

Written Submission

Energy and Climate Change Committee Inquiry Low carbon network infrastructure

About Balfour Beatty

1. Balfour Beatty's Power Transmission and Distribution teams work with regional, national and international electricity network owners and operators to provide technical engineering solutions.
2. With experience and expertise across the full spectrum of the electricity grid, including overhead lines, cable tunnels and distribution networks, we deliver a range of proactive and reactive services which support a reliable and safe supply of power flowing to millions of homes and businesses around the world.
3. From scoping and feasibility, to design, construction and on-going maintenance, our in-house experts, flexible resources and industry-leading innovations support clients in the development of some of the world's most ambitious power transmission and distribution projects.

UK electricity infrastructure

4. Having a resilient electricity system is vital for a growing economy. However, developing energy infrastructure that is fit for the future is a significant challenge. Part of that challenge is ensuring that new power sources, whether from nuclear or wind and other renewables, are connected to the electricity transmission network in order to move the electricity to where it is needed. In England and Wales, much of the new electricity generation will be in remote locations such as on the coast, or offshore, where there is little existing transmission infrastructure, so additional transmission capacity will be necessary to transport the energy to towns and cities.
5. It will also be necessary to carry out work on existing areas of the network to upgrade and reinforce it to make it fit for these new low carbon sources of electricity.
6. As the UK transitions to a low carbon economy, it is likely that electricity supply and demand variability will increase, driven by changes in the electricity generation mix; an increased in the proportion of variable renewable generation such as wind, solar and tidal, and a decrease in the proportion of flexible, conventional generation likely to be fuelled by gas.
7. In terms of variable renewables, the output from wind and solar generation for example, can often be unpredictable. To ensure a reliable supply of electricity, it will be necessary to ensure that reserves can be held. There are a number of ways this could potentially be resolved, including greater exploitation of conventional generation and energy storage. Electricity storage

could be revolutionary in terms of balancing electricity supply and demand if it is possible to find a way of doing it cost-effectively.

8. The UK's transmission and distribution networks are limited in the investment that they can make to accommodate increasing amounts of distributed generation. As such, bottlenecks in the capacity of the networks are stifling the investment in new generation.
9. The funding mechanism for the network operators is partly to blame, as the funding is focused on the cost of the transmission and distribution networks rather than the cost impact on the whole electricity market. These issues are partly the cause for the current crunch in capacity and are drivers for the introduction of the Capacity Mechanism.
10. These issues could potentially be addressed through the use of a reopener mechanism for the distribution networks, to cover additional costs. This could be similar to the Strategic Wider Works¹ funding mechanism for the transmission network operators and could be used to develop economic solutions to accommodate increased distributed generation.
11. Use of a reopener mechanism would also mean that grid connections could be more readily available, particularly if the network operator is funded only for an reinforcement or refurbishment work required to accommodate the new connection and the generator is required to fund the connection, either through higher use of system charges or a lump sum up front fee.
12. The UK's electricity infrastructure is limited in its ability to balance the network without over-supply of generation, due to the losses in the transmission and distribution networks and the ability to quickly drop generation to respond to a drop in demand. There are a number of solutions that could improve this situation and reduce oversupply. These include the installation of more undeviating (via high-voltage direct current or alternating current) infrastructure to link generation more directly to demand e.g. linking onshore wind generation in Scotland to demand in South East England using the planned Eastern bootstraps.
13. Alternatively a requirement for distribution networks to take a more active role in their system's management and balancing, together with an obligation to procure a capacity of storage to support demand centres – similar to the requirement in California – could create a more efficient and balanced electricity system. These solutions could also reduce the environmental impact of developing the network to be low carbon, particularly if network operators are encouraged to upgrade existing infrastructure or utilise existing network corridors.
14. In addition if network operators are encouraged to take the lead on developing energy storage solutions, this could have a positive impact on the cost of electricity by reducing the price-time differentials. Increased energy storage at distribution and transmission level could also have a positive impact on the environmental impact of the electricity infrastructure through reducing the number of 'peak' power plants which are required to support demand and by ensuring that low carbon generation can be stored to meet demand.
15. The biggest challenge for the network operators in achieving a low carbon network is the limitation of their funding. Although schemes like the Low Carbon Network Fund (LCNF) have shown the possibilities for innovation in network design and management, the cost of implementing these schemes en masse is too high. When the cost challenge of the RIIO² regime is

¹ Ofgem, Strategic Wider Works mechanism <https://www.ofgem.gov.uk/electricity/transmission-networks/critical-investments/strategic-wider-works>

² RIIO is Ofgem's framework for setting price controls for network companies

added into the mix, it is easy to see why network operators are looking to low cost contractors to support them in the maintenance of their networks. Whilst this may be cost effective in the short run, it stifles innovation within their supply chain and reduces the ability of the network operators to use more competent contractors to work together to identify opportunities for innovation as part of the development of the networks or deliver innovative solutions in construction.

16. Ofgem incentivises the network operators fairly well to develop innovation, but often they are forced to choose a single solution from a sole supplier to progress for funding support.
17. Energy projects take years to plan, design and build. Significant funds will be needed to ensure that the UK's electricity infrastructure is resilient and fit for the future. These will not be forthcoming without ongoing investors being confident in the policy landscape. The UK has recently lost its place in the top ten markets for clean energy according to the Renewable Energy Country Attractiveness Index³, as investors have taken up opportunities in markets overseas. We would therefore urge an end to the recent sudden changes in direction in energy policy, in order to maintain investor confidence.

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³ EY, RECAI Issue 45, [Renewable energy country attractiveness index](#), September 2015