The voice of the energy industry

EnvC119/18

Response to the Committee on Climate Change's Call for Evidence on building a zero-carbon economy

13 December 2018

About Energy UK

Energy UK is the trade association for the GB energy industry with a membership of over 100 suppliers, generators, and stakeholders with a business interest in the production and supply of electricity and gas for domestic and business consumers. Our membership covers over 90% of both UK power generation and the energy supply market for UK homes. We represent the diverse nature of the UK's energy industry – from established FTSE 100 companies right through to new, growing suppliers and generators, which now make up over half of our membership.

Our members turn renewable energy sources as well as nuclear, gas and coal into electricity for over 27 million homes and every business in Britain. Over 680,000 people in every corner of the country rely on the sector for their jobs, with many of our members providing long-term employment as well as quality apprenticeships and training for those starting their careers. The energy industry invests over £12.5bn annually, delivers around £84bn in economic activity through its supply chain and interaction with other sectors, and pays £6bn in tax to HM Treasury.

Executive Summary

We welcome the opportunity to respond to the Committee on Climate Change's Call for Evidence on building a zero-carbon economy. As a strong supporter of the Paris Climate Agreement, Energy UK fully supports that the UK and the rest of the world set a target to reach net zero emissions, as underlined by the recent IPCC report[1]. The report suggests that in order to limit global warming to 1.5 degrees, global emissions would need to reach net zero by 2050; or by 2075, if it is to be limited to 2 degrees.

In the power sector, the UK has already been very successful in dramatically reducing emissions and further significant reductions are evidently achievable. As set out in the recent 'Decarbonisation Pathways'[2] study by Eurelectric, it is possible to achieve carbon neutrality in the power sector across Europe, by 2045. The specific circumstances of the UK will need to be weighed up when considering the UK's contribution to an EU-wide target for 2050 (notwithstanding Brexit) – it may be possible for the UK to reach net zero in power even before 2045.

However, the biggest challenges for the UK to achieve net zero remain in the heating, transport and industrial sectors. Therefore, in deciding when to reach net zero emissions across the whole economy, the UK will need to take into account a range of factors, including the costs, risks and opportunities arising from setting deep and far-reaching emissions targets across all sectors.

The Government's Industrial Strategy is designed to address UK productivity and sets out a vision for the future, built around the UK's four 'Grand Challenges', including clean growth. Setting a commitment to net zero should result in an environment where government strategy and policies align and ensure that the UK plays a leading role in decarbonisation technologies, creating Intellectual Property, developing UK supply chains and enabling global exports.

Our responses to selected questions are set out below.

[1] IPCC (2018) *Special Report: Global Warming of 1.5 ºc.* Available: https://www.ipcc.ch/sr15/
[2] Eurelectric (2018) *Decarbonisation Pathways.* Full report available here: https://cdn.eurelectric.org/media/3457/decarbonisation-pathways-h-5A25D8D1.pdf

Response to Consultation Questions

Part 1: Climate Science

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?

Promoting some fuels or technologies may expose us to trade-offs that require careful consideration. When targeting net zero carbon emissions, the CCC should be mindful of other emissions (NO_x, SO_x, PM) that negatively impact air quality – with a direct impact on health and associated social security costs – and are subject to national limits and targets in Defra's Clean Air Strategy.

It is worth noting, however, that large combustion plants for generation, are strictly controlled through Environmental Permits and are set stringent emissions limits in line with Best Available Techniques which are enforced by the four UK environmental regulators.

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?

With any emissions accounting under a net zero target, it is important to ensure that we are taking sufficient steps to decarbonise domestically rather than just offshoring our emissions. Furthermore, accounting methodologies should recognise measures already in place to avoid carbon leakage such as exemptions from carbon taxes or free EU Emissions Trading System (EU ETS) allowances.

We would urge caution when considering how to account for emissions embodied into imports particularly if these emissions are accounted for within the country of origin's national inventory as there is a risk of 'double counting' emissions. However, it is important to ensure that government policy is structured in such a way to prevent carbon leakage, particularly in those sectors which are subject to strong international competitive pressures.

We note that, at the moment, the UK imports 6% of its electricity from interconnected markets via interconnectors, and that is set to increase significantly. Under territorial emissions accounting, any emissions from this imported power (if generated from fossil fuels) will not be captured in the UK emissions inventory.

Nonetheless, interconnection will play an important role in helping to balance energy flows as an increasing proportion of intermittent renewable energy is brought onto electricity grids. Any barriers to the flows of energy across interconnectors would increase the cost of the low carbon transition and potentially set back action on climate change. The aim therefore must be to ensure that trading of energy operates freely across borders on a level playing field that keeps costs down for consumers and ensures decarbonisation and security of supply.

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?

Energy UK strongly champions emissions trading schemes as the most cost-efficient means of decarbonising. Emissions trading systems also facilitate a level playing field across the participating

installations or countries, avoiding cross-border distortions and reducing emissions in a way that locates the point of least cost of abatement.

Using the example of the EU ETS, following recent amendments to the design of the scheme (such as the introduction of a Market Stability Reserve in 2019 to manage the current oversupply of allowances) the scheme has begun to deliver a sufficiently robust carbon price. In 2020, emissions from sectors covered by the system are expected to be 21% lower than in 2005. In 2030, under the revised system, they are projected to be 43% lower[3]. For the power sector in particular, the EU ETS has also enabled the delivery of affordable, reliable, and sustainable electricity across participating countries.

For these reasons, Energy UK has strongly advocated retaining membership of the EU ETS or creating a standalone UK Emissions Trading System (UK ETS) and linking this immediately to the EU ETS as its top two preferences for post-Brexit carbon pricing. Both options would serve as a means of maintaining a stable and predictable carbon price signal before and after the exit of the UK from the European Union.

The only reason that Energy UK can see for creating a standalone UK ETS would be if there was an express intention of linking it to the EU ETS as soon as is feasible. If there is no realistic prospect for that in the immediate future, then a permanent standalone UK ETS has too many potential drawbacks to be worth pursuing, including:

- A potential lack of liquidity, due to the smaller number of participants.
- Linked to this, a higher risk of price volatility and greater market uncertainty.
- This in turn will make it more difficult to ensure consistency with the EU ETS, which is likely to be a condition for the closest possible future participation in the Internal Energy Market, another priority for Energy UK members.

Post-Brexit, the UK should work closely with the EU to reinforce its leadership role in global climate diplomacy. An internationally-agreed carbon price covering all sectors of the economy remains ideal, and it is vital for governments to jointly pursue it. The UK can have a role to play in this context.

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?

Carbon credits can indeed support climate action leading to emissions reductions in developing countries, but these should be accompanied by robust oversight to ensure projects deliver measurable and verifiable carbon reductions.

The EU ETS has amply demonstrated how an effective global market can be used to support massive investment in projects in developing countries. The Clean Development Mechanism (CDM) has led to investment of more than $330 billion in 8,100 projects across 111 developing countries and the reduction or avoidance of over 2 billion tonnes of carbon dioxide. This success was largely driven by demand for credits in the EU ETS during Phase 2.

A global trading system would build in similar investment incentives either for project-based credits or credits issued under cap-and-trade schemes in developing countries. Although there are concerns about the lack of scarcity of allowances in the EU ETS currently, increased ambition in the EU and in an international scheme will be required to meet long-term carbon reduction targets and to deliver the zero-carbon economy. Indeed, as there are always likely to be some residual sources of emissions, a trading system which allows these to be offset against carbon removal or storage projects could be an efficient way to address these most challenging emission sources.

[3] https://ec.europa.eu/clima/policies/strategies/progress_en

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?

There are no silver bullets for decarbonising the UK economy, however electrification, making use of low-cost low-carbon generation combined with innovative low carbon technologies such as Bioenergy with Carbon Capture Usage and Storage (BECCUS) and Carbon Capture Usage and Storage (CCUS), are expected to play an important role in removing Greenhouse Gas (GHG) emissions from those more challenging sectors such as transport, heating and cooling and industry.

On the road to 2050, electrification should be further enabled through the relevant physical infrastructure and institutional arrangements in other sectors such as electric vehicle charging infrastructure, regulatory frameworks, targeted R&D and innovation support, together with a future-proof investment environment for low-carbon technologies.

A series of industrial processes can technically be electrified with up to 50% direct electrification in 2050 and the relative competitiveness of electricity against other carbon-neutral fuels will be the critical driver for this shift. In the short-term, heat optimisation is the biggest potential for energy efficiency. This can be achieved by developing process integration and systemic approaches, alongside greater use of heat recovery equipment e.g. heat exchangers or high temperature heat pumps, which upgrade low grade waste heat and reuse it within the process. Hydrogen and other carbon-neutral alternatives will also play a role and drive indirect electrification.

In buildings, energy efficiency is a key driver of emission reductions and Energy UK has long called for energy efficiency to be taken forward as a national infrastructure priority alongside the introduction of net zero carbon new build standards. A range of options are possible to decarbonise heat in the UK, including electric heat pumps, hybrid heat pumps and low carbon gases such as renewable gas or hydrogen. However, clear policy and regulatory signals are required longer term to drive consumer use at both the domestic and commercial level. Developing a comprehensive evidence base on how different solutions work in practice through large scale trials is vital in the short term. Furthermore, it is important to recognise that heat has an important role to play as part of a smart, flexible energy system. Heat resources represent a valuable source of flexibility that could reduce the upfront cost of low carbon heating systems and enable heat to be decarbonised at least cost.

With major car manufacturers switching to electric fleets (see BMW, Volvo, VW etc.) the shift toward electrification of road transport is already initiated and EVs are approaching cost parity with Internal Combustion Engine Vehicles (ICEVs). Energy UK is strongly supportive of the rollout of electric vehicles and want to see a high level of ambition from the UK Government[4]. The user experience must be central to the transition from internal combustion engine vehicles to electric vehicles. Widespread adoption of smart charging, in particular to avoid adding to peak demand, will be critical to ensuring the most cost-effective integration of electric vehicles into the electricity system. As smart charging standards are taken forward in the UK, it will be important that they are based around promoting customer choice and compelling offerings. Given the need for a robust charging network to enable the mass rollout of EV's, there will be an important role for the government to play in supporting a burgeoning network before the full demand for such a network is in place.

If we are to look at targets beyond 80% by 2050 to meet the increased ambition required under the Paris Agreement, further thinking is also required about the role CCUS (and other "yet to be developed"

[4] Energy UK (2018) Business letter to the Prime Minister Theresa May on Zero Emission Vehicles. Available: https://www.energy-uk.org.uk/publication.html?task=file.download&id=6782

technologies) could play across all sectors to meet a net zero target. CCUS and BECCUS could be vital in helping the UK to achieve a more ambitious target (see answer to Question 7), in particular for industrial sectors with limited alternative options for decarbonisation.

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?

As an already large user of sustainable biomass for power, the UK is well placed to repurpose its existing biomass generating assets and supply chains to enable BECCUS deployment, achieving negative emissions at scale. Negative Emissions Technologies (NETs) such as BECCUS that capture carbon from the atmosphere are essential if the UK is to offset these difficult-to-cut emissions and meet a net zero carbon goal. The Energy Technologies Institute (ETI) estimates that by 2050, BECCUS could deliver 55 million tonnes of net negative emissions per year – around half of the UK's current 2050 emissions target. The ETI also estimate that BECCUS could reduce the cost of decarbonisation by up to 1% of GDP[5]. It is important that the UK works with other states to ensure that international standards for biomass are further developed, to ensure a common framework to measure and minimise the lifecycle emissions of the fuel.

To enable the deployment of NETs, consideration needs to be given to mechanisms which incentivise and reward negative emissions. At present there is no mechanism to achieve this and this is preventing the development of projects which have been shown by the IPCC, Royal Society, and ETI as vital to achieve 2050 decarbonisation targets.

Energy UK considers the extent of CCUS's role in electricity generation to depend on how competitive it is against other low carbon generation technologies in terms of impact on whole system costs[6]. If CCUS becomes cost effective in the near future, it could provide a source of firm and flexible generation to complement nuclear and renewables as the reliance on unabated gas-fired generation is reduced. There is also the potential of using CCUS in the production of hydrogen from natural gas, meaning that electricity-generating gas plant run on hydrogen rather than each station having its own dedicated CCUS fitted. The HyNet North West Project[7], for example, is a hydrogen energy and CCUS project based on the production of hydrogen from natural gas. Saving over one million tonnes of CO_2 emissions every year, the project includes the development of a new hydrogen pipeline; and the creation of the UK's first CCUS infrastructure.

A cost-effective mix of low carbon generation technologies will be required in parallel with improvements in energy efficiency and UK energy policy should not become an 'either/or' with CCUS on the one hand and alternative technologies on the other – both should be pursued in parallel.

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?

Energy UK supports innovation in new technologies aligned with decarbonisation, covering generation, new flexibility products including energy storage, Combined Heat and Power (CHP), and energy services that fit with a low carbon future, including renewables and nuclear.

[5] Energy Technologies Institute (2016) *The evidence for deploying Bioenergy with CCS (BECCS) in the UK.* Available: https://d2umxnkyjne36n.cloudfront.net/insightReports/The-Evidence-for-Deploying-Bioenergy-with-CCS-in-the-UK.pdf?mtime=20161107110603

[6] Energy UK (2018) *Response to the BEIS Committee's Carbon Capture, Usage and Storage Inquiry*. Available: https://www.energy-uk.org.uk/publication.html?task=file.download&id=6898

[7] https://hynet.co.uk/

One possibility is the use of hydrogen as an alternative fuel to natural gas, or the use of CCUS. These technologies require Research and Development (R&D) funding before they can be deployed commercially. A cross-industry group on decarbonisation would add strength and credibility to certain areas of the UK (such as Wales or the North West) as potential CCUS or hydrogen 'clusters' thanks to their unique geology, existing technical skill base and concentration of industry.

Going forward, carbon neutral electricity will be the key to help decarbonise other sectors, through direct and indirect electrification and through offsetting emissions from these sectors through various CCUS technologies which have the ability to deliver neutral or negative emissions.

As the UK decarbonises its electricity system, and increases the electrification of other sectors of the economy, the ability to balance the energy system will become increasingly important. Measures such as smart charging, hybrid heat pumps, and smart grids have a part to play, but it is important that the interim role of natural gas for electricity generation (but perhaps longer-term for hydrogen production), the role of CCUS, and both long and short-term storage is not understated in any policies.

Over the past decade, utilities and energy businesses have introduced digital innovation to optimise processes while new technologies and services continue to disrupt and transform the traditional power sector value chain. The digital future of the electricity system will require the UK to make smart grids a reality so as to integrate centralised and decentralised technologies, and promote customer participation in a secure, flexible and cost-effective manner. Long-term decarbonisation will not be possible without digitalisation. Digital technologies are essential to integrate distributed energy resources such as renewables, storage and demand response and to help them interact optimally and efficiently. It is therefore key to address existing challenges such as the dynamic development of regulatory frameworks, appropriate investment strategies and a sectoral approach to innovation and digitalisation.

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?

We support a UK target of net zero as a long-term goal. The UK needs to set and maintain a realistic trajectory to net zero, while retaining its current position of international leadership on climate change policy and positioning itself to maximise the economic opportunities of decarbonisation. The ultimate date for net zero delivery will be driven by technology progress and global adoption.
Energy UK supports the continuation of the Contracts for Difference (CfD) framework so as to provide a stable investment climate that developers and the supply chain need to bring forward renewable energy schemes/projects. Since the first auction in 2015, the UK Government has not held any auctions for Pot 1 technologies (including onshore wind and solar power), effectively denying them a route-to-market despite their substantial cost reductions.

As reasoned in Energy UK's response to government's five-year review of the Electricity Market Reform (EMR) package[8], these cost reductions should be capitalised upon by ensuring that there is a route-to-market for them through a revenue stabilisation CfD. Affordable decarbonisation cannot take place without such an approach.

Further demonstrated by a 2018 report from consultants BVG Associates (BVGA), "The Power of Onshore Wind"[9], a commitment to five new CfD auctions between 2019 and 2025 would encourage 5GW of new onshore wind capacity.

Our understanding is that the UK Government's decision not to support the Swansea Tidal Lagoon project was largely based around costs. Minimising the cost to the consumer of decarbonisation is a key driver, along with security of supply. In the long term, a diverse power portfolio can play a key role

[8] Energy UK (2018) *Response to BEIS CfD Amendments to the Scheme Consultation*. Available: https://www.energy-uk.org.uk/publication.html?task=file.download&id=6791
[9] BVGA (2018) *The Power of Onshore Wind.* Available: https://bvgassociates.com/download/6985/

in delivering both of these objectives for the UK. The fall in the cost of offshore wind illustrates what can happen when industry and Government work together and we hope that the potential contribution from tidal power can be revisited in the future.

As explained in detail in Energy UK's recent report[10], we would also recommend that the Government develops a clear roadmap for the decarbonisation of heat. For industry to successfully deliver toward decarbonisation efforts, the report calls for government to act as a market enabler, particularly in the next 5 years, pursuing technology neutral policies which, where possible, provide long-term certainty. Such a roadmap could highlight key milestones, for example phasing out the sale of carbon intensive technologies, the introduction of carbon pricing, and the development of an awareness scheme. This would provide companies and investors with the confidence to invest in low-carbon heating technologies.

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?

On the one hand, setting an ambitious target now to reach net zero across the whole economy by 2050 could drive investment and deployment in the UK and set an example to other countries. It could support the UK becoming a world leader in low-carbon technologies, such as offshore wind and CCUS.

On the other hand, there is a risk that unilaterally tightening the UK's 2050 decarbonisation target might disproportionately increase costs to industry and commerce, causing migration of carbon intensive industries to locations with lower costs and higher emission rates. This could hurt UK industry and consumers and also lead to increasing global GHG emissions as a result. Any tightening of targets must therefore be combined with measures to avoid export of carbon emissions if it is to have an overall positive effect. For example, in the absence of a global emissions trading scheme, there would need to be a mechanism in place to avoid unintentional negative consequences and protect against carbon leakage.

Regarding the potential economic benefits from UK leadership in key low-carbon technologies, realising these benefits would require targeted investment, which is not driven by targets per se but by government policy and support. International co-operation, possibly led by UK organisations, could allow such leadership and share the likely huge costs for the development and demonstration of key technologies needed for a net zero carbon economy.

We would highlight heat as a particular challenge as it is not clear when the UK will be able to reach net zero in this sector. To decarbonise heat would require moving excess zero-carbon electricity production from summer to meet winter demand, which would require the development and deployment of seasonal storage at scale, which does not exist at present. When and how to achieve net zero emissions across the whole economy will be contingent on the development of seasonal storage at reasonable cost.

We note that one of the primary scenarios in the recent IPCC SR15 report allows some overshoot in emissions with the assumption that these emissions are eventually removed utilising NETs. Whilst we would not advocate an expectation that an overshoot in emissions will occur, it is important to note that any overshoot in emissions will require the deployment of NETs such as BECCUS at scale in addition to its role of offsetting 'difficult to decarbonise sectors'.

[10] Energy UK (2018) *Kick-starting the decarbonisation of heat*. Available: https://www.energy-uk.org.uk/publication.html?task=file.download&id=6609

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?

We would encourage the CCC to review the European Commission long-term GHG gas reduction strategy[11] issued on 28 November. The Communication analyses eight policy options for the EU's future emissions reduction effort. Two scenarios chart a path toward net zero emissions by 2050; five scenarios look at emissions cuts of around 80% (the EU's current target); another scenario would result in emissions cuts of up to 90%. The Commission's pathways to net zero emissions by 2050 would be of relevance to the CCC's own analysis for the UK. The first net zero emissions path looks at boosting the role of bioenergy and carbon capture and storage, whilst the second examines moving towards a full circular economy to reduce, reuse and recycle materials and products. Reaching net zero will also depend on boosting natural carbon absorption by restoring or planting new forests.

We would also encourage the CCC to review a recent report issued by Eurelectric ('Decarbonisation Pathways'[12], November 2018, supported by McKinsey) which indicates that the European power sector can reach net zero by 2045 (NB: There is still some residual unabated fossil fuel emissions in power, accounting for 4 to 6% of supply in 2045 – these have to be offset by CCUS or other NETs in order to reach 100% decarbonisation in power). Across all sectors, it also notes that *up to* 95% reduction in emissions across Europe, by 2050, is achievable, but to do so requires a 'cost breakthrough' which assumes accelerated cost reductions for a range of technologies including renewables, nuclear, CCS and storage. The report describes the necessary market conditions to reach that objective and the enablers from policy and society.

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[11] European Commission (2018) *A Clean Planet for all: A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy*. Available: https://ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_733_en.pdf
[12] Eurelectric (2018) *Decarbonisation Pathways.* Available: https://cdn.eurelectric.org/media/3457/decarbonisation-pathways-h-5A25D8D1.pdf