SELECT COMMITTEE ON SCIENCE AND TECHNOLOGY

Resilience of Electricity Infrastructure

Call for Evidence

1. The House of Lords Science and Technology Select Committee, under the Chairmanship of Lord Selborne, is conducting an inquiry into the resilience of electricity infrastructure. This includes electricity generation, transmission and distribution infrastructure. The Committee invites interested individuals and organisations to submit evidence to this inquiry.

2. Energy policy in the UK focusses on balancing three interconnected demands: energy security, affordability and decarbonisation. This is known as the energy trilemma. Within this framework, this inquiry looks specifically at the current and future contribution of science and technology to ensuring the resilience of the UK’s electricity infrastructure.

3. In the short term the balance between supply and demand will be affected by the closure of aging power stations. On 30 June, the energy regulator, Ofgem,\(^1\) published its latest assessment of Britain’s capacity margins – the surplus of electricity generated relative to demand. Margins are expected to tighten over the next two winters, dropping to their lowest levels in 2015/16.\(^2\) The narrowing of these margins has implications for the resilience of electricity systems.

4. Measures are being taken to improve Capacity Margins. As time is too short to replace this lost generation capacity by building new plant, the National Grid will procure new ‘balancing services.’\(^3\) These contracts for balancing services are with generating plant that would otherwise be closed or ‘mothballed’ or with large energy users who have the flexibility to reduce their demand at peak times. As a longer term solution the Government will put in place a Capacity Market, which will bring forward new power plants from 2018.\(^4\)

5. In addition to these short term measures, large scale investment in new electricity infrastructure will be needed over the coming decades. As well as providing resilience, this infrastructure will need to deliver low carbon electricity at affordable prices.

---

\(^1\) Office of Gas and Electricity Markets


6. The requirements for decarbonisation are set by the Climate Change Act 2008, which established legally binding targets for the reduction of greenhouse gas emissions by 80% by 2050. The power sector accounts for around 27% of the UK’s greenhouse gas emissions. The Committee on Climate Change therefore recommends that the carbon intensity of power generation should be reduced from 500 g CO\textsubscript{2}/kWh to 50 g CO\textsubscript{2}/kWh by 2030.\(^5\)

7. Existing technologies provide three main ways of achieving decarbonisation of electricity generation: renewables, nuclear and using carbon capture and storage with fuel-burning generation. The Government aim to stimulate investment in these technologies by introducing Contracts for Difference, which offer fixed prices for low carbon electricity generation.

8. Renewables and nuclear generate a much less flexible supply of electricity than fuel-burning plant. Nuclear provides a constant base load, but generation cannot easily be increased in response to peaks in demand. Meanwhile, the amount of electricity generated by renewables varies depending on factors such as weather conditions.

9. There are existing and emerging technologies which can provide additional low carbon generation capacity at peak times or smooth out peaks of demand. In this inquiry we seek further information on the options for achieving this. This could include:

- electricity storage;
- increased interconnection to overseas electricity networks;
- dynamic management of demand;
- more flexible nuclear technology;
- flexible fuel burning generation coupled to carbon capture and storage (or use);
- flexible hydro generation;
- increasing the diversity of the renewable portfolio.

10. In addition, electricity infrastructure will face new challenges associated with more frequent extremes of weather. More localised electricity generation will place novel demands on the system. New demands for electricity supply, such as that from electric vehicles and heat pumps, will also have an impact. Meanwhile, energy efficiency measures can help to counter these increases in demand. Smart meters will be rolled out across the UK by 2020 and along with smart appliances will enable users to have increased control over their electricity use. As systems become increasingly complex they may also become more vulnerable to cyber-attack.

11. We invite evidence on the resilience of the UK’s electricity infrastructure to peaks in demand and sudden shocks. We are interested in the resilience of the system both in the

\(^5\) 80% of 1990 levels.
short term (to 2020) and in the medium term (to 2030) as electricity generation is
decarbonised. In addition we could welcome evidence on the cost effectiveness of different
approaches and the balance between achieving efficiency and sufficient redundancy to ensure
a resilient system. We seek evidence on the impact and effectiveness of UK and EU policies,
incentives and regulations in achieving this.

12. We are interested in the following questions:

Short term (to 2020)

- How resilient is the UK’s electricity system to peaks in consumer demand and
  sudden shocks? How well developed is the underpinning evidence base?

- What measures are being taken to improve the resilience of the UK’s electricity
  system until 2020? Will this be sufficient to ‘keep the lights on’?

- How are the costs and benefits of investing in electricity resilience assessed and how
  are decisions made?

- What steps need to be taken by 2020 to ensure that the UK’s electricity system is
  resilient, affordable and on a trajectory to decarbonisation in the following decade?
  How effective will the Government’s current policies be in achieving this?

- Will the next six years provide any insights which will help inform future decisions
  on investment in electricity infrastructure?

Medium term (to 2030)

- What will affect the resilience of the UK’s electricity infrastructure in the 2020s?
  Will new risks to resilience emerge? How will factors such as intermittency and
  localised generation of electricity affect resilience?

- What does modelling tell us about how to achieve resilient, affordable and low
  carbon electricity infrastructure by 2030? How reliable are current models and what
  information is needed to improve models?

- What steps need to be taken to ensure that the UK’s electricity system is resilient as
  well as competitively priced and decarbonised by 2030? How effective would current
  policies be in achieving this?

- Is the technology for achieving this market ready? How are further developments in
  science and technology expected to help reduce the cost of maintaining resilience,
  whilst addressing greenhouse gas emissions? Are there any game changing
technologies which could have a revolutionary impact on electricity infrastructure and its resilience?

- Is UK industry in a position to lead in any, or all, technology areas, driving economic growth? Should the UK favour particular technology approaches to maintaining a resilient low carbon energy system?

- Are effective measures in place to enable Government and industry to learn from the outputs of current research and development and demonstration projects?

- Is the current regulatory and policy context in the UK enabling? Will a market-led approach be sufficient to deliver resilience or is greater coordination required and what form would this take?

If respondents consider that questions apply to both the short and medium term, please provide information on both, clearly stating the medium and long term issues. Respondents need not provide responses to all questions. Equally, if there are any crucial issues not captured under the questions we pose, please highlight what they are and explain their salience.

Public hearings will be held in the autumn, and possibly into early 2015. The Committee aims to report to the House, with recommendations, before the end of the Parliament. The report will receive a response from the Government, and may be debated in the House.

Instructions as to how to respond to this Call for Evidence can be found in Annex I overleaf.

21 July 2014
ANNEX 1: GUIDANCE FOR SUBMISSIONS

Written evidence should be submitted online using the written submission form available at http://www.parliament.uk/resilience-of-electricity-infrastructure. This page also provides guidance on submitting evidence.

If you have difficulty submitting evidence online, please contact the Committee staff by email hlscience@parliament.uk or by telephoning 020 7219 5750.

Short submissions are preferred. A submission longer than eight pages should include a one-page summary. Paragraphs should be numbered. All submissions made through the written submission form will be acknowledged automatically by email.

Evidence which is accepted by the Committee may be published online at any stage; when it is so published it becomes subject to parliamentary copyright and is protected by parliamentary privilege. Submissions which have been previously published will not be accepted as evidence. Once you have received acknowledgement that the evidence has been accepted you will receive a further email, and at this point you may publicise or publish your evidence yourself. In doing so you must indicate that it was prepared for the Committee, and you should be aware that your publication or re-publication of your evidence may not be protected by parliamentary privilege.

Personal contact details will be removed from evidence before publication, but will be retained by the Committee Office and used for specific purposes relating to the Committee’s work, for instance to seek additional information.

Persons who submit written evidence, and others, may be invited to give oral evidence. Oral evidence is usually given in public at Westminster and broadcast online; transcripts are also taken and published online. Persons invited to give oral evidence will be notified separately of the procedure to be followed and the topics likely to be discussed.

Substantive communications to the Committee about the inquiry should be addressed through the clerk of the Committee, whether or not they are intended to constitute formal evidence to the Committee.

This is a public call for evidence. Please bring it to the attention of other groups and individuals who may not have received a copy direct.

You may follow the progress of the inquiry at: http://www.parliament.uk/hlscience.