

BEIS
Electricity Systems Team
Department for Business, Energy, and Industrial Strategy
4th Floor,
3 Whitehall Place,
London, SW1A 2AW

12 January 2017

Dear Sir/Madam

Re: Response to Call for evidence: A smart, flexible energy system

Thank you for the opportunity to comment on this important call for evidence into the long-term evolution of the UK energy system. Following the signing of the Paris Agreement under the United Nations Framework Convention on Climate Change, the UK faces very significant challenges in terms of cost, infrastructure capability, and customer acceptance to achieve the targets that have been set.

To make progress towards a lower carbon energy system, it is vital that the UK energy system is considered as a holistic entity, and it is imperative that electrical energy and gas energy systems increasingly work in synchronicity to deliver the needs of the customer and not, as used to be the case, independently.

In reviewing the consultation documents we were disappointed that the consultation is weighted very heavily towards energy from electricity, and does not adequately consider the significant contribution that our existing gas distribution infrastructure can provide to a flexible energy system now and into the future.

We would therefore encourage the call for evidence to discuss the detailed benefits of cross vector technologies, those bridging the gap between gas and power, to amplify the existing flexibility and resilience of the UK gas infrastructure onto the power grid.

In addition, an increasing volume of independent research points to a UK which is not driven towards an ever more electricity based solution for heat and power, but to a more effectively balanced, low carbon energy system which includes the existing and extensive gas infrastructure that continues to serve the needs of the customer with minimum disruption to their lives and minimum changes to pricing.

We would also propose there is a need for research into a Smart, Flexible Gas Energy System. The total energy supplied via the existing UK gas infrastructure is several orders higher than that provided by the electricity network (magnified even further during periods of peak demand). It is therefore fundamental to invest in research aimed at understanding the gas grid and customer behaviour that drives the peak and annual demands, and from this develop technologies to understand and manage these over time. This research must focus on the interactions between energy demands on both the gas and electricity networks, and how these may be impacted by smart technologies and changing customer needs and expectations.

We consider that two potential benefits of such research could be reduced cost to the customer, (as peaks fall and the need to reinforce the gas infrastructure reduces) and associated capital expenditure. Further reductions in leakage could also be realised as pressures could be lowered over the winter period. These drivers for change must, in our view, form part of the UK energy strategy through to 2050.

As a part of your consultation, we have carefully considered each of the following documents:

- 1. A smart, flexible energy system: Call for evidence (BEIS)**
- 2. Smart Energy Consumer Panel Research: Summary Report (BEIS)**
- 3. Energy Storage Use Cases (DNV GL)**
- 4. An analysis of electricity system flexibility for Great Britain (Carbon Trust and Imperial College London)**

In considering our response to these documents, we consider that we are not in a position of authority for many of the questions as they are currently posed, given they clearly relate to the electricity grid. Notwithstanding, NGN has considered the questions in detail and has provided a response to those questions in Appendix A.

We consider that Gas is an integral part of any Smart Energy System and a vital cog in the UK's ability to meet the challenges of the UK Energy Trilemma. We firmly believe that there is no "silver bullet" to the challenge that is faced by the UK energy industry and that any approach must seek the optimal balance between all existing and developing energy sources so that we can continue to provide an outstanding, safe and low cost service to UK customers and consumers.

We are committed to supporting the development of a smart and flexible energy system for the UK, but stress that this is not achievable without proper consideration of the benefits and potential provided by the existing UK gas infrastructure.

If you would like to discuss our response in more detail, or require any further information to support your review, please do not hesitate to contact David Gill our Director of Stakeholder Relations at dgill@northerngas.co.uk or mobile 07825533649 who will be able to promptly respond to your query.

Yours faithfully,



Mark Horsley
Chief Executive Officer

Appendix A: NGN Response to specific questions: A smart, flexible energy system: Call for evidence (BEIS).

Q1. Have we identified and correctly assessed the main policy and regulatory barriers to the development of storage?

NGN cannot comment on the various merits of chemical battery systems such as lithium ion etc. However, in terms of storage solutions for the UK electricity networks we must not overlook the capability of the UK gas network infrastructure. Through careful design of our infrastructure, the UK gas network has developed significant energy flexibility and utilises within-day storage and balancing on a very large scale. Technology now exists to transfer that capability onto the UK power infrastructure, with the use of gas turbines and power to gas systems (electrolysers). Gas turbines are in general use throughout the UK and Power to Gas systems are in operation in Europe. This storage solution holds a number of advantages over conventional chemical battery systems, not least of which is the scale of storage that could be simply and economically realised.

Are there any additional barriers faced by industry?

To deploy Power to Gas systems within the UK will require regulatory change to accept an increased level of hydrogen within the gas delivered to customers appliances. Research into this approach has recently been sanctioned by Ofgem, and National Grid Gas and NGN are working collaboratively on this piece of work to deliver the necessary safety answers which would allow the regulatory changes to be implemented. There are likely to be further policy challenges around the cost model for storage delivered by gas networks as a service to the power sector, and NGN would be happy to support any exploration of this in due course. Note this also relates to your question 3.

Q2. Have we identified and correctly assessed the issues regarding network connections for storage?

The connection solutions based on a power to gas system may differ to that of a chemical battery. The location of the asset may be better placed closer to the gas grid and could require different environmental safeguards. Research should be carried out to better understand where the energy constraints lie currently, and where they are likely to develop in order to correctly locate storage that avoids potential stranding in later years. This work will be influenced by the capability of the UK gas infrastructure to provide such a service.

Q3. Have we identified and correctly assessed the issues regarding storage and network charging?

There is complexity surrounding charging for storage services, which would become more complex with the provision of flexibility from the UK gas infrastructure. This is essential to minimise the costs to the customer. Consequently, maintaining that position whilst developing a new service model for storage will be very challenging.

Q4. Do you agree with our assessment that network operators could use storage to support their networks?

To further exploit the renewable sector and provide stability on the UK electricity network, storage is essential, as it is in the gas sector.

Are there any circumstances in which network companies should own storage?

Our view is based on the needs of the customer. If ownership results in lower cost to the customer and delivers a stable energy system then that suggests there is benefit in that approach.

Q5. Do you agree with our assessment of the regulatory approaches available to provide greater clarity for storage?

Further work is required to fully understand the impact of delivering power to gas storage solutions to the power grid. It is not clear from this paper that this has been considered. From a gas

perspective it is difficult to understand why the utilisation of storage would be considered as generation, but can see that is the traditional view taken. A simpler view may be that storage is simply holding onto power before returning it to the grid and therefore should perhaps be considered as another form of power distribution, i.e. moving energy from one part of the system to another.

Q25. Can you provide evidence to show how existing Government policies can help or hinder the transition to a smart energy future?

The Government should focus on a whole energy system review rather than focus on any particular sector. As referenced in our opening discussion, both power and gas energy systems can become increasingly integrated and to try to address the issue in one without due consideration of the other is likely to lead to frustrated development and additional cost to the UK and a missing of the Paris agreement carbon targets.

Q28. Do you agree with the 4 principles for smart appliances set out above (interoperability, data privacy, grid security, energy consumption)?

In principle the four positions are appropriate, however, the potential for smart gas appliances appears to have been overlooked. The development of these may lead to quantifiable reductions in peak demand on the gas infrastructure which could in turn deliver benefits to the customer in terms of increased available capacity for connections and potentially lower costs as a result of a reduction in infrastructure spend.

Q35. What barriers (regulatory or otherwise) are there to the use of hydrogen water electrolysis as a renewable energy storage medium?

We actively support local authorities in their drive to develop hydrogen refuelling infrastructure. The process is complex, costly and is only happening as a result of Office for Low Emission vehicles (OLEV) and European funding for both infrastructure and vehicles. Further work to simplify the planning process would be a significant step forward, in conjunction with a serious programme, UK wide, to install electrolyser systems in every major forecourt. However, this would require significant investment, and although we consider that battery systems may eventually deliver on range, hydrogen can provide a more attractive alternative. Given the Power to Gas capability of electrolyser systems there is perhaps a benefit in the wide spread roll-out of hydrogen refuelling stations, which can provide a stabilising effect on the power grid and also deliver green gas into the UK gas networks. We also note that on-site water electrolysis may not be the only vector for providing hydrogen for refuelling stations, with the possibility for either hydrogen production from methane (via Steam methane Reformers) or for direct delivery through a converted hydrogen pipeline network.

Q43. Do you agree with the emerging system requirements we have identified (set out in Figure 1)? Are any missing?

NGN would suggest careful consideration of cross vector technologies that impact both the power and gas distribution and transmission systems. As already stated these will become increasing common and play an ever more significant role in the UK energy mix. These do not appear to be listed in Figure 1.

Q45. With regard to the need for immediate action:

a) Do you agree with the proposed roles of DSOs and the need for increased coordination between DSOs, the SO and TOs in delivering efficient network planning and local/system-wide use of resources?

Yes. We suggest this will be an increasingly complex position through deployment of cross vector solutions and as such offers up some significant infrastructure gains in terms of resilience, planning and reinforcement options. It is suggested that the review should include the UK gas networks in this co-ordinated approach to gain maximum benefit.

b) How could industry best carry these activities forward? Do you agree the further progress we describe is both necessary and possible over the coming year?

The optimum solution could be to drive through these new processes via joint industry groups to understand all of the impacts and opportunities, and from that understanding, deliver policy change to underpin the optimum methods of working, and support the models needed to deliver improvement.

c) Are there any legal or regulatory barriers (e.g. including appropriate incentives), to the immediate actions we identify as necessary? If so, please state and prioritise them.

There are perhaps a significant number of barriers not least the different regulatory review periods currently in place for both power and gas networks.
