



National Infrastructure Commission: Call for evidence

Royal HaskoningDHV Response
Delivering Future-Proof Energy Infrastructure

07/01/2016

1.0 Introduction: Setting the context for our response

Royal HaskoningDHV is an independent, international engineering and project management consultancy with more than 130 years of experience. Backed by the expertise and experience of 7,000 colleagues all over the world, our professionals combine global expertise with local knowledge to deliver a multidisciplinary range of consultancy services for the entire living environment from over 130 countries. By showing leadership in sustainable development and innovation, together with our clients, we are working to become part of the solution to a more sustainable society now and into the future.

In the UK, Royal HaskoningDHV's experience encompasses projects in several sectors including ports, flood risk, energy generation, transport, aviation and waste. Our collaborative approach means that our staff work outside, as well as within, sectoral silos and across geographic boundaries, ensuring that we identify opportunities or issues of mutual relevance to our clients and share project solutions from other sectors or countries. We firmly believe that working in partnership across sectors and disciplines delivers successful outcomes that cannot be achieved by those working solely within a sector.

We therefore consider that the sectoral and geographic split of the three initial challenges facing the Commission risks limiting the identification of links between these challenges (and others). The National Infrastructure Commission has a 'once in a generation opportunity' to seek to understand the drivers that shape the characteristics of the regions of the UK and how those drivers and characteristics interrelate. Transport and energy should be the facilitators of this grand vision instead of being pushed into the role of drivers of economic growth.

Royal HaskoningDHV is one of the UK and Europe leading energy consultancies with a particular interest in renewable energy.

Our track record speaks for itself.

- We have 40 years' experience in onshore wind development
- We have provided consulting and design services to over 500 projects
- We have provided services to 11GW of offshore wind consenting projects in UK and Europe
- We have successfully lead the EIA and consent process for 8 GW of offshore wind capacity and associated transmission assets in the UK since 2004
- We have provided design and consent services on 1300km of offshore export HV cables from North Sea offshore wind projects
- We have also consented and helped to optimise the route for over 200km of onshore HV cables and their associated substations
- We are the leading consultancy providing technical and project development support to the tidal sector principally in the UK.
- Active energy from waste projects in the UK
- Active Biomass and Anaerobic digestion projects in the UK
- Royal HaskoningDHV employs over 200 professionals in the UK focussed on the energy sector predominantly providing technical and engineering services to the low carbon sectors.

The UK currently has a very significant and global leading position in the low carbon industry particularly driven by the renewable energy sector. The level of investment in the UK planned by European utilities and investors, most noticeably in the offshore wind sector is very significant indeed. If the investment can be delivered we believe it can be transformative, enhancing society and communities in the north of the UK in particular. In order for the investment to be delivered investors require two main things; a market which will allow for long term investment

with a reasonable rate of return; and more importantly long-term stability for the energy market, energy policy environment. . Our experience is that prior to December 2013 the cross-party support for renewables created the stability and confidence for developers and investors that allowed the UK wind and marine energy sector to surge ahead of the rest of the world. Whilst we accept reform in the market was required our primary call to government is to restore stability in the policy environment as well as the market.

In 2014 and 2015 we have seen the industry stutter and many major investors pull out of the UK due to losing confidence in the government's long term commitment. The COP in Paris last month and the governments very welcome response creates an opportunity for this National Infrastructure Commission to play a key role in delivering stable market arrangements that allow the transition in our energy generation infrastructure from centralised power stations to a model of a dispersed mix of generation linked into the European energy market.

We welcome and support the consultation and questions asked but urge the commissioners to look further and consider the changes made today in the context of the inevitable transition to the energy infrastructure and market the UK will need in 20 and 50 years' time. With this long term view clearly in mind the commission can set a clear direction for the UK's transmission market and system into the future.

2.0 What changes may need to be made to the electricity market to ensure that supply and demands are balanced, whilst minimising cost to consumers, over the long-term?

Royal HaskoningDHV would argue that the questions posed in the consultation are too narrow and miss the fundamental challenge that is upon the UK now. The UK energy generation and transmission sector retains much of its original model of centralised heavy carbon electricity generation with an associated demand-led national grid developed to deliver power where it is needed. The development of renewable energy generation capacity, particularly wind, has challenged this model but has been incorporated whilst preserving much of the original market paradigms. The challenge now for the NIC and UK Government is to recognise that the present model, handed down from the 1950s, is redundant and is increasingly inhibiting the transition to reliable, cheap and low carbon energy market needed in 21st century Britain.

We urge the NIC to consider reforms to the transmission market that will encourage the evolution (rather than revolution) of the transmission network towards one that will accept greater dispersed generation, flexibility and interconnectivity between the UK and our European neighbours. Key factors to consider are:

1. Assurance of grid connection for dispersed generation projects.

The standoff over Orkney and Western Isles connections has had a significant and detrimental effect on the development of renewable industry in these areas. Connectivity is a key risk for any project and its investors. There needs to be greater flexibility and incentives for The Network Operator (TNO) to allow, reward and proactively incentivise these enabling developments to occur. We would also seek to ensure that once a commitment is given by TNO to create a connection that it is held to a fixed timetable through penalties that reflect the consequential damages of delay.

2. A long-term vision for the direction of the UK Grid development which provides assurance to project developers.

The Grid development scenario approaches provided by National Grid are a helpful indicator but without a long-term vision, either set by or endorsed by the government. The risk is that we see a continuation of the same policies without any real movement towards the more flexible and integrated grid the UK needs.

3. OFGEM Price Control to reflect low carbon policies

The energy generation market is increasingly driven by the need to meet the goal of low carbon, reliable and cost-effective power generation. We do not see the same policies being actively implemented in the transmission price control or Revenue=Incentives+ Innovation+Outputs (RIIO) process. OFGEM mention a move to a low carbon economy but in practice we feel much more can and should be done.

It will be key for the future balancing of the transmission system, and to ensure the benefits of low carbon energy can be passed on to consumers, to ensure that the OFGEM price control systems for the Network operator properly reflect the UK's international obligations to reduce carbon emissions.

4. Linking flexibility to the distribution and demand side

As explained above the current grid system is primarily continuing to work to a centralised generation paradigm and so its systems and processes are set up in this way. It is clear that to meet our carbon emissions targets the UK needs to move towards an ever diversified energy generation market with large, medium and increasingly small energy generation and storage projects coming on line. In order to be ready for these developments we feel there is a need to ensure the transmission and to some extent the distribution grid is able to accommodate and support innovation and investment to ensure greater flexibility in the use of the grid.

3.0 What are the barriers to the deployment of energy storage capacity?

Royal HaskoningDHV have limited visibility of the energy storage sector however we are pleased to provide a broad summary of our views.

The technologies for energy storage are varied our view is summarised below.

Pump Power Storage systems

- Tried and tested technology used reliably for decades
- Tend to be large scale
- Capital cost very high, operational costs very low
- Location specific requirements exacting and tend to result in them being located away from the main markets

Battery Systems

- Comparatively new systems
- Low capacity of 0.2 – 5MW range
- Longevity (number of cycles per battery) is not well tested
- Can be used to 'trim' peaks in generation and so facilitate greater transmission capacity within existing infrastructure. Particularly useful to regulate and trim wind farm peak loads
- Technology developing quickly
- Capital cost is lower, operational costs variable.

Other systems such as flywheel or stored kinetic energy systems exist but we feel are mainly applicable to improving power quality by load levelling.

The barriers to deployment are very different between the two systems. The barriers to large scale pump storage systems (once environmental and planning concerns can be met) tend to be financial and business case uncertainties and the availability of technically feasible sites in strategically important locations.

The key barriers to deployment of more online and small scale, usually battery based, energy storage systems appears to be the lack of a market, or market supporting mechanisms for these third party services. Slow take up of storage technology risks creating a negative cycle where the potential value of the systems is not fully recognised. If energy storage systems are not adopted in a range of real-world situations, it is impossible to measure their value, and consequently monetizing their value will remain problematic.

We believe that the actions required are;

1. Invest in energy storage to maximise transmission

We feel there is a case to consider the use of energy storage systems as load levelling systems associated with the transmission network as a matter of urgency. Driving efficiency in the power network is far cheaper than the cost of upgrades. We feel with the strategic use of energy storage the capacity for more dispersed renewable energy generation can be enhanced. The use of energy storage would allow electricity transmission grids to operate more efficiently and cost effectively, allowing the system to be run at average load rather than the current maximum peak load.

Creating and supporting a market for the implementation of energy storage as part of the national grid network is a challenging but necessary step to monetizing the technology and ensuring effective investment.

Considering how such an investment can be paid for, many wind farm developers are looking at installing their own 'peak shedding' technology. It may be cheaper to have a more centralised system built into the transmission grid to accommodate a more diverse generation portfolio from multiple generators.

If undertaken effectively the energy storage could help end the absurdity of wind farms being required to close down on particularly windy days.

2. A Vision of Smart Technology Across the Grid

Initial opportunities lie at the transmission scale to ensure the system is operated far closer to average load than to peak loads. However what is required is a broader vision of both an energy transmission and consumer system where flexibility and the cost saving benefits of smart energy technology can be maximised.

Smart meters in homes are a good start and the consumer can now take advantage of remote and maximised appliance management to minimise cost (and so maximise efficiency). It is at the distribution network level that dispersed generation will need to be accommodated with increasing pace. Energy storage and buffering will play an important role in meeting increasingly episodic demand from consumers who self-generate most but not all of their electricity.

The picture is a complex one and getting more so, we welcome the National Grid's Future Energy Scenarios and would encourage them to be broader and to take the step beyond the scenarios to set a vision for the future with a suite of clear investment policies and priorities.

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

It is Royal HaskoningDHV position that the most beneficial level of electrical interconnection for the UK consumers is for the UK to become part of a wider interconnected European electricity network and taking part in an integrated European Electricity market process.

In simple terms the benefits of an integrated European Electrical distribution system are:

- Significant efficiency gains as market coupling allows generation capacity to be used far more efficiently and helps to avoid over generation of unusable electricity. Time differences between Europe and the UK mean peak demands rarely interact and the UK stands to be a significant beneficiary of such integration.
- Significant improvement in efficiencies of generation capacity and reserve energy management across Europe.
- Increased competition in the UK electricity market providing lower costs for UK consumers
- A single set of grid codes and a single market design and regulatory function
- The development of a European renewable energy strategy rather than a patchwork of National plans.
- Fair, transparent, and non-discriminatory access to the high-voltage transmission network for UK generators.

Further information

We would be delighted to engage with the Commission to provide further explanation and to participate in the discussion surrounding the challenges.

Our lead contact for delivering future-proof energy infrastructure is Alistair Davison. Alistair can be contacted via:

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