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Dear Dora,

Low Carbon Networks Fund – electricity demand

National Grid owns and operates the high voltage electricity transmission system in England and Wales and, as National Electricity Transmission System Operator (NETSO); we operate the Scottish high voltage transmission system. National Grid also owns and operates the gas transmission system throughout Great Britain and through our low pressure gas distribution business we distribute gas in the heart of England to approximately eleven million businesses, schools and homes. In the UK, our primary duties under the Electricity and Gas Acts are to develop and maintain efficient networks and also facilitate competition in the generation and supply of electricity and the supply of gas. Our activities include the residual balancing in close to real time of the electricity and gas markets on behalf of consumers.

National Grid contracts for demand side response services and is constantly looking to develop these to facilitate new entrants and developments in this market. Alongside this, we model our Future Energy Scenarios which includes assumptions on demand shifting and reduction. Innovation allows us to bridge between our business as usual developments and our long term modelling; improving our scenario assumptions and highlighting where we need to develop our tools and networks for the future.

We are currently involved in various Low Carbon Network Fund Projects lead by the Distribution Network Operators (DNOs), where we are able to provide support from the view of transmission which ensures that whole systems benefit can be tested and realised from innovative smart grid solutions. Further to this, we are also working closely with DNOs through workshops to develop our joint understanding of how demand side markets may play out in the future. The Low Carbon Network Fund (and Network Innovation Competition) provides a suitable vehicle for encouraging collaborative and innovative ways of working. Our response to your letters questions are detailed below.

1. Do you agree that trialling electricity demand reduction or shifting through the LCN Fund could provide DNOs with valuable learning on their role in supporting the development of a low carbon economy?

Yes, demand shifting and reduction can play an important role in our future energy systems which can be developed by its inclusion in innovation projects.

Value to the Distribution Network Operators

Networks could use demand shifting and reduction for a multitude of purposes as they move from passive systems to actively managed networks.

- Managing network constraints: using voluntary demand management, demand shifting and reduction, to manage network constraints and faults to prevent compulsory disconnections or generation curtailment.
- Speeding up connections: to speed up network connections, demand shifting and reduction can be used to optimise the system usage and generation output enabling low carbon generation to connect sooner and curtailment to be reduced.
- Delaying network investments: By reducing peak demand or balancing supply and demand for short periods of system tightness, investment in the networks can be reduced.
- Active system management: Optimising the balance of supply and demand on a local level, ahead of market gate closure, can assist in managing the system at a lower cost, reducing peak demand and therefore the cost of generation and infrastructure, facilitating earlier connection of low carbon technologies.

The methods utilised and benefits achieved from demand shifting and reduction may differ across geographical regions. This is something that has come out strongly through workshops with the DNOs. For example, areas with high renewable connections and low demand may predominantly use demand shifting and reduction as a way of speeding up the connection process and renewable output; however, dense urban areas with high levels of photovoltaics may find more value from a system balancing perspective.

The level of distributed generation in some system areas is significant and so is the value which can be saved by using demand shifting and reduction to manage the systems rather than investing in network capacity. As the system operator we consider demand net of distributed generation. We believe that innovation in demand shifting and reduction needs to consider both the active management of demand and distributed generation as it is the net effect that impacts our networks and considering one in isolation will not reflect the true savings, impact and role that active network management could have.

Coordination and System Benefit

The LCNF should ensure that the scope is available for DNOs to trial demand shifting and reduction both for their own purposes but also how this can be incorporated with value along the whole energy systems value

chain. It is widely recognised that demand shifting and reduction can be utilised by different parties and not exclusively the networks. For the optimum value to be realised and to enable it to achieve penetration and scale, it needs to be coordinated across parties, technologies and commercial arrangements developed.

Value to the System Operator and Enabling Access of Shared Services

Demand side response has a role at the transmission system level as well as the local level. Development is required to facilitate the sharing of demand shifting and reduction services and enabling access to this value across the market. For example, through coordination the DNOs and other market parties could contribute and contract for this as an aggregated service both providing value to them and benefits to the system operator.

Beyond the Meter and the Whole House/ Whole System Solution

Developments and innovation should not be constrained to technological developments but also behavioural, incentive and contractual developments 'beyond the meter'.

Demand shifting and reduction can sit alongside energy efficiency; we believe it would be efficient and effective for energy efficiency to be included in projects for several reasons. It is acknowledged that coordinated communication with the consumer will be of greatest impact; new technology in the home may also have an energy efficiency benefit as well as facilitating demand side response and the value of this needs to be captured. Separating energy efficiency and demand side response may mean the potential is not fully realised

By considering further developments 'beyond the meter' we can evaluate the impact and effect on consumers, their behaviour and demand. We can analyse how the future housing stock and consumers may behave and not just consider demand shifting and reduction in isolation. For example by installing more efficient heating in homes we can monitor both the energy efficiency impact and trial how it can be used for demand side response and energy storage. When then combining this with other technologies such as automated smart appliances and electric vehicles we get a complex interacting system.

An example of innovation from a 'whole house' perspective would be the SSE Zero Carbon Homes project¹. In this project zero carbon homes were built which incorporate a range of technologies such as heat pumps, solar photovoltaics, biomass boilers, triple glazed windows and efficient appliances. It is homes like this which will be the housing stock of the future and we should not limit our ability to trial innovation to retrofits or half-way-houses.

Value to the Consumer

Demand shifting and reduction and innovation in this area should create savings across the market that can be passed on to consumers and allow them make more informed decisions and choose from a wider range of developed technologies to make their own savings. It should provide choice to consumers regarding the usage of electricity and prevent cross-subsidies among consumers.

¹ <http://www.ssezerocarbonhomes.com/>

Key points:

- Whole house and whole system is key; how demand shifting can be integrated alongside other technologies and techniques and shared across market participants. It should not be seen to stop at the meter as the system will, in the future, integrate and be influenced by technology and the consumers. We need to consider the impact and role of the housing stock of the future and as such should not limit the options available for innovation.
- The impact and management of distributed generation affects the level of demand seen by the NETSO and can be managed by demand shifting and reduction and other methods.
- Not all DNOs will use demand shifting and reduction in the same way and so it should not be assumed that the learning from LCNF projects would be valuable across all network parties.
- Innovation needs to allow for benefits to be realised across a multitude of parties for it to achieve penetration and scale.

2. Does the drafting proposed in annex 1 facilitate the trialling of electricity demand reduction or shifting through the LCN Fund?

With regards to equipment we would propose that the changes incorporate equipment for monitoring the shift in demand and linking this with external systems where these systems do not form part of business as usual equipment or developments.

In addition to the changes recommended we would suggest that as the value of demand shifting and reduction is spread across different parts of the value chain, the value beyond the DNOs themselves should be considered as part of the criteria.

Network Innovation Competition

The Network Innovation Competition (NIC) that commences in April 2013 is very closely aligned to the LCNF. The changes that are proposed to the LCNF to explicitly accommodate demand shifting and reduction are also likely to be relevant to the NIC, both for the electricity and gas networks.

We need to ensure that innovation continuing under the NIC continues in a coordinated and transparent manner. This will enable the market to realise whole system benefits as we've described above and that there is transparency of our actions so that we can understand the impact we may have on other market participants through technology installation, actions and communication to consumers.

We need to consider the impact on consumers as different trials take place alongside normal market changes and communication. We need to ensure there is no duplication, conflicting messages or unintended consequences which may happen if parties do not cooperate and act together both in their aims and communication.

Yours Sincerely,

Craig Dyke
Strategy Development Manager