

## The Prince of Wales's Corporate Leaders Group National Infrastructure Commission – Call for Evidence

The Prince of Wales's Corporate Leaders Group is pleased to provide a response to the call for evidence. Please find a short introduction to the Group followed by our response, concentrating in particular on the third challenge to improve how electricity demand and supply are balanced.

### **The Prince of Wales's Corporate Leaders Group (CLG)**

The CLG is a select club of European business leaders working together, under the patronage of The Prince of Wales and with the support and advice of the University of Cambridge Institute for Sustainability Leadership, to advocate solutions to climate change to policy makers and business peers at the highest level, both within the EU and globally.

The CLG members are committed to working towards business models that are compatible with the global emissions trajectory required to keep cumulative emissions below one trillion tonnes of carbon from manmade CO<sub>2</sub>, thus striving to limit global temperature rise to 2°C. CLG members are committed to playing a leadership role in securing a just, low carbon transition, both in terms of changing their own businesses and sectors, and advocating change in the wider economic and political context. At a minimum the CLG supports the goal of achieving net zero emissions globally well before 2100, and “at least” 40 per cent emissions reductions overall by 2030 and at least 80 per cent by 2050 EU-wide.

The CLG seeks to deliver its goal through bringing European business leaders together to advocate for policy change in relation to climate change and a low carbon transition, drawing on high-level convening, thought leadership, business innovation and new partnerships as required.

The CLG is composed of major companies including market leaders and household names that are representative of the majority of EU member states. It is deliberately composed to represent a broad cross section of business sectors, including service providers, retailers and consumer goods companies, infrastructure operators, energy generators, energy producers, energy intensive industries, advanced manufacturing, and technology suppliers.



The Prince of Wales's Corporate Leaders Group (CLG) is an initiative of the University of Cambridge Institute for Sustainability Leadership (CISL). CISL is not a member of the CLG but provides the secretariat to it<sup>1</sup>. For further details on the CLG's activities and plans please see <http://www.corporateleadersgroup.com/>.

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<sup>1</sup> Decisions of the CLG do not represent the policies or positions of CISL or of the wider University of Cambridge

## Consultation Response

Over the next 15 years nearly £60trillion will be invested in global infrastructure in urban, land-use and energy systems. Resource efficiency, infrastructure investment and innovation are key drivers of a new low-carbon growth model.<sup>2</sup>

As business leaders, our interests are aligned with the future of the UK economy, and we believe that the future could be bright. The UK has world-leading expertise and capacities in innovation, engineering, finance, and business that provide the foundation for leading the global transition to a sustainable, resilient and low carbon economy that would create jobs, prosperity and growth. As major UK businesses, we are playing our role by investing in new resilient, low-carbon infrastructure, goods and services, but a new economy will only be realised if government actively works with us to deliver this transformational change. This means a strong and stable policy framework, consistent rhetoric, and making the right choices about the infrastructure we plan to build, the way we intend to run it, and the incentives faced by business.

We believe there are four key characteristics of a prosperous and sustainable economy:

1. A secure, efficient and decarbonised power sector
2. A resilient, efficient and low carbon built environment
3. An integrated and secure transport system that enables ultra-low carbon choices
4. Sustainable consumption patterns that are supported and encouraged by policy frameworks, business models and supply chains.

The Corporate Leaders Group would like to emphasise the need to embed resilience to extreme weather and climate change into UK national infrastructure, all plans must look to reinforce and actively complement UK decarbonisation in line with long term climate goals.

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<sup>2</sup> 'Better Growth, Better Climate', The Global commission on the Economy and the Climate, September 2014

## National Challenge 3

**The future of UK energy infrastructure will be defined by a broad range of national and international trends and risks including: the Carbon Budgets; the EU Energy Union; European grid interconnection; the falling cost of renewables; resource price shocks; the Post-Paris international climate change regime; the electrification of transport and heat; and political pressure to control or reduce prices.**

We advocate that advancing efforts to address this challenge will need the Commission to ensure that it invests in its ability to exploit synergies across technologies, sectors and national borders, that it remains alert and flexible to opportunities and that it empowers those who control demand to be able to decide on relevant infrastructure. Future UK electricity and energy systems should be considered with a holistic infrastructure view, not contemplating electricity, heat and transport as separate and unconnected systems. Integration of these energy vectors is a necessary step towards decarbonisation; infrastructure development has to recognise this assimilation.

The UK Climate Change Committee (CCC) develops common, consistent and robust scenarios to underpin all infrastructure planning. Bodies such as UK Foresight show how complex and uncertain trends and technologies can be assessed in an open and participatory way so as to inform a comprehensive strategy.

### ***1. What changes may need to be made to the electricity market to ensure that supply and demand are balanced, whilst minimising cost to consumers, over the long-term?***

The CLG recognises that in efforts to balance supply and demand in the long term whilst minimising costs to consumers the Commission should recommend reforms that are likely to correct predicted imbalances in the 2020s at the lowest costs. Responding to these predictable future uncertainties requires an ability to understand and manage demand, integrate across infrastructure systems, build-in flexibility and preserve optionality.

The CCC's lowest cost decarbonisation scenario through to 2030 shows interconnection, demand response and storage deployment significantly increasing system flexibility. They have demonstrated that the lowest-cost trajectory to 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 in 2030<sup>3</sup>. Under this lowest-cost trajectory low-carbon generation reaches a total share of around 75% of generation by 2030. The CCC's analysis shows that the demand side has an important role in increasing the flexibility of the power system, alongside interconnection,

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<sup>3</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/>

storage and flexible back-up capacity; supporting the Commissions initial focus on lowest-cost balancing<sup>4</sup>.

Recent policy changes have removed all public investment in carbon capture and storage (CCS) development and deployment creating a very significant barrier to lowest cost balancing which the Commission should address in its recommendations to Government. The Department of Energy and Climate Change and the CCC conclude that a major deployment of carbon capture and storage (CCS) technology in the first half of the 2020s will drive down costs by reducing the requirement for low-carbon new generation. The Commission should draw on the expertise of the CCC and the Department of Energy and Climate Change to insure that it is addressing current and future balancing challenges rather than those that have already passed. If the Government chooses to ignore the changes to the UK energy system predicted in its own scenarios, and specified in its legally binding Carbon Budgets in order to simplify decision making today there is a high risk of policy failure; policy designed to address the balancing challenge of today will fail to address the very different challenges of the 2020s.

- *What role can changes to the market framework play to incentivise this outcome:*
  - *Is there a need for an independent system operator (SO)? How could the incentives faced by the SO be set to minimise long-run balancing costs?*
  - *Is there a need to further reform the “balancing market” and which market participants are responsible for imbalances?*
- *To what extent can demand-side management measures and embedded generation be used to increase the flexibility of the electricity system?*

The potential for consumers to respond to price signals and adjust demand is currently unknown but may be a very significant and cost-effective alternative to achieving system balance through supply side measures. The Commission should consider initiating or recommending a fundamental review of the issue of consumer engagement in the context of maximising the potential for demand flexibility and the decarbonisation of heat. The current market is based on the presumption that consumer engagement should be driven by price and price alone. Whilst there is likely to be a proportion of consumers, particularly those that are large or sophisticated, that will respond to price, many will not despite the low levels of effort required.

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<sup>4</sup> ‘Flexibility is important. To maximise the value of these investments and ensure security of supply it will be important to improve the flexibility of the power sector. That will require investment in flexible gas-fired generating capacity alongside expansion of international interconnection, flexible demand response and potentially electricity storage. The costs of these measures are included in our assessment of intermittency and system costs.’ Committee on Climate Change, Power sector scenarios for the fifth carbon budget, p7, October 2015, <https://www.theccc.org.uk/publication/power-sector-scenarios-for-the-fifth-carbon-budget/>

## **2. What are the barriers to the deployment of energy storage capacity?**

- *Are there specific market failures/barriers that prevent investment in energy storage that are not faced by other 'balancing' technologies? How might these be overcome?*

At present, energy storage does not provide the most efficient means to help balance the energy system when compared to demand side response, interconnection or generation. Energy storage systems are currently technically immature but have the potential for significant cost reductions over the coming years and decades.

Driving forward these technical developments requires new and additional R&D investment but also a programme of deployment to deliver 'learning by doing'. This, in turn, might require system operators, both at transmission and distribution level, to take a long term perspective on the potential benefits for cost efficiencies. These considerations must therefore be included within the relevant regulatory and incentivising frameworks.

- *What is the most appropriate scale for future energy storage technologies in the UK? (i.e. transmission network scale, the distributed network or the domestic scale.)*

## **3. What level of electricity interconnection is likely to be in the best interests of consumers?**

Evidence suggests the UK is currently under-connected with its neighbours and significantly greater levels of interconnection would be in the interests of consumers. The current wholesale price of electricity in the GB market is double the price of the German and Nordic electricity markets. Greater interconnection should lead to greater price convergence, including lower costs for GB consumers.

UK interconnection capacity represented only 6% of installed generation capacity in 2014. This puts the UK 21st out of 28 member states. In 2002, the European Council (including the UK) agreed a target for member states to reach interconnection capacity equivalent to 10% of installed generation capacity. The UK is unlikely to meet this level until 2021, 19 years after it was first agreed.

Interconnection is a strategic system resource. It plays four key functions to support the interests of UK consumers:

- First, greater interconnection between GB and European markets can enable optimal use of existing generation assets, meaning the most efficient plant are used first – lowering costs to consumers
- Second, interconnection across European markets can enable new generation (and/or demand) to be sited in the most optimal locations – for example for wind power to be located in the windiest regions and solar PV to be located in the locations with the most solar irradiation.
- Third, interconnection can act as a flexibility resource, to facilitate the integration of variable renewable generation.



- Fourth, interconnection can support energy security across asset replacement cycles – meaning the UK can import power when margins are low (as at present) and have the potential to become an electricity exporter in the future.

In this context, determining the best value interconnection level for consumers requires an assessment of the full system benefits, including enabling role interconnection plays in the energy transition - not just price differentials.

Interconnectors are long-term infrastructure. In a rapidly changing electricity system with major shifts to both generation and demand, the UK is unlikely to have completely optimal interconnection capacity at every moment in time. However, given the role of interconnection in creating system options and managing risk, underinvestment in interconnection may be more damaging to UK consumer welfare than overinvestment.

In recognition of the value of interconnection in developing the internal energy market, in October 2014 the European Council agreed a target for countries to achieve 15% interconnection capacity by 2030. This target helps to provide forward certainty for the industry as well as adding a political focus on moving investment forward. The 15% target should be seen as an appropriate minimum level of interconnection capacity for the UK to achieve by 2030, with further interconnection capacity developed if needed.

- *Is there a case for building interconnection out to a greater capacity or more rapidly than the current 'cap and floor' regime would allow beyond 2020? If so, why do you think the current arrangements are not sufficient to incentivise this investment?*

The 2020s will see the continuing convergence of investment in building efficiency, electricity and gas infrastructure, and the beginning of the integration of electricity and transport systems. It will be impossible to make a credible case for future energy investment without a clear assessment of the impact of regulation and public investment on future demand. This must include assessment of international power resources as the UK grid will be increasingly balanced at European scale, drawing on Norwegian hydroelectric, Irish wind and Spanish solar power<sup>5</sup>

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<sup>5</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/68816/216-2050-pathways-analysis-report.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/68816/216-2050-pathways-analysis-report.pdf)

- *Are there specific market failures/barriers that prevent investment in electricity interconnection that are not faced by other 'balancing' technologies? How might these be overcome?*

Interconnection faces specific barriers and challenges that are not faced by other balancing technologies. It is cross-border by nature, which means dealing with multiple jurisdictions and plays multiple roles in the energy system beyond system balancing alone.

Realising the benefits from more coordinated and strategic grid planning and interconnector system balancing requires the Commission to make significant political and regulatory reforms.

- Political reform can be achieved by refocusing political engagement with neighbouring countries to explore opportunities to co-operate on energy system planning and low carbon resource sharing. This should include bi-lateral discussions with key neighbouring countries and placing a strong mandate on the North Seas Countries Offshore Grid Initiative to exploit the opportunities associated with developing an offshore network.
- Regulatory reform requiring Ofgem to reform the regulatory system for onshore and offshore networks and interconnections to ensure effective co-ordination across the regimes as well as realising the full value of creating options to manage future uncertainty.