction where subsequent visitor spending was estimated to have generated around £30m net additional worth of sales in the wider economy, almost £8m in terms of additional wage and salary payments, as well as around 35 extra FTE jobs.<sup>11</sup>
- A green roof was retrofitted onto a tube depot in Ruislip gardens and water runoff rates were compared with a control roof. The green roofs reduced the peak flow to under a quarter of that of the control roof and delayed the peak flow time up to 2 hours 45 minutes. The green roofs were additionally designed to encourage pollinating species.
- Nottingham Green Streets project was designed to capture runoff from 5500 m<sup>2</sup> of highway from a total surface area of 7100 m<sup>2</sup>. The scheme was designed to manage surface water runoff from a 1:30 year event and to always intercept and treat the, often polluted highway runoff. Evidence indicates a 33 per cent reduction in the flow reaching the sewer during a 1 in 1 return period storm.
- Elvetham Heath, Fleet, Hampshire is a 63ha residential development plus ancillary services including a school, village centre, large retail outlet, park and ride and sports pitches. 1868 housing units in total with a mean density of 30 units/ha. SuDS included soakaways (for roads and groups of houses), 14 detention basins, 1 pond (lined), and a number of swales/linear ponds. The scheme is designed to function to limit discharge to the 50 year return period greenfield rate of 7l/s/ha and to function without flooding up to the 30 year return period event. An estimated 10 per cent increase in property value for those areas of the development in the vicinity of SuDS components or scheme.

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<sup>10</sup> Environment Agency (2006). Environmental Economy Report for the North West, Bridge Economics.

<sup>11</sup> DEFRA (2013) Green Infrastructure's contribution to economic growth: a review, Eftec



## Willmott Dixon Energy Service's response to the National Infrastructure Commission's Consultation on the "National Infrastructure Assessment Process and Methodology", May 2016

[name redacted], [job title redacted]  
[email address redacted]  
Willmott Dixon Energy Services  
July 2016

### 1. Introduction

Willmott Dixon is the UK's second largest privately-owned capital works, regeneration and support services company. Founded in 1852, and led by Group chief executive, Rick Willmott who is the fifth generation of the Willmott family to head the business. The company has a turnover of >£1.3bn and employs circa 3,000.

In addition to the capital works projects we undertake for government, local authority and private sector clients in the education, justice, commercial offices, retail, health and social housing sectors, we also deliver planned, preventative and responsive repairs to circa 250,000 social homes and, via our Energy Services business, provide low energy retrofit services to homes and businesses.

We see the transition to a low energy / carbon economy and tackling of fuel poverty as defining issues of our time and have engaged fully with this agenda through our own actions, such as a commitment to send zero waste to landfill, by becoming a carbon neutral business in 2014, as well as striving to be an industry leader in undertaking low energy home retrofit.

We welcome the opportunity to feed into the National Infrastructure Commission's (NIC) latest consultation on the plan for developing the UK's National Infrastructure Assessment (NIA).

Our response makes clear that **we strongly agree that building energy efficiency should be included firmly within the remit of the National Infrastructure Commission** as part of a whole energy system approach to providing a cost effective and largely de-carbonised energy system, which is affordable by all, by 2050.

In practice, this means ensuring energy efficiency is included in the NIC's workstreams related to evidence-gathering set out in the consultation document – specifically:

- The creation of expert panels and the running of roundtables in 2016/17;
- The Call for Evidence planned for Autumn 2016 – including “sector evidence reviews”, “economic and engineering modelling”, and “scenarios”;
- The Vision and Priorities paper (up to 2050) to be published by the NIC in the summer of 2017.

We also summarise answers to questions posed in the consultation document at Annex A.

We would welcome the opportunity to assist the NIC in its evidence-gathering efforts for the Vision and Priorities paper in 2017 and for the NIA itself in 2018.

## 2. The current position on energy efficiency

There is widespread agreement that energy efficiency in buildings has a crucially important role to play in the energy system; in helping to balance energy demand and supply; in supporting energy security objectives and in unleashing significant economic growth.

For example, authoritative research by Frontier Economics in 2015<sup>1</sup> showed that a national **programme of investment in the energy efficiency of the building stock in Britain, over a period of ten years, is capable of delivering major economic and social benefits – in the order of £8.7 billion**. This net benefit is comparable to other major infrastructure road and rail projects, including HS2 (Phase 1). The report concluded that there is a strong case for Government to make home energy efficiency an infrastructure investment priority and to develop an infrastructure programme to deliver it.

Analysis by **Cambridge Econometrics and Verco in 2012<sup>2</sup> also demonstrated that for every £1 invested in energy efficiency, £3.20 is returned to economy. In terms of jobs, a report by the UK-GBC in 2014 also highlighted that major investment in energy efficiency could almost double the number of people were employed in the energy efficiency industry to 260,000.**<sup>3</sup> In summary, that report also concluded that the economic case for making the energy efficiency of the UK housing stock a national infrastructure priority is strong.

Despite these significant economic benefits no public money has been allocated to home energy efficiency programmes instead funding has relied upon the Energy Company Obligation, a levy on energy bills, as the only vehicle for home energy efficiency. Further, political pressure to reduce energy bills in the short term, has reduced this source cutting home energy efficiency investment by a third since 2012.

We welcome the NIC's reference to *"the importance of looking at the future of heating and the shift to low carbon solutions in the context of the UK's carbon targets, and the important role that increasing energy efficiency could potentially play."*

In its latest progress report to Parliament, the Committee on Climate Change (CCC) repeatedly cited the Scottish Government's decision to designate energy efficiency as a 'national infrastructure project'. As part of this, an offer of support will be made to owners of all buildings in Scotland – residential and non-residential – to help them achieve a good energy efficiency rating over the next 15-20 years.<sup>4</sup>

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<sup>1</sup> Frontier Economics, Energy Efficiency: An Infrastructure Priority, 2015. <http://www.frontier-economics.com/documents/2015/09/energy-efficiency-infrastructure-priority.pdf>

<sup>2</sup> Building the Future, the economic and fiscal impacts of making homes more energy efficient, 2014 <http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf>

<sup>3</sup> Up from 135,000 in 2014. UKGBC, A Housing Stock Fit for the Future, 2014.

<http://www.ukgbc.org/resources/publication/housing-stock-fit-future-making-home-energy-efficiency-national-infrastructure>

<sup>4</sup> Committee on Climate Change, Meeting Carbon Budgets – 2016 Progress Report to Parliament, June 2016

### 3. Why a coordinated national infrastructure programme on energy efficiency is needed

Buildings are one of the largest energy using sectors, and therefore any robust long-term infrastructure plan for the future energy system must include investment in energy efficiency to reduce demand and increase energy security.

Reassuringly, between 2005 and 2013 UK homes saw a huge 30% drop in (weather adjusted) median gas consumption. At today's prices this means that approximately £5 billion less per year will be spent on gas alone across the UK's 27 million homes than if consumption had remained at 2005 levels. **DECC cited one of the reasons for this drop in consumption as being down to energy efficiency programmes, efficient boiler regulation and some austerity-driven thermostat adjustment with the trend starting well before the 2008 recession.** This is a great UK success story, meaning we are already far more energy secure than we otherwise might have been.

However, this progress was made by initiatives which are being reduced or are reaching the end of their effectiveness and the job of retrofitting the housing stock is only partially completed. Further, public investment has reduced in recent years and the impacts of tighter heating regulations, which have driven more efficient boilers to be specified when they are changed, has reducing effectiveness over time as the boilers reaching the ends of their lives are increasingly of the more efficient types. Indeed the UK's housing stock remains amongst the "leakiest" in Western Europe.<sup>5</sup>

Poor homes leave residents with high energy bills and the risk of ill-health in cold temperatures. It is well recognised that to avoid fuel poverty homes need to be at least a band C on an Energy Performance Certificate. There are over 20 million homes in the UK below this standard.

Whilst many of the 'easy' low energy measures of changing the boiler or loft and cavity insulation have been undertaken there are more to be tackled. As progress is made with these, the 'hard to treat' homes are increasingly left behind. Only a very small percentage of the country's 8 million solid walls have been insulated.

An area missed by the current focus on low cost measures and funding via an energy company obligation is the link between regeneration of neighbourhoods and delivery of very low energy retrofits. In the Netherlands, an innovative approach called 'Energiesprong'<sup>6</sup> has been adopted where neighbourhoods have been regenerated and the resulting homes are net zero energy. Enabled by a 'mass scale', industrialised approach to regeneration, costs are driven down and even partly funded by an energy charge being applied to householders in lieu of a traditional energy bill. Further, the whole house retrofits are undertaken in less than 3 days and the energy performance is assured by the contractor. This isn't a pipe dream. Over 600 have already been completed and this could provide a template for the UK to adopt. This approach is being promoted by EnergiesprongUK.

**We therefore strongly agree that building energy efficiency should be included firmly within the remit of the National Infrastructure Commission as part of a whole energy system approach to providing a cost effective and largely de-carbonised energy system by 2050.**

<sup>5</sup> EBR/ACE, The Cold Man of Europe <http://www.ukace.org/wp-content/uploads/2015/10/ACE-and-EBR-briefing-2015-10-Cold-man-of-Europe-update.pdf>

<sup>6</sup> See [www.energiesprong.uk](http://www.energiesprong.uk)

#### **4. Gathering data and evidence on the energy system and the role of energy efficiency for the Vision and Priorities paper and the NIA**

We note the NIC plans to create a governance structure, including expert panels and roundtables and ask that energy efficiency experts be represented in these structures. Similarly, we would be pleased to assist with the energy efficiency dimensions of the sector evidence reviews planned and modelling work to be carried out.

As the NIA's focus is on "long term needs", we suggest a key piece of analysis should be to investigate in detail how high levels of energy efficiency in buildings affect energy demand profiles over time, and as a result, how much supply-side capacity could be freed up.

Specifically, it should be possible to estimate the savings on future energy supply infrastructure costs by raising the energy performance of buildings across the country, regardless of the mix of low carbon heating solutions chosen.

A second theme for evidence gathering should relate to types of interventions and investments required to realise the energy efficiency levels needed. A good example of this is the pilot projects which are shortly starting in the UK using the Energiesprong approach to neighbourhood regeneration.

The thread running through low energy regeneration is that physical assets create infrastructure services as the NIC notes. In our sector, energy efficient buildings are the assets, and heat and comfort (plus economic growth, energy security etc.) are the services. By improving and maintaining the asset, we deliver the services more efficiently. In doing so, pressure on the supply-side is reduced.

#### **5. Conclusion**

By 2050 the UK will have to reduce greenhouse gas emissions by at least 80%. In light of the Paris Agreement it is highly likely that the UK will have to effectively produce net zero carbon emissions within 35 years. These targets cannot be met cost effectively unless there is a huge advance in home energy efficiency.

Energy demand reduction must be delivered as part of a joined up, whole energy system infrastructure approach. This not only makes sense from an energy system perspective, it also makes sense from an economic perspective, with the Government's own cost benefit analysis showing that an energy efficiency programme can deliver comparable economic benefits to other infrastructure programmes. But an energy efficiency infrastructure programme would also play a critical role in helping deliver a zero carbon energy system as well as tackling fuel poverty and reducing NHS costs related to cold homes. As part of an infrastructure programme, capital investment could be released to help bring all UK buildings up to at least EPC band C.

The days of delivering low cost energy efficiency measures to individual homes are mostly behind us. Home energy efficiency needs to be driven at as an infrastructure project so is within the remit of the NIC. The NIC's evidence gathering process and modelling work needs to investigate the critical role that an energy efficiency infrastructure programme can play in delivering a secure, cost effective and low carbon energy system which provides affordable warmth for all.

## Annex A

### Summary of answers to specific consultation questions

**Question 1** - What issues do you think are particularly important to consider as the Commission works to this objective?

It is easy to see how investing in building energy efficiency fosters sustainable economic growth and improves the quality of life in all regions of the UK due to its inherent local benefit and local delivery. Key for the NIA to consider is how such an infrastructure programme can be developed to provide a framework which gives the confidence, indeed provides the imperative, for industry to invest and innovate in order to drive better solutions, enhancing quality and reducing delivery costs.

**Question 3** - Do you agree that the NIA should cover these sectors in the way in which they are each described?

Yes. We welcome the focus on the energy system as a whole. As such it has to include the demand side, in terms of reducing the level of energy wasted, as well as the phasing of this demand relative to supply capacity.

**Question 4** - Are there particular aspects of infrastructure provision in these sectors which you think the NIA should focus on?

Yes, see Question 1.

**Question 6** - Do you agree that the NIA should focus on these cross-cutting issues?

Yes. Indeed we suggest that the NIA considers how radically different approaches might produce much more powerful results by challenging the received wisdom, such as happened in the Netherlands. The resulting 'energiesprong' zero net energy approach to regeneration of homes is a paradigm shift in thinking, with remarkable immediate results, spawning a potential mass scale delivery model for the future.

**Question 8** - Do you agree with this methodological approach to determine the needs and priorities?

Yes. A combination of evidence reviews, qualitative scenarios and quantitative modelling is a sensible approach.

**Question 12** - In your view, are there any relevant factors that have not been addressed by the Commission in its methodological approach?

We reiterate the importance of including energy efficiency experts, experience from overseas and evidence (specifically of buildings and our housing) in the development on the NIA's Vision and Priorities paper for 2017, and in the NIA itself in 2018.