

Energy Networks Association: Response to the Clean Growth Strategy

Thursday 21st December 2017

The UK's gas and electricity networks

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.

Our energy networks are recognised around the world for their strong track record of safely and securely providing the UK with the gas and electricity it needs in three key areas:

1. *Trusted performance* - UK energy networks are amongst the most reliable in the world and are recognised for their leading performance that meets the needs of all consumers, whether they be domestic or business. The average gas customer will experience an unplanned interruption once every 140 years and for electricity customers, since 1990, there has been a 50% reduction in number of customer interruptions, and a 60% reduction in length of customer interruptions.
2. *Reduced costs & increased investment* - Network costs are now 17% lower than they were at the time of privatisation and are projected to remain flat, and in some areas fall, into the next decade. By 2020, the UK's energy networks will have attracted some £80 billion of investment since 1990. They are forecasted to invest £45bn between 2017 and 2023.
3. *Delivering innovation* - Network companies have spent a total of £99m across 928 projects through the Network Innovation Allowance, and supported a total of 1,735 innovative projects across all innovation funding mechanisms. Independent research carried out by Pöyry has shown that innovation projects by local electricity Distribution Network Operators (DNOs) could deliver up to £1.7bn of benefits by 2031.

Understanding this track record of our energy networks since privatisation in 1990 is key to understanding the role that our energy networks can play in helping the Government meet our decarbonisation targets and the objectives of the Clean Growth Strategy. As regulated monopolies that are publicly and directly accountable to the energy regulator, Government and Parliament through a price control system, energy network companies act as an important lever of public policy.

The role of energy networks in meeting our climate change targets to date

Decarbonisation is changing our energy system rapidly and the way in which energy is produced, supplied and consumed is already very different from only a few years ago. The pace of change we are seeing is set to accelerate as take up of new technologies such as smart meters, energy storage and low carbon vehicles increases and consumers are exercising greater choice and control over the way in which they use energy. In response to that the structure of our market is becoming more decentralised.

Network companies have been quick to respond to these changing demands, and have led on innovation to remove barriers and facilitate investment in and take-up of low-carbon solutions; and within the existing price control system, RIIO, has been key to delivering this.

The highest profile change to date has been in our electricity system, as network companies transition from managing a centralised system where electricity flows in one direction (from generation to the consumer) to a decentralised system where electricity is generated and consumed in a far greater variety of ways. Local electricity Distribution Network Operators (DNOs) have connected 28GW of distributed generation, predominately in the form of solar PV and wind turbines, since 2007. In the current price control period (2015-23) they have committed to rapidly increase the use of competitive markets for demand side response and reduction, along with a range of other services related to new energy technologies to help them balance electricity supply and demand locally, reducing the need to build new infrastructure.

These short-term changes have been matched with long-term, structural changes. 2017 has seen DNOs publish strategies for their transition to Distributed System Operators (DSOs). These strategies build on the changes to date to introduce a major increase and change in the operational responsibilities and capabilities of local electricity grids for managing electricity supply and demand at a local level. This, in turn, will change the way they interact with the Transmission System Operator, National Grid.

Network companies are also working closely with BEIS and Ofgem as part of the cross-industry Open Networks Project to identify those changes that will need to take place to the roles and responsibilities of electricity networks in order to deliver the UK's smart grid. This Project was recognised as a 'key initiative' for networks transformation as part of the Government's Smart Systems and Flexibility Plan.

Change has not been restricted to electricity networks. As the Clean Growth Strategy points out, the current RIIO price control regime has been successful in supporting a range of gas decarbonisation projects run by local Gas Distribution Networks (GDNs). The development of biomethane has also been one of the success stories in the Government's Renewable Heat Incentive (RHI). Since the scheme opened, over 80 biomethane production sites have connected to local GDNs across the UK, reducing the carbon footprint of the gas used by homes and businesses without any changes to their appliances or behaviour. These sites now contribute more than 2.5TWh to domestic gas production. The pace of change can be expected to hasten over the next decade and beyond, bringing unprecedented challenges in the way in which we design, operate and manage our networks.

The structural changes that we are seeing to our energy market as a result of decarbonisation mean that the importance of the role that energy networks play in managing our energy system is already increasing. From heat pumps and district heating to electric vehicles and storage, they are already act as a platform for a whole range of new energy technologies and are increasingly taking on new roles and responsibilities that reflect that.

As the focus of decarbonisation shifts to new areas beyond electricity generation to areas including heat and transport and new technologies are deployed more widely, the pace and scope of those changes will expand to all areas of our energy network infrastructure. As a

major economic asset that is worth some £62bn and operates in all corners of the country, the UK's energy networks have a huge role to play in helping the Government to meet the objectives of the Clean Growth Strategy.

Our members believe that meeting these challenges and maximising the contribution that energy networks can make to clean growth will require greater co-ordination, one where industry, government and regulator share a common vision and shared responsibility with the aim of delivering outcomes for the benefit of the UK.

Overall comments on the Clean Growth Strategy

ENA members welcome the publication of the Clean Growth Strategy. The Strategy represents a move forward in developing a more co-ordinated approach to Government policy on decarbonisation, providing greater connection and strategic co-ordination across a variety of different policy areas.

We urge the Government to commit to the implementation and continued development of the Strategy as the primary means of responding to our climate change targets. We welcome the acknowledgement of the important role that network innovation has to play in meeting our climate change targets, and the role that our gas networks can play as part of the three illustrative 2050 pathways.

We believe that the Strategy should be just the starting point for a more developed, cohesive approach from Government policy that fully utilises the potential of the UK's energy networks to help us reach our decarbonisation targets. The Strategy should give greater recognition to the role of the current RIIO1 price control and forthcoming RIIO2 price control regimes as instruments of Government policy on decarbonisation, beyond the current their current objectives, and the importance of those price controls to delivering decarbonisation policy. This is important to provide a sense of direction of travel for the strategic use of energy networks in decarbonisation policy whilst ensuring that Ofgem's short-term (currently 8-year) objectives of price controls are aligned with the Government's long-term decarbonisation and energy policy objectives.

At the heart of this should be the principle of taking a 'Whole-System Approach' to policy, regulation and market design. This approach is based on the principle that increased co-ordination and integration of innovation in our gas and electricity networks is the quickest, cheapest and most effective way of meeting our decarbonisation goals. If our power, heat, transport and waste sectors are all interdependent and so must the solutions to their decarbonisation.

With that in mind, our response focusses on the Pathways set out in the Strategy and the role a Whole-System Approach can play within that context.

Beyond the Fifth Carbon Budget, towards 2050 (p.55-56)

ENA agrees with the statement that it is extremely “challenging to predict what the UK economy will look like in 2050”, however we strongly welcome the use of potential Pathways to identify ‘low-regrets’ steps that Government can take. Whilst there is an understandable desire for the Government to avoid being overly prescriptive, we do believe that it should be seeking to explore what long-term policy options are open to it. We welcome the approach being taken to build the evidence base around the options to decarbonise heat and transport and are keen to engage with BEIS as it seeks to do so.

As a general remark, we believe that the suggestion that a pathway of full or near full electrification offers a viable solution to decarbonising both heat (which accounts for nearly half of our energy demand) and transport is one which has seen waning support in recent years across the energy sector, as lessons are learnt and costs are better understood from the roll-out of new technologies and energy efficiency measures.

Our specific comments on the Pathways are as follows:

- 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.
- This would mean the incremental cost to the consumer up to 2050 could be £4,500 to £5,000, as opposed to a cost of £12,000 to £14,000 under a full or near-full electrification scenario.
- We therefore would seriously question whether the challenges and costs posed by the Electricity Pathway are the best way for the Government to reach its decarbonisation objectives as part of the Clean Growth Strategy.
- With the role of our electricity networks already rapidly evolving, ENA believes that also focussing on decarbonising our gas networks alongside that of electricity networks is the cheapest way to meet our carbon commitments.
- We welcome the inclusion of the Hydrogen Pathway as an alternative to the Electricity Pathway, however we believe that as that alternative it should not focus on hydrogen exclusively. It should be developed into a Whole-Systems Approach Pathway that looks at the range of technologies which can help decarbonise gas, and brings in lessons being learnt from research and innovation projects. The following section of our response provides practical examples of the types of energy innovation that could form the basis of this.
 - Gas network innovation is supporting the development of options and new sources of green gas, and gas network companies have already begun the process of deploying new sources of these green gas, such as bio-methane and hydrogen, at more than 80 sites across the UK.
 - Through the RIIO price control structure, projects such as H21, HyDeploy and 100% Hydrogen are helping to develop hydrogen pathways, while other projects are exploring the technical viability of synthesising gas from black bag waste and the potential role for hybrid heating systems in reducing gas demand and consumer bills.

- It is worth noting that the development of biomethane has been one of the success stories in the Government's Renewable Heat Incentive (RHI). Since the scheme opened, over 80 biomethane production sites have connected to Gas Distribution Networks across the UK, reducing the carbon footprint of the gas used by homes and businesses without any changes to their appliances or behaviour.
- The current investment in our gas network is also preparing it for decarbonisation. The Iron Mains Risk Reduction Programme, undertaken by gas network companies, also has a role to play. New pipework made from polyethylene, which is suitable to convey hydrogen as well as natural gas, is being used to replace iron gas mains deemed as being at risk by 2032.

ENA believes that Government policy should take the 'low regrets' approach of the Hydrogen Pathway and develop it further into a Whole Systems Pathway, as set out in the following sections of this response. We believe that this approach will not only be in the best interests of consumers but also make the best use of both our existing gas and electricity networks to decarbonise most cost effectively.

Recognising the value of a Whole-System Approach to decarbonisation

A Whole-System Approach means looking at optimal network investment and operational decisions for the whole energy network, not just the individual parts in isolation. It also means considering interactions across energy vectors (e.g. heat networks, energy storage or transportation) so that wider options and value can be taken into account. This work is supported by consideration of the connections, data links, interfaces, coordinated planning opportunities, potential impacts and shared learnings across electricity and gas network and other energy vectors, both currently and in the future.

ENA members believe that if our power, heat, transport and waste sectors are all interdependent, then so must be the solutions for their decarbonisation. A Whole-System Approach is based on our energy networks using new smart technologies to work together in an integrated way, building on the strength of our existing gas and electricity network assets.

We welcome the Strategy's recognition of the £720m of funding available to networks companies to help support smarter more flexible energy networks (p.50) under the current RIIO price control regime. This funding is helping develop a number of exciting innovation projects which demonstrate the clear potential of a Whole-System Approach to decarbonisation and should act as the basis for the development of a Whole Systems Pathway.

ENA believes that the Clean Growth Strategy should provide greater recognition of the role that a Whole System Approach can play in reaching our decarbonisation targets.

Continuing to support research and innovation in these areas is key, as the Strategy already states. Developing a Whole-System Approach Pathway to understand the role that Approach can play in meeting the Clean Growth Strategy's objectives is also important, as outlined above. We believe that the Strategy should reflect the importance and potential of that Approach across any other relevant areas.

The Open Networks Project, whose main focus is on the transformation of electricity networks' roles and responsibilities, is taking a Whole Systems Approach, and we are mapping the interactions between the electricity networks and all other relevant energy vectors, including gas, heat and transportation. The DSO will effectively become a neutral market facilitator, and the Open Networks Project is very much taking a technology-agnostic approach. Hence we firmly believe that the strategy for the DSO transition is aligned with the Clean Growth Strategy.

Examples of projects taking a Whole-System Approach are:

Domestic heating: The Freedom Project

The Freedom Project, a joint Wales & West Utilities and Western Power Distribution £5m innovation project in the Bridgend 'living heat laboratory' in South Wales, uses an air-source heat pump and high-efficiency gas boiler hybrid system in 75 residential properties. Project estimates suggest that a hybrid approach to decarbonising our heating that is combined with green gas growth could lead to as much as an 80% reduction in carbon emissions from domestic heat.

Smart switching between the two technologies through a control panel enables the buying of fuel and the sale of heat simultaneously, creating value for both the consumer and enabling the system to offer heat and power flexibility services to the wider network. The project simulates a residential demand side response service, with an aggregator buying gas and electricity on live wholesale markets on behalf of the consumer to meet their chosen settings.

This 'fuel arbitrage' system' creates value for not only the consumer but also the wider system. In creating a product that can be sold to heat demand aggregators and service providers, it reduces or removes the need for capital expenditure by the consumer, removing the need for Government subsidy and giving fuel-poor households the ability to benefit from low-carbon technology.

With just a 6% penetration of traditional heat pumps leading to a 16% increase in peak electricity demand, the hybrid approach of the two technologies will allow empowered Distributed Service Operators to utilise the technology to manage electricity demand.

Transport: Leyland CNG Filling Station

HGVs account for 15 per cent of greenhouse gas emissions from UK transport. In partnership with CNG Fuels, gas distribution network Cadent invested in the first commercial high-pressure compressed natural gas (CNG) refuelling station. The facility is connected to the high-pressure local transmission system at Leyland, Lancashire, and has been operating since March 2016.

The John Lewis Partnership currently uses the station to fuel its fleet of dedicated CNG heavy goods vehicles from their nearby regional distribution centre.

Results from the first 12 months of operation show that greenhouse gas (carbon dioxide) emissions from HGVs using the Leyland station were cut by 84 per cent.

Market design: InTEGReL

In September, Northern Powergrid and Northern Gas Networks launched the £30m InTEGReL energy research and development facility with Newcastle University, which will provide a space for industry, academia, SMEs and Government to test the integration of new energy technologies in a way that brings transport, electricity and gas into one place.

Supporting system flexibility: Real Time Networks Project

The gas networks will need to become more flexible as we move to a lower carbon future with a greater integration of renewables. SGN are therefore undertaking a project to develop a 'real-time network' that can support a greater volume of renewable gas like biomethane and hydrogen. This will be achieved through the installation of sensing technologies in a section of the network in the Medway towns in North Kent.

As greater volumes of renewable gas is injected into the network, we will need to measure the energy content of the gas in the grid, rather than just the traditional flow and volume. The sensors will measure variables including flow, pressure, temperature, and gas quality. As well as enabling greater volumes of renewable gas into the network, the flexibility will increase the gas networks ability to adapt to the future energy needs of GB.

Combining different sources of decarbonised gas: H21 Project

The H21 Leeds City Gate Project aims to power the city of Leeds using hydrogen, and in the process, pave the way for more UK hydrogen networks.

H21 has shown that this goal is technically feasible, and can be done at a realistic cost.

Working from the new dedicated H21 project office at Leeds City Council, NGN are now drilling down into greater detail – looking at how hydrogen behaves with existing gas meters (including smart meters) and innovative ways of producing and storing hydrogen.

The project has already attracted worldwide attention, and there is lots more to come.

NGN have also teamed with Keele University and Cadent to examine how hydrogen and natural gas can work together in gas pipes, and customers' cookers and boilers.

These projects will help fill any evidence gaps, and make an even more compelling case for a hydrogen future.

Finding new sources of renewable gas for transport and the grid: BioSNG

The Swindon BioSNG plant is the world's first commercially operating plant making gas from black bin waste and has been developed by Cadent in partnership with energy from waste technology firm Advanced Plasma Power (APP) and clean energy consultant Progressive Energy. The plant is expected to produce 22GWh of "substitute" natural gas per year to replace fossil gas in the UK's energy networks. It will fuel heating and cooking appliances in homes and businesses. Some gas will also be used as a fuel for Heavy Goods Vehicles. Some 10,000 tonnes of household waste is expected to be used by the plant every year and it is

thought that across all value streams, the plant will lead to a 5,000 tonnes per annum reduction in greenhouse gas emissions for the UK.

The project commenced in March 2016 and will finish in March 2019. The total cost is £27m which includes funding from the NIC, Department for Transport, APP shareholders and private investment from National Grid.

Concluding remarks

The publication of the Clean Growth Strategy is a welcome step forward in delivering a more co-ordinated and inter-connected approach to decarbonising our economy. ENA warmly welcomes the recognition the Strategy gives to the role that our energy networks have to play in meeting our climate change targets.

But we also believe that Government policy can and should do more to fully harness the potential of what is a major energy infrastructure asset for the United Kingdom. At the core of that should be the recognition that the strategic use of a Whole-System Approach to the management of our energy networks through the price control regime is the quickest and cheapest way to utilise new technologies.

We view these comments as the starting point for further discussions with the Department of Business, Energy and Industrial Strategy on its plans for the further development of the Clean Growth Strategy and would welcome the opportunity to meet with you in the near future.