Energy and Climate Change Select Committee – Inquiry into future of the UK's low carbon electricity network infrastructure

British Gas response

November 2015

Executive Summary

Over recent years there has been a series of upgrades to our electricity networks. British Gas believes that we are now in a position where the country's electricity infrastructure is largely well equipped to meet the demands of today's energy system.

We are concerned about the rising impact of network costs on customer bills. Network costs typically account for £270 of a £1,150 dual fuel residential bill (£134 for electricity network costs), and have risen by around 30% over the last 4 years[1]. British Gas, alongside other interested parties such as Citizens' Advice[2], has been keen to ensure that value is delivered for customers.

Long term network demand is uncertain

We recognise that GB's energy landscape will change as more low carbon and renewable generation sources connect to the grid, and progress is made towards the electrification of transport. It is, however, uncertain what direct impact this will have on electricity networks, especially over the long term.

National Grid's 'Future Energy Scenarios' report[3] shows that across all 4 of its planning scenarios, total annual electricity demand is predicted to fall between 2014 and 2020. In 3 of the 4 scenarios demand continues to fall or remain broadly flat out to 2030 (relative to 2014 levels), while in the remaining stretch ('Gone Green') scenario, demand increases by ~ 7%.

British Gas considers that increasing energy efficiency, combined with developments such as demand side response, district heating and distributed energy and power will play an important role in helping to offset underlying drivers of demand, alleviating pressure on the centralised grid networks.

We believe that a key focus for policy makers should be based on delivering any new investment at least cost to customers by reducing the need for grid reinforcement. This can be achieved both through the successful deployment of new technologies and smarter optimisation of the networks.

[1] British Gas billing data, based on a 2014 electricity bill
[2] Citizens Advice, *Many Happy Returns? The Consumer Impact of Price Controls in Regulated Networks*, 2015, https://www.citizensadvice.org.uk/Global/CitizensAdvice/Corporate%20content/Publications/ManyHappyReturns-NewBrandEdition%20(2).pdf
[3] National Grid, *Future Energy Scenarios*, July 2015

Evolving technologies stand to reduce the burden on electricity networks

Our parent company Centrica published its strategic review earlier this year.[4] As part of that review both Centrica and British Gas committed to prioritise investment in distributed energy and heating systems.

Distributed energy brings together flexible, local generation, storage and energy efficiency measures. That includes demand side response, enabled by smart metering, as well as battery storage. These schemes are managed by smart energy control centres to ensure costs and emissions are kept as low as possible.

As distributed energy and heating schemes deliver power and heat locally, very close to sources of demand, they will often use less of the centralised network infrastructure, and will help improve energy productivity by reducing losses.[5] They can also help reduce or avoid demand at peak times, reducing network charges for those using the schemes and reducing the need for additional investment in network infrastructure itself and centralised generation. When pricing signals, such as network charges, are cost-reflective this should all allow energy to be delivered to customers at least-cost.

Certainty over the policy framework and the future roles of DNOs

The incentives for communities and businesses to invest in district heating and distributed energy schemes is based across a range of policies, many of which are currently under review (i.e. FiTs, RHI, energy efficiency, business energy efficiency taxation and planning policy). In order to ensure the long-term development of this nascent market, and the cost benefits which can be brought to the electricity network, we believe that greater policy and regulatory certainty is required.

We also consider suppliers and community generators will be the prime route through which distributed energy and district heating schemes are delivered. We believe both National Grid and network operators should retain independence, so as not to foreclose the market to suppliers and other investors. We also believe that the development of customer facing functions across network operators would increase DNO operating costs unnecessarily, and is unlikely to deliver best value for customers.

[4] Centrica Strategic Review, July 2015, https://www.centrica.com/news/interim-results-2015-and-outcome-strategic-review

[5] 54% of energy used in generation is currently lost in the network. DECC, 2015, Digest of United Kingdom Energy Statistics, Chapters 5 and 7.

Question1 - What are the limitations of today's electricity infrastructure and how can these limitations be addressed?

Over recent years, there have been a series of upgrades to the electricity networks. British Gas believes that we are now in a position where our electricity infrastructure is well-equipped to meet the demands of today's energy system.

National Grid's 'Future Energy Scenarios', and DECC's 2050 Pathways Analysis both set out a range of different scenarios for the deployment of new technologies, such as renewable electricity generation, electric heat pumps, electric vehicles and micro-generation.

The extent to which these technologies are deployed, and the manner in which they are deployed (i.e. as part of a distributed energy or district heating network) will have a bearing on what levels of additional investment may, or may not, be required in the electricity networks.

To date we have not seen sufficient growth in this sector to warrant substantial upgrades to electricity infrastructure. If, in the future, changes are needed to ensure the networks can meet shifting demands, this must be done cost effectively. Government and the Select Committee should consider how our networks can evolve, without the need for costly upgrades, which ultimately add costs to consumer bills.

British Gas believes there are a number of alternative ways to meet new stresses placed on the electricity system. These are more cost-effective than would be possible through traditional methods of grid reinforcement.

We believe that distributed energy, district heating schemes, smart grids and low-carbon gas-based technologies (such as gas absorption heat pumps) have an important role to play in helping reduce or slow the need for electricity infrastructure upgrades.

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centralised generation. When pricing signals, such as network charges, are cost-reflective this should allow energy to be delivered to customers at least cost. This makes it important that network charges should therefore seek to reflect accurately the costs of network reinforcement to customers.

In addition, low-carbon gas-based technologies and heat networks also have the ability to reduce the need to make changes to the electricity infrastructure. Emerging technologies, such as microCHP, are not intermittent and generate most of their electricity at peak generation times, thereby reducing pressure on the grid. Heat networks also create new infrastructure, which can be used with different technologies as new, lower-carbon technologies emerge.

Question 2 - What will a low carbon network look like, what are the challenges for Government and other bodies in achieving it, and what benefits (environmental, financial or otherwise) will it bring to the UK?

British Gas recognises the potential benefits that a low-carbon network can deliver for customers across the UK.

The UK is expected to see an increase in the use of electricity as a source of heat and transport in the coming years, changing demands on existing infrastructure. At the same time, new smart technologies are expected to lead to the emergence of self-balancing homes, businesses, communities and micro-grids.

Taken together, these innovations and developments fundamentally change the relationship between the customer and the supplier, turning consumers into 'prosumers' (customers who both produce and consume energy). These changes have the potential to mean the low-carbon network will essentially become a back-up or insurance system – as opposed to the extensive smart infrastructure network that has previously been anticipated.

Much of the innovation described above is dependent on a range of Government policy and regulation. Feed in Tariffs (FiTs), the Renewable Heat Incentive (RHI), planning policy, tax incentives[6] and energy efficiency policy (ECO) all send market signals to investors looking to

[6] We note that HM Treasury is currently consulting on additional incentives which could increase the uptake of business energy efficiency. We believe Government should consider incentivising measures such as battery storage and solar as part of this, to increase adoption of distributed energy solutions. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/464304/PU1853_business_energy.pdf

develop district heating and/or distributed energy projects. In light of recent changes to FiTs and wider policy, such as Zero Carbon Homes, we believe Government needs to clearly articulate the future trajectory of these policies, to provide the certainty investors require.

More fundamentally we note that the existing network pricing framework (i.e. STOR, Triads etc) is driven by physical grid considerations. As we transition into a shared services environment where suppliers and commercial businesses play an increasing role, thought will need to be given to how the pricing system can evolve.

Finally, we also note that some elements of the existing framework for setting transmission network charges also act as a disincentive to storage units seeking to export power to the grid. Storage units are effectively charged twice as transmission network charges impose charges when energy is imported from and exported to the grid, unlike generation only assets which only pay grid charges once. We believe this discrepancy should be addressed as part of wider preparations for an energy future which includes more battery storage.

Question 3 - How can we ensure that a low carbon network is designed and operated fairly and in a way that helps to minimise customer bills?

British Gas has taken a close interest in network costs as they have risen over recent years.

In the previous Parliament, we provided evidence to the predecessor ECC Committee that network companies are making returns consistently above the allowed cost of equity and that they should be subject to the same external scrutiny as other parts of the energy supply value chain[7]. The Committee recommended that network regulation be subject to an independent audit and, since then, Citizens' Advice has also called for referral to the National Audit Office[8].

Related concerns led us to appeal the electricity distribution price controls of five of the six main Distribution Network Operators to the CMA for investigation.

[7] Written evidence submitted by British Gas (NTC0030)
http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/energy-and-climate-change-committee/network-costs/written/8309.html

[8] Citizens Advice, *Many Happy Returns? The Consumer Impact of Price Controls in Regulated Networks*, 2015, https://www.citizensadvice.org.uk/Global/CitizensAdvice/Corporate%20content/Publications/ManyHappyReturns-NewBrandEdition%20(2).pdf

In its response to this appeal, the CMA decided a reduction in revenues of £105m across all 10 slow-track networks between 2015 and 2023 be made to the £28.7bn revenue allowances granted to the relevant networks over this eight year period.[9]

We believe that another, important outcome of our CMA appeal is that the CMA has been able to identify a number of areas where network regulation can be improved, particularly with regard to transparency and third-party engagement. As these are acted upon, we expect the improved regulatory practice should be beneficial for all parties – customers' interests will be further protected through enabling more informed engagement; networks will benefit from the increased certainty a more rigorous process brings. The National Audit Office could play a valuable role in assisting the regulator as it seeks to learn the lessons from the CMA's conclusions.

Finally we believe that a key way to manage costs that are passed on to customers' bills is likely to be to reduce the need for grid reinforcement and on-going maintenance charges. This is exactly the opportunity that is presented by the development of distributed energy and district heating schemes.

Question 4 – How can we ensure that grid connections are readily accessible across the country and that costs are fair?

We think that network costs should be charged on a cost-reflective basis as this would ensure value-for-money for customers by encouraging the most economic solutions.

Previous debates on transmission network charging have raised the question of socialising/smearing the costs of transmission nationally, i.e. all generators (and all demand users) would face a uniform unit rate irrespective of their geographical location. 'Project TransmiT', Ofgem's last review of transmission network charging, rightly rejected socialisation because of its economic inefficiency. We agree that socialisation would distort efficient locational signals as it would lead to network users ignoring the costs they avoid/create by locating on particular parts of the network. It is therefore essential that cost-reflective locational signals remain a core part of transmission charging arrangements going forward, as this will lead to lower overall costs in the long run.

[9] Competition and Markets Authority, *British Gas Trading Limited v The Gas and Electricity Markets Authority: Final Determination*, September 2015, https://assets.digital.cabinet-office.gov.uk/media/5609588440f0b6036a00001f/BGT_final_determination.pdf

Question 5 - What are the key technologies available today and how effectively do Government and Ofgem incentivise innovation and development of the grid and grid technologies?

Key technologies available today include:

- Smart Metering & Consumer Access Devices
- Smart Appliances
- Storage (including battery storage)
- Electric Vehicles
- Heat Pumps (including Gas Absorption Heat Pumps)
- Thermal Storage
- Solar Photovoltaic (PV)

In addition, increasingly sophisticated and open connectivity and communications technologies are being developed which allow automatic demand response to be enabled from existing and new assets.

Government and Ofgem currently incentivise innovation of the grid and grid technologies through funds for demonstration of near-to-market technologies, and earlier-stage R&D investment.

For example, The Low Carbon Networks Fund (LCNF) was set up in 2010 by Ofgem to provide up to £500 million in support over five years to trial new technologies through projects sponsored by the DNOs.[10] The LCNF has committed over £250million to a range of projects that demonstrate storage, EV charging, demand response, distributed generation, and advanced monitoring and control technologies. European funding, via Horizon 2020, also exists to run similar trials.

British Gas has been involved in three LCNF projects where we trialled a variety of demand side management propositions for customers. Our involvement in these trials presented compelling results around the impact of customer Time of Use tariffs (ToU), which resulted in a reduction in peak consumption for customers which persisted throughout the trial. In addition, the majority of customers participating in the trial saved money, and 95% of customers said they would chose a multi-rate tariff compared to a standard rate tariff.

[10] Ofgem, *Electricity Distribution Price Control Review Final Proposals - Incentives and Obligations*, 2009, https://www.ofgem.gov.uk/sites/default/files/docs/2009/12/fp_2_incentives-and-obligations-final_0.pdf

Going forward, we suggest there is a need to focus available funding on more commercial trials and better enabling routes to market. We would also like to see funding via different routes (not necessarily the DNOs) and the possible introduction of longer term tax-based incentives, for technologies, such as battery storage, which are close to market and will have a significant positive impact on our ability to balance and manage pressure on the grid at peak times.

We would also be interested in trialling the integration of different technologies within a local energy system at a large scale, to understand the impact of grid technologies when they work together.

Question 6 - What impact will changes to the electricity system – including distributed energy generation/storage, demand response and interconnection – have on the role of National Grid and the Distribution Network Operators? (e.g. in terms of ownership structures, responsibility for system balancing and system security)

At this stage, the impact of decentralised generation is unknown, although a number of industry analysts, including PwC, indicate that distributed energy stands to play a 'key transformative role' in the sector, challenging the traditional model of centralised generation.[11]

To ensure innovation and value for money for customers, we believe the DNOs' role should be to facilitate an open and transparent market place, where competition exists between different market players, such as aggregators, suppliers and energy services companies.

Given the monopoly status of the DNOs and the current price settlement mechanism, any significant change in the role of the DNOs would result in increases in consumer bills, and could have potentially detrimental impacts on competition. DNOs do not have the capability or infrastructure to engage directly with customers, so suppliers and independent generators will need to retain their interface with customers.

Distributed generation may also have an impact on National Grid, as it will need to deal with more intermittency on the grid from renewables. To combat this, we believe it will be necessary to develop more sophisticated products and services for flexibility and ancillary services.

[11] PwC, 14th PwC Global Power and Utilities Survey, May 2015

Question 7 - What lessons can be learnt from low carbon electricity grids from other countries?

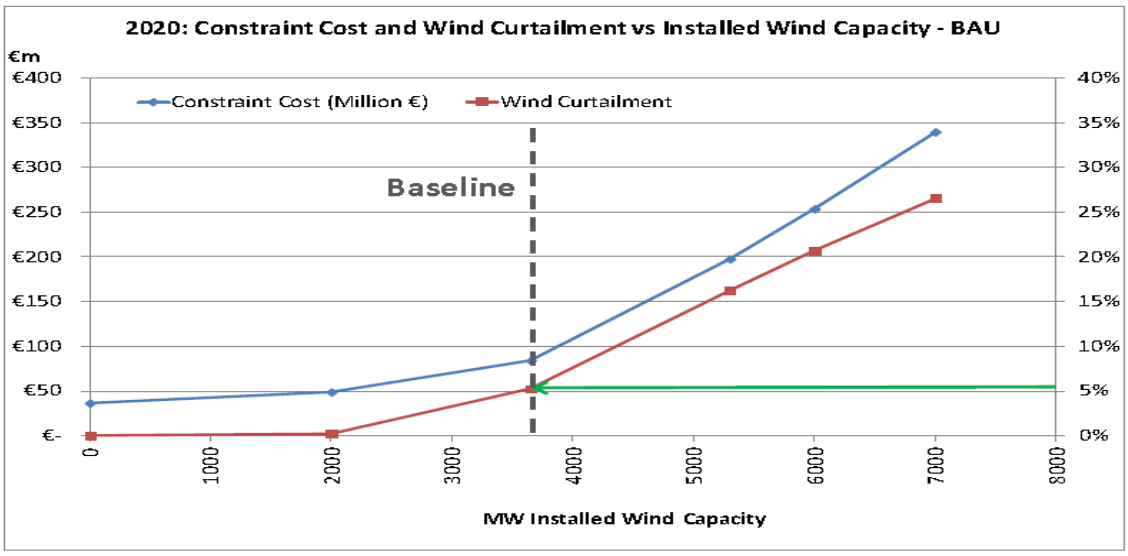
As well as supplying energy to British homes and business through British Gas, the Centrica group also includes Bord Gáis Energy – which supplies over 750,000 customers with energy in Ireland.

Experience from the system in Ireland shows that moving towards a low carbon grid is as much about changing the operation of the existing grid and enhancing the services provided to the grid as developing the infrastructure. Facing operational problems related to changing power flows, system stability and resource variability in a system with over 40% renewable wind generation; the Irish industry began a process to enhance the services available to and on the grid.

This programme – the 'DS3 Programme' – is currently in progress and is focusing on developing market signals for new investment in flexible services (including generation, storage and demand), implementing new performance systems and processes and developing new tools to enable the system operators to operate and manage the system with increasing levels of variable generation and demand.

With reference to Figure 1 below, the studies by the Irish system operators showed that without the required support services to facilitate the rising level of variable renewable generation, system operators would have to curtail renewable generation to maintain the system within its frequency and voltage standards. It was estimated that this would increase system constraint costs by a factor of 5 and would prevent Ireland from achieving its renewable targets and low carbon ambitions.

Figure 1: EirGrid Study Analysing the impact of rising renewable generation levels on curtailment and system constraint costs



In focusing on system services as much as system infrastructure the aim of the DS3 programme is to ensure that the benefits of a low carbon economy are delivered to customers in practical terms and at minimum cost by optimising the existing infrastructure.

From an infrastructure point of view, the Irish experience also points to the need to develop and roll out a practical, simple and engaging stakeholder engagement strategy as part of any large infrastructure strategy.