CCC Call for Evidence – Zero Carbon Economy

Response from Energy Networks Association

Energy Networks Association (ENA) represents the companies that operate and maintain the gas and electricity grid network in the UK and Ireland. Serving over 30 million customers, they are responsible for the transmission and distribution network of "wires and pipes" that keep our lights on, our homes warm and our businesses running.

Part 1: Climate Science

Question 1 (Climate Science): The IPCC's Fifth Assessment Report and the Special Report on 1.5°C will form an important part of the Committee's assessment of climate risks and global emissions pathways consistent with climate objectives. What further evidence should the Committee consider in this area?

ANSWER: *No response*

Question 2 (CO_2 and GHGs): Carbon dioxide and other greenhouse gas gases have different effects and lifetimes in the atmosphere, which may become more important as emissions approach net-zero. In setting a net-zero target, how should the different gases be treated?

It is important to provide a level playing field between technologies and for the economy as a whole. Setting a UK net-zero target would increase the importance of ensuring that new technologies make genuine carbon savings. ENA believes taking a cross-sector Whole-System Approach to energy policy, regulation and market design is central to meeting the challenges of decarbonisation in the UK at the lowest possible cost and with minimal disruption. Setting a more ambitious target for decarbonisation will increase the importance of considering cross-vector impacts and trade-offs across the economy.

Specific emissions factors for different gasses should be set on the basis of international standards and agreements. This is crucial to ensure fair competition between industries, and avoid policies to deliver carbon emission targets risk 'off shoring' of emissions. We have explored this issue in more detail in answer to Question 3.

Part 2: International Action

Question 3 (Effort share): What evidence should be considered in assessing the UK's appropriate contribution to global temperature goals? Within this, how should this contribution reflect the UK's broader carbon footprint (i.e. 'consumption' emissions accounting, including emissions embodied in imports to the UK) alongside 'territorial' emissions arising in the UK?

The UK has played a leading role in global decarbonisation efforts. Energy network investment and innovation has helped facilitate this, through the connection of renewable gas and electricity generators, smarter system management, and world-leading research and development programmes.

Energy Networks Association 6th Floor, Dean Bradley House, 52 Horseferry Road London, SW1P 2AF
T +44 (0)20 7706 5100 E info@energynetworks.org W www.energynetworks.org Follow us on Twitter @EnergyNetworks

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Consideration of the UK's contributions to global temperature goals should take into account wider strategic goals such as those laid out in the government's Industrial Strategy. That means ensuring energy intensive industries – which represent 8% of the UK economy and support 1.1m jobs – are decarbonised rather than 'offshored'. Since 1997, due to a variety of economic drivers, greenhouse gas emissions from UK industrial production has dropped by 33% - but UK consumption of those products has dropped by just 4%, and carbon emissions from imports have risen by 31% in their place. To maintain the UK's economic success and support for decarbonisation policies, it is vital that the recommended approach embraces opportunities to lead decarbonisation within the UK[1].

Question 4 (International collaboration): Beyond setting and meeting its own targets, how can the UK best support efforts to cut emissions elsewhere in the world through international collaboration (e.g. emissions trading schemes and other initiatives with partner countries, technology transfer, capacity building, climate finance)? What efforts are effective currently?

UK energy networks are delivering world leading innovation projects to support the delivery of a low cost, low carbon energy system. For example gas networks are currently undertaking two projects which have developed collaborative links overseas:

- Hydrogen networks projects H21, H100 and Hydeploy
- The Freedom Project, testing hybrid heating systems

The H21 project has a high profile around the world, and Hydeploy has direct links with the Grhyd – Engie project in Dunkirk which is also looking at the potential for Hydrogen blending in gas distribution networks.

Electricity networks have also undertaken a large number of innovation projects in recent years to manage the growth of distributed generation that has been driven by the UK's climate change targets.

The UK needs to ensure that network price controls continue to provide strong incentives for innovation, and support networks and UK companies in their supply chains to deliver transformational projects based on that innovation. To date, network innovation has successfully encouraged 'first of a kind' projects, but government and the regulator need to set a strategic approach to develop the energy system of the future.

[1] BEIS, Final UK greenhouse gas emissions national statistics: 1990-2016 https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-2016 & DEFRA, UK's Carbon Footprint 1997 – 2015, Figure 2 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/704607/Consumption_emissions_May18.pdf

Question 5 (Carbon credits): Is an effective global market in carbon credits likely to develop that can support action in developing countries? Subject to these developments, should credit purchase be required/expected/allowed in the UK's long-term targets?

ANSWER: *No response*

Part 3: Reducing emissions

Question 6 (Hard-to-reduce sectors): Previous CCC analysis has identified aviation, agriculture and industry as sectors where it will be particularly hard to reduce emissions to close to zero, potentially alongside some hard-to-treat buildings. Through both low-carbon technologies and behaviour change, how can emissions be reduced to close to zero in these sectors? What risks are there that broader technological developments or social trends act to increase emissions that are hard to eliminate?

Energy network infrastructure should be viewed as a platform for a range of different decarbonisation solutions in these areas. A whole-system approach, where both networks work more closely together than is currently the case, is key.

Project Freedom, a joint-venture between an electricity Distribution Network Operator and a Gas Distribution Network in Brigend, is a leading example of a whole-systems approach in practice. has tested a complementary approach for domestic heating – using smart hybrid systems which balance the use of the gas boilers and electricity systems – and will be developed to consider non-domestic opportunities for such technology. With an increase of 6% of heat pumps expected to lead to a 16% increase in electricity demand, this project has the advantage of spreading the load of a decarbonised heating solution over both types of network, freeing up capacity for the networks to support decarbonisation in other areas.

UK industry are major users of natural gas, with 3.9TWh used for iron and steel production, 97 TWh for other industrial energy, and 5TWh for non-energy uses such as use as a feedstock for chemical production in 2017. Many of these users are difficult to decarbonise through existing technology, though projects such as Hynet and H21 are providing opportunities and options for replacing natural gas or other higher carbon fuels with hydrogen, which has no emissions at the point of use.
Developing hydrogen as an option for difficult sectors requires developing the systems to produce low-carbon hydrogen at scale, transport and distribute it to users, and develop appliances which can safely and efficiently use hydrogen. It is likely to require the development of CCUS for hydrogen production.

Tighter targets also re-emphasise the importance of dealing with challenges such as the seasonality of heat demand, and the need for a system which can deal with rapid increases in demand. It will also require consideration of links across systems, such as the interactions between agricultural emissions and energy. Bioenergy with Carbon Capture and Storage (BECCS) could have an important role in providing 'negative emissions' to balance unavoidable emissions in these sectors, as noted in the CCUS Cost Challenge Task Force Report (July 2018), and supported by the CCC's own report on Biomass in a low-carbon economy (November 2018). Finally, it will require a clear, widely accepted

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framework for assessing emissions across the economy, including the embedded emissions in generation technologies[2].

Question 7 (Greenhouse gas removals): Not all sources of emissions can be reduced to zero. How far can greenhouse gas removal from the atmosphere, in the UK or internationally, be used to offset any remaining emissions, both prior to 2050 and beyond?

ANSWER: *No response*

Question 8 (Technology and Innovation): How will global deployment of low-carbon technologies drive innovation and cost reduction? Could a tighter long-term emissions target for the UK, supported by targeted innovation policies, drive significantly increased innovation in technologies to reduce or remove emissions?

KPMG research conducted on behalf of ENA has shown that a scenario based on evolving both our gas and electricity networks to help decarbonise our economy could save consumers as much as £214bn by 2050 compared to a full or near-full electrification scenario. This would cost £104bn-£122bn, compared to £274-£318bn for a full or near-full electrification scenario.

National Infrastructure Commission research shows that using smart energy technologies, such as renewable energy generation, demand side response and energy efficiency measures, to provide services to Britain's electricity grid could avoid many of the costs of building new energy infrastructure, including new power stations, saving the British public up to £8bn per year by 2030.

Long term targets can support business and investor certainty, but also need policy and regulatory frameworks. For example, regulated networks need specific innovation support given that economic drivers are to minimise short term costs. This has proved successful within UK network regulation: an assessment by Pöyry found that Ofgem's Low Carbon Network Fund delivered £1.7bn of benefits, and around £50m has been invested in projects around the future of the gas networks since 2013.

Current funding mechanisms for energy network innovation limit end to end technology development (H21 and Hy4heat in the case of gas networks) being in one project. There could be greater value driven from cross sector working (for example Innovate UK funding) if this was delivered through price control mechanisms[3].

[2] Hynet, https://cadentgas.com/about-us/innovation/projects/liverpool-manchester-hydrogen-cluster, H21 https://northerngasnetworks.co.uk/h21-noe/H21-NoE-23Nov18-v1.0.pdf, DUKES 2018, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/729395/Ch4.pdf

[3] Pöyry LCNF report: https://www.ofgem.gov.uk/system/files/docs/2016/11/evaluation_of_the_lcnf_0.pdf

Question 9 (Behaviour change): How far can people's behaviours and decisions change over time in a way that will reduce emissions, within a supportive policy environment and sustained global effort to tackle climate change?

Policy and regulation can work with consumer preferences and decisions to support emissions reductions, however there is a need for policy to place an emphasis on consumer engagement that educates and raises awareness of the importance of change.

While gas boilers remain the clear preference of UK consumers for domestic heating, incremental improvement in boiler energy efficiency standards have already been successful in delivering emissions reductions. Modern boilers emit up to 40% lower carbon emissions per kWh heat than older models, and according to Ofgem statistics a typical domestic gas customer used 40% less gas in 2017 than 2003. This is a good example of how behaviour change can be supported; relying on public decisions changing without the support of legislation such as this would represent a significant risk to delivery of emissions targets.

Policy makers should therefore consider how to build on this to continue to deliver energy efficiency and emissions reductions, and to prepare for future opportunities. This could include action such as considering how regulation could support the transition to hydrogen appliances, or how network upgrades can be planned to take account of future loads or the need to transport a wider range of low carbon gasses. Such action should also consider how to better protect vulnerable customers and ensure a positive impact on reducing fuel poverty. It should build on work undertaken through the Ofgem Network Innovation Allowance and Competition, such as Hydeploy and Hydeploy 2, which include specific workstreams on perceptions of hydrogen[4].

Question 10 (Policy): Including the role for government policy, how can the required changes be delivered to meet a net-zero target (or tightened 2050 targets) in the UK?

In areas such as heat and industrial emissions, a net-zero or tighter 2050 target increases the importance of short term action. This should be aimed both at delivering intermittent reductions, and developing technology which can deliver against the long term targets – while recognising that there are inherently greater uncertainties in terms of technology and cost as we look further forward.

As a regulated sector, energy networks need the right frameworks in place to deliver their changes to their assets and operational procedures, as well as to innovate and help develop evidence on options for decarbonisation. Ofgem should be encouraged to set ambitious frameworks for decarbonisation and innovation within gas and electricity network price controls. Changes to the Gas Safety (Management) Regulations to expand the proportion of decarbonised gasses which can be carried in the network are underway and should be supported.

A balance should also be struck between local and national decision making – a national framework is needed to deliver targets, but community or regional solutions may differ, and require engagement which is best coordinated at local level.

[4] POST Note on Carbon Footprint of Heating Technologies: http://researchbriefings.files.parliament.uk/documents/POST-PN-0523/POST-PN-0523.pdf

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Whilst recognising need for action it is important that any policy decisions made in the short term should not eliminate potential long-term options prematurely. For example on decarbonisation of heat continued investment in existing infrastructure asset health, including gas and electricity, transmission and distribution networks will keep options open at low cost. Consistency will be needed between policy ambitions and tools driven by BEIS, and Ofgem's price controls, to help deliver consumer outcomes. Industry, government and regulators need to work closely to ensure that together we identify solutions and deliver decarbonisation at least cost and disruption to consumers, whilst maintaining security of supply

Part 4: Costs, risks and opportunities

Question 11 (Costs, risks and opportunities): How would the costs, risks and economic opportunities associated with cutting emissions change should tighter UK targets be set, especially where these are set at the limits of known technological achievability?
ANSWER: *No response*

Question 12 (Avoided climate costs): What evidence is there of differences in climate impacts in the UK from holding the increase in global average temperature to well below 2°C or to 1.5°C?
ANSWER: *No response*

Part 5: Devolved Administrations

Question 13 (Devolved Administrations): What differences in circumstances between England, Wales, Scotland and Northern Ireland should be reflected in the Committee's advice on long-term targets for the Devolved Administrations?
ANSWER: *No response*

Part 6: CCC Work Plan

Question 14 (Work plan): The areas of evidence the Committee intend to cover are included in the 'Background' section. Are there any other important aspects that should be covered in the Committee's work plan?
In addition to the areas identified, the CCC should consider the latest innovation and trials from other countries. For example, in the context of the global hydrogen economy this could include:

Question 14 (Work plan): The areas of evidence the Committee intend to cover are included in the 'Background' section. Are there any other important aspects that should be covered in the Committee's work plan?

- Evidence from trials such as hydrogen blending in Dunkirk (https://www.engie.com/en/innovation-energy-transition/digital-control-energy-efficiency/power-to-gas/the-grhyd-demonstration-project/)
- Developments at the South Australia Hydrogen Park (http://www.renewablessa.sa.gov.au/topic/hydrogen/hydrogen-projects/hydrogen-park-south-australia) and Energiepark Mainz (http://www.energiepark-mainz.de/en/project/energiepark/)
- The potential use of Hydrogen in industrial processes as well as heating, for example in the production of green ammonia (http://www.siemens.co.uk/pool/insights/siemens-green-ammonia.pdf)