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29 April 2016

Dear James

### **Consultation on getting an electricity connection when the network is constrained**

I refer to the above consultation document published 4 March 2016. UK Power Networks recognises that the focus of the consultation is on our customers' view of industry performance. However, such is our commitment and drive to facilitating the connection of DG to our network we wanted to take the opportunity to share our perspective on the growth of the DG market.

UK Power Networks owns, operates and maintains the electricity distribution networks in the east of England, the south-east of England and the economically vibrant London area providing electricity to over eight million customers.

Over the last five years we have witnessed a remarkable change in the diversity of the enquiries and ultimately connections made to our network. This network was traditionally designed and built to distribute electricity in one direction from grid supply points (our interface with the National Grid) through to commercial, industrial and domestic customers. It is now increasingly hosting large numbers of distributed generators (DG), exporting power from the primary renewable resources of wind and solar energy and that electricity is no longer moving only in one direction.

At UK Power Networks, we have found ourselves in the vanguard of the growth in this sector as generators seek to secure a connection to the local distribution system. From a historical base activity level of around 1,000 enquiries in 2010, volumes have increased at a phenomenal rate to over 8,000 in 2015. Pro-active engagement with customers has been critical to our success in connecting customers and we have provided expert advice to more than 160 customers at our DG surgeries in 2015 alone.

Whilst the growth in enquiry volumes for the connection of DG is not unique to UK Power Networks, we have connected 4GW of generation to the UK Power Networks area, representing a significant proportion of DG connected within the UK. In the first quarter alone this year we have connected approximately 400MW to our network. Five of the schemes energised during this period have been in constrained areas of our network where active network management has allowed the generation to connect economically.

The growth of the DG market has pushed parts of our network to very high levels of utilisation.



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The successful connection of this volume of DG has been enabled through much closer engagement with our customers through DG stakeholder forums, one-to-one meetings and customer surgeries. From these sessions we have embedded new commercial, technical and service innovations into our routine business activity.

It was as a result of this engagement that UK Power Networks, through the support of the initiated Low Carbon Network Fund, carried out the ground breaking £9million tier 2 Low Carbon Network Fund *Flexible Plug and Play* project which developed innovative ways to connect wind and solar DG schemes in an area of Cambridgeshire using active network management.

This approach to flexibility has now become standard business practice and last year we rolled out flexible connection solutions to new areas in our eastern region. To date, we have connected over 125 MVA of generation that has delivered direct savings in connection charges of over £70m to over 30 of our larger customers. Not only are they saving money and making their projects viable, but by avoiding extensive reinforcement they can connect their projects faster, which is exactly what customers told us they wanted.

Later this year we are bringing flexible connection solutions to another four areas of our network and expect to be able to connect a further 30 MW.

In addition we have deployed a range of measures on our own network to release further capacity. A good example was our use of smart devices to trial new and innovative types of protection schemes in parallel with traditional systems to try and maximise network utilisation. Our extensive trials were successful in allowing us to implement a new type of protection system that allows us to overcome problems with the reverse power flows associated with generation connections meaning we can export more generation while maintaining the integrity of the network if faults occur.

Through our regular engagement with stakeholders in 2015 it became clear that energy storage was a technology that a number of our customers were interested in exploring. We have had more than 9GW of enquiries about connecting storage since September 2015 reflecting the interest in the services this technology is able to provide.

We have been quick to share the learning from our Low Carbon Networks Fund energy storage project and hosted a workshop with over 25 developers. One of the key outcomes of that session was learning that storage developers would like to be informed about where in the network they can connect. Working on the premise that such a tool would need energy import and export visibility, we set up a session with some of the storage developers to discuss the technical challenges of developing it. Four companies joined us for this exercise and we received feedback on how it could be improved. We plan to publish this information in the form of a 'storage heat map' later this year.

The high levels of utilisation on our own network have in some areas had a knock-on effect for National Grid. We have been working hard with National Grid to develop proposals to reconfigure areas of the network to facilitate additional connections. Our Kent Active System Management (KASM) project is looking at unlocking additional capacity through more advanced network management tools and we have proposed an extension to this to develop integrated distribution and transmission active network management.

The KASM project will link up UK Power Networks' and National Grid's control centres and will demonstrate for the first time the value of contingency analysis software on a distribution network. The software will also use a suite of load and generation forecasting modules to predict the

likelihood and effect of outages like failures of overhead lines in real-time. This will enable Control Engineers to take appropriate preventive action to keep the distribution network secure and reliable. Planners will also be able to use the software to automate the analysis of multiple possible contingency scenarios.

The East Kent area is a complex system of embedded generation and interconnections to the continent and currently requires 34 contingency scenarios to be manually analysed in order to understand it fully. The complex network management issue means limited additional generation can be connected in the short term. The contingency analysis software is expected to give us more confidence to operate the network closer to its limits, potentially enabling the deferment of significant customer funded reinforcement, and it will help reduce constraints placed on generators during planned outages.

Despite the success of our projects we are not complacent. The market continues to evolve and our customers expect us to continue to provide advice and expertise and deliver real solutions to the challenges of constrained networks. We will continue to innovate and actively engage with customers to test new ideas and bring them to market.

If you have any queries on this please do not hesitate to contact us.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Mark Adolphus', with a stylized flourish at the end.

Mark Adolphus  
Director of Connections

Copy: James Hope, Head of Regulation and Regulatory Finance