

Energy UK's response to the Sixth Carbon Budget and Welsh emissions targets – Call for Evidence¹

February 2020

A. The path to the 2050 target

Question 5: How big a role can consumer, individual or household behaviour play in delivering emissions reductions?

How can this be credibly assessed and incentivised?

Delivering the emissions reductions needed to reach net zero by 2050 will require far greater participation from consumers, individuals and households than we have seen so far as well as behaviour change to help optimise energy use, but also more widely making lifestyle changes that might not need to happen otherwise. This will need to be clearly communicated to everyone as this transition to net zero will directly impact people's lives and businesses. As such, **customer engagement is key and needs to start now with clear and transparent communication from Government and industry**. Net zero will require all actors in society to change and adapt, this needs to be clearly explained.

Government needs to develop focussed policy and put in place a funding framework to help households on their journey to improve their homes with energy efficiency and installing low carbon heating systems. These are disruptive and costly changes that households need to understand and accept. Financial support and regulatory reforms are needed to guide individuals and businesses through this transformation. **Strict energy efficiency standards** as discussed in the Government's Non-Domestic Private Rented Sector Minimum Energy Efficiency Standards: Trajectory to 2030 consultation², recommending that **all rented non-domestic buildings meet an EPC Band B by 2030** are a good example of offering clear direction. **Such policy will need to be supported by financial incentives and subsidies for those less able to pay.**

Lessons also need to be learnt from past experience, such as the smart meter rollout, where technical issues alongside limited public communication on the reasons why smart meters are important for consumers as well as the energy system meant that the benefits of this technology were not well understood and that the public did not embrace it. **Smart meters offer many benefits in enabling flexibility and optimisation of the energy system which translate in cheaper bills for consumers and less carbon emissions.** This message has been lost during the rollout of smart meters, but needs to be promoted to consumers as increasing numbers of low carbon technologies and smart appliances are taken up across the UK. **Demand side flexibility has a significant role to play in keeping costs of the energy system transition down**, but will only be taken up if consumers trust in automated controls is improved and the value of changing behaviours is made apparent.

¹ Bulb has recently joined Energy UK as a trial member and has not contributed to the development of this response

² Non-Domestic Private Rented Sector Minimum Energy Efficiency Standards: Trajectory to 2030 consultation

Question 6:

What are the most important uncertainties that policy needs to take into account in thinking about achieving Net Zero?

How can government develop a strategy that helps to retain robustness to those uncertainties, for example low-regrets options and approaches that maintain optionality?

One of the main uncertainties when it comes to achieving net zero **is the decarbonisation of heat**. The processes used for heating and hot water contribute almost a quarter of UK carbon emissions and are also recognised as a leading cause of poor air quality within the home³⁴. To date, there have been a variety of incentives aimed at increasing uptake of low carbon solutions, with limited success. To drive change, **a timeline for tight carbon emissions regulation is required now supported by financial incentives**.

Decarbonising heating and cooling will require significant change to a number of supply chains, business models, investment and industrial processes. Time is of the essence making it essential for manufacturers and supply chain partners of a range of low carbon technologies to be supported by policies and finance required to secure committed choices from households and investors.

Where government can be most effective is in setting out ambitions and frameworks, and then allowing private markets and local actors to deliver solutions that best fit customers' needs.

Government should publish a heat roadmap setting out strong direction and policy in 2020. This would cover:

- Regulation: **Implement incremental improvements to standards that ban the most carbon-intensive technologies**, culminating in a **ban on the sale of carbon-emitting boilers by 2040**.
- Communication: Industry to launch a timely communication campaign in collaboration with Government to **engage customers on the need to change**, the range of solutions open to them and the benefits to them.
- Trials: **Specific large-scale trials of a range of technologies and a local approach** to deploying low carbon heat to be rolled out from 2020.
- Fiscal signals: Introduce **mechanisms from 2025 to signal required behaviour change**, and to **raise ring-fenced revenue to support low carbon deployment**.
- National framework for local solutions: Government to **release funds to local actors based on bids that meet its objectives and deliver decarbonisation at lowest cost**.
- Energy efficiency: This strategy should be coupled with a **strong market for energy efficiency to support decarbonisation at lowest cost**.

Low regret options, such as integrating low carbon technologies in new homes, can help with the change of direction and promote a smooth transition for households. This includes making mandatory the installation of low carbon heating systems or connection to heat networks for all new homes from 2025.

All new homes should also be equipped with technologies promoting decarbonisation, such as smart meters and access to electric vehicle (EV) charging infrastructure. As such **key enabling infrastructure, such as EV charging infrastructure is needed for the decarbonisation of transport** (Transport and Environment suggest 500,000 public chargers required by 2030⁵) and to support low carbon housing.

Other areas of uncertainties are around **technological uncertainties relevant to fully decarbonising power** (e.g. long term costs, lifecycle CO₂ emissions and the role of options such as

³ WHO - <http://www.who.int/airpollution/household/pollutants/combustion/en/>

⁴ https://www.parliament.uk/documents/post/postpn366_indoor_air_quality.pdf

⁵ <https://www.transportenvironment.org/sites/te/files/publications/01%202020%20Draft%20TE%20Infrastructure%20Report%20Final.pdf>

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gas and CCUS, hydrogen, different storage technologies as well as novel nuclear technologies).. This means that while exploring and developing a range of new technology options, the decarbonisation of power will continue to rely on proven low carbon technologies such as renewables and conventional new nuclear, supported by a strong carbon price.

A pathway to low carbon generation is needed with visibility of when decisions are on critical path. The CCC Net Zero report suggests the UK could need at least 75GW of offshore wind by 2050. **A roadmap for the North Sea and Irish Sea, complementing the Offshore Wind Sector Deal, alongside a cross departmental strategy are needed** to deliver net zero by 2050 and ensure that potential barriers from planning for example are addressed. Close cooperation with neighbouring countries through initiatives such as the North Seas Cooperation Agreement will be important, given the significant deployment of offshore wind required in both the Irish and North Seas for the EU to meet their Net Zero target.

Question 7: The fourth and fifth carbon budgets (covering the periods of 2023-27 and 2028-32 respectively) have been set on the basis of the previous long-term target (at least 80% reduction in GHGs by 2050, relative to 1990 levels). Should the CCC revisit the level of these budgets in light of the net-zero target?

Energy UK believes that the most important target is net zero by 2050 and that the carbon budgets must help create the trajectory to get there and reflect this ambition.

The new target of net zero by 2050 and the time elapsed since the carbon budgets were initially set might mean that revisiting those budgets would prove beneficial, but **the path should only be changed if the CCC can show that a new path is more cost effective than the current one.**

We also note that **making key strategic and investment decisions in the 2020s and early 2030s** - which put us on a clear path to net zero – **are as, if not more important** than, the precise carbon budgets applying in that period.

Question 8:

What evidence do you have of the co-benefits of acting on climate change compatible with achieving Net Zero by 2050?

What do these co-benefits mean for which emissions abatement should be prioritised and why?

There are **clear environmental, economic and health co-benefits of actions on climate change and achieving net zero.** The decarbonisation of the power, transport and heating sectors, will all lead to **improved air quality, and biodiversity as well as increased energy independence.**

The ongoing transition to a cleaner energy system, including increased deployment of low-carbon energy has clearly made a massive contribution to the reduction in GHG emissions. However, this unprecedented shift has also resulted in significant cuts in emissions associated with air pollution such as sulphur dioxide (SO₂), nitrogen oxides (NO_x) and particulate matter (PM_{2.5} and PM₁₀) that can cause serious health problems and damage to ecosystems.

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Between 2000 and 2017, the UK power sector achieved a 97% reduction in SO₂ emissions, alongside a 72% cut in NO_x emissions and reductions in PM ranging from 71-89%⁶. Other sources of these emissions, include transport and domestic fuel. Road transport notably from internal combustion engine (ICE) vehicles dominates production of NO_x emissions, accounting for 32% of emissions in the UK in 2017⁷. As these are particularly harmful in high concentrations around main roads, **action taken to mitigate climate change through decarbonising transport will also deliver a substantial co-benefit of improved local air quality** for those living in big cities and towns.

Co-benefits can also be found in the form of job creation, economic growth and energy independence. The redevelopment of the Yorkshire and Humber region through the deployment of low carbon and renewable infrastructure and technologies, as well as large infrastructure projects such as Hinkley Point C in the South West, show the **business and economic potential behind the transition to a net zero economy**. The size of investment required and delivered to date has had a real impact in local economies with job creation and local investments in wider infrastructure. This growth in UK-based industry and electricity generation also reduces our reliance on foreign imports for energy and manufactured goods.

B. Delivering carbon budgets

Question 9: Carbon targets are only credible if they are accompanied by policy action. We set out a range of delivery challenges/priorities for the 2050 net-zero target in our Net Zero advice.

What else is important for the period out to 2030/2035?

Energy UK believes that the transition to net zero should be based on the following principles:

Open and competitive markets are best placed to deliver the transition at lowest cost

- **Ensure that markets are competitive and open to any eligible technology**, so as to stimulate competition and innovation at lowest cost while maintaining security of supply throughout the transition.
- **Predictable policy frameworks and investment tools** are needed to enable the investment required to deliver at least 9 GW of generation per year until 2050.
- The **Contracts for Difference (CfD) scheme** which supports low carbon generation, **should continue and be available to all relevant low-carbon technologies** providing services to the energy system.

Cost effective finance

- **Backstop regulations, incentives, new fiscal products**, including green mortgages and loans **will be needed to drive consumer demand**.
- **De-risking large scale low carbon infrastructure projects**, such as new nuclear and certain parts of CCUS projects via Regulated Asset Base (RAB) arrangements, **has the potential to lower the cost of capital and therefore the overall costs of these projects**.

⁶ National Atmospheric Emissions Inventory - BEIS

⁷ National Statistics Release: Emissions of air pollutants in the UK, 1970 to 2017– Defra

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What else is important for the period out to 2030/2035?

- **Encourage efficient investment to ensure the safe operation of energy networks while supporting the UK's net-zero ambitions** and future-proof the network to minimise disruption to consumers.

Fair allocation of costs

- **Avoid regressive schemes that penalise low income households.**
- **For households in or at risk of fuel poverty, energy efficiency should be delivered via a national energy efficient programme funded through general taxation**, moving away from the current supplier obligation model funded by energy consumers which is regressive.
- **Review the cost of decarbonisation which falls mainly on electricity rather than gas on energy bills to ensure a fairer cost distribution across all sectors.** Re-balancing these costs may be required for whole life costs of low carbon alternatives to become competitive with conventional gas boilers. **Achieving a balance between consumers and taxpayers in the funding of decarbonising heat** will be also required.
- **A strong carbon price remains important for future market design** and will be required to support the development of low carbon sources of capacity and flexibility, and for the progressive decarbonisation of gas.

A resilient supply chain and workforce

- **A strong supply chain for smart low carbon technologies needs to develop before 2025** to support the deployment of these technologies at scale. This needs to be supported by stricter standards driven by carbon emission reduction limits. Developing a supply chain for low carbon heat is particularly important.
- **Government needs to publish a National Infrastructure Plan for Skills** that incorporates everything required by current UK government law and policy to deliver on the carbon budgets and ultimately net zero.
- **Apprenticeship standards and T-Level programmes should include modules on low-carbon design and installation** and be developed in collaboration with employers and businesses to ensure the content meets the needs of industry during the 2030s.

Question 10:

How should the Committee take into account targets/ambitions of UK local areas, cities, etc. in its advice on the sixth carbon budget?

Many Local Authorities have declared a climate emergency and set themselves plans reduce their carbon emissions. The range of ambitions varies with some Council's concentrating on their own direct emissions, whilst others are more ambitious such as Bristol City Council's ambition for its area in totality to be zero carbon by 2030.

There are many areas of decarbonisation that are more suited for local authorities to deliver, especially in the realms of transport and heat decarbonisation. However, there is no agreed obligation on what local authorities should deliver, nor consistency of approach. It is also noted that several local authorities are doing very little in terms of mitigation, whereas others are doing a great deal.

In our view, **the CCC should set out the minimum that local authorities are required to deliver to meet the sixth carbon budget, and advise central government where this would be best**

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delivered as a legal requirement on local authorities, whilst allowing flexibility for councils to go further and/or deliver earlier.

The CCC should also consider whether it could provide Local Authorities with advice on what they can deliver for the UK to meet the sixth carbon budget.

Many of Energy UK's members are engaging with local authorities on local energy projects and as smart meters become the norm, the opportunity to deliver **flexibility to maximise the use of local generation for local consumption will increase**. This **could reduce the cost of decarbonising transport and heat as re-enforcement of local networks can be reduced**. However, one key barrier to this is the **inability of suppliers and their local authority partners to lock customers into longer term contracts linked to investment in the customer's property of generation, storage or energy efficiency measures**. **The CCC should consider whether this barrier can be overcome** without putting customers at risk of detriment.

Question 11:

Can impacts on competitiveness, the fiscal balance, fuel poverty and security of supply be managed regardless of the level of a budget, depending on how policy is designed and funded?

What are the critical elements of policy design (including funding and delivery) which can help to manage these impacts?

How policy is designed and funded will depend on Government's approach to decarbonisation, but some key elements must be taken into account:

Security of supply must remain an overarching priority, especially as the energy system transformed itself to become net zero. **Policy design must be aimed at net zero while supporting or enhancing security of supply, aiming for a secure, clean and affordable energy system at all time, especially as new intermittent generation come on the system and at times of fossil fuel based generation exiting the system.**

Decarbonisation cannot be done for free and it is very likely to have an impact on the budget, however with well-designed policy, this budget impact can be mitigated by a stronger economy resulting from business opportunities arising and being seized. **One approach to reduce the costs of low carbon infrastructure deployment is to de-risk investments**, and this had significant impact on reducing the costs of offshore wind. **Policy which enables investment in low carbon infrastructure at a lower cost of capital will reduce the lifetime costs to consumers.**

Policy must be designed in a way that allows private markets to operate in a competitive and optimised manner to drive innovation and delivery at the lowest cost to customers.

Government should not pick winners but let the market come up with those technologies that support the transition and will ultimately deliver net zero. **Schemes such as the Contracts for Difference (CfD) must therefore be technology neutral.**

As mentioned in Q9, **the least able to pay will need to be supported during the transition, e.g. by delivering energy efficiency via a national programme funded through generation taxation** to alleviate the financial burden on low income households.

To support these key elements, **Government will need to design policy that offer flexibility and space for innovation and creativity, support a financial system that rewards low carbon projects with affordable finance and create a regulatory framework that encourages core changes** in the way businesses and organisations operate, e.g. building regulations to support zero carbon home designs to avoid retrofitting costs later on.

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What are the critical elements of policy design (including funding and delivery) which can help to manage these impacts?

Government must use the suite of measures and levers at its disposal to minimise the cost of decarbonisation by developing a strong, sustainable economy while ensuring that the least able to pay are not left behind.

Question 12: How can a just transition to Net Zero be delivered that fairly shares the costs and benefits between different income groups, industries and parts of the UK, and protects vulnerable workers and consumers?

Avoid regressive schemes that penalise low income households

The net zero legislation has now put energy efficiency and the decarbonisation of heat at the heart of the debate; and with it the question of how to **fund costly programmes in a way that does not penalise the least able to pay while encouraging those able to pay to do so.**

Energy suppliers have, for example, been delivering government's energy efficiency programmes for decades, recovering the costs through consumer energy bills, regardless of their incomes. Energy UK believes that this approach, while allowing for a large level of delivery over the years, is no longer the most effective way of delivering this objective given its regressive impacts, Energy efficiency measures are also becoming more complex and harder to deliver as the more straightforward measure run out.

Poorer households spend a much greater proportion of their income on energy (10%) than the richest households (3%) with the proportion of poorer household income to meet different energy policy funding being over eight times that of the richest households⁸.

Fair allocation of decarbonisation costs between gas and electricity in retail markets

Currently, the cost of decarbonisation falls very largely on electricity rather than gas bills. On domestic bills, according to Ofgem's Default Tariff Cap methodology environmental and social policy costs represent over 19% of an electricity bill compared to 3% of a gas bill⁹. The difference would be greater still if the costs of carbon pricing were included. On non-domestic electricity bills, this increases to 20.4% vs 1.6% for gas¹⁰.

The transition to net zero means greater use of low carbon electricity and low carbon gas in our domestic heating. However, **with the costs of decarbonisation (both policy and carbon) overwhelmingly falling on electricity bills and, therefore driving up the cost of electricity, policy costs create a disincentive for homes and businesses to switch their gas consumption** to lower carbon fuels (additionally, this puts additional costs on the electrification of transport (EVs)).

Energy UK believe that **a fairer allocation of costs across fuels in order to recognise their function in delivering decarbonisation is needed.** However, **this transition needs to be managed appropriately dependent on the customer propositions and technologies available.** Establishing a high carbon price for example on gas bills would only work as an incentive for consumers if cost effective low carbon alternatives to boilers are available. Where these alternatives

⁸ UKERC - Funding a Low Carbon Energy System: a fairer approach?

⁹ Energy UK's analysis of Ofgem's October 2019 price cap breakdown, including ECO but excluding WHD

¹⁰ Energy UK's analysis of the 2018 Consolidated Segmental Statements

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are not available or effective support mechanisms are not in place, consumers will be burdened with higher energy bills.

There is also a **need to ensure that decarbonisation of other sectors are not placed on electricity consumers**. For example, decarbonisation of industry through CCUS should not be funded through a levy on consumer energy bills. Instead **schemes need to be developed which can enable the allocation of funds from the sectors which benefit from decarbonisation**.

C. Scotland, Wales and Northern Ireland

Question 13:

What specific circumstances need to be considered when recommending an emissions pathway or emissions reduction targets for Scotland, Wales and/or Northern Ireland?

How could these be reflected in our advice on the UK-wide sixth carbon budget?

In a number of areas the Devolved Administrations are reliant on UK legislative and GB regulatory frameworks to deliver on their respective ambition, which has material benefits for the Devolved Administrations and the rest of the UK/GB. To ensure these frameworks do not present a barrier to the Devolved Administrations in pursuing greater climate ambitions, there **should be scope for additional flexibility and support**.

In Scotland, there are 260,000 domestic customers who are using high carbon fuel sources e.g. coal, oil and LPG for heating. **The decision by the Scottish government to develop new regulations to ensure new build use renewable or low carbon heating from 2024 requires action at a governmental level to enable financial support, supply chain readiness, installer training and consumer awareness raising**. The Climate Emergency Response Group has proposed that the Scottish government launch a three Year Heat Pump Sector Deal which would be designed to provide grant funding to customers in fuel poverty and partial funding to self-funded customers.

Question 14: The Environment (Wales) Act 2016 includes a requirement that its targets and carbon budgets are set with regard to:

- The most recent report under section 8 on the State of Natural Resources in relation to Wales;
 - The most recent Future Trends report under section 11 of the Well-Being of Future Generations (Wales) Act 2015;
 - The most recent report (if any) under section 23 of that Act (Future Generations report).
- a) What evidence should the Committee draw on in assessing impacts on sustainable management of natural resources, as assessed in the state of natural resources report?
 - b) What evidence do you have of the impact of acting on climate change on well-being? What are the opportunities to improve people's well-being, or potential risks, associated with activities to reduce emissions in Wales?
 - c) What evidence regarding future trends as identified and analysed in the future trends report should the Committee draw on in assessing the impacts of the targets?
 - d) Question 12 asks how a just transition to Net Zero can be achieved across the UK. Do you have any evidence on how delivery mechanisms to help meet the UK and Welsh targets may affect workers and consumers in Wales, and how to ensure the costs and benefits of this transition are fairly distributed?

The Welsh Government is seeking to maximise benefits to Wales from renewable energy generation in line with the WoFGA by developing policy and guidance on 'local ownership'. This work is ongoing and final proposals have not yet been released. However, **we believe the best way to maximise both deployment of renewables and local economic benefit, is via encouraging 'shared ownership' rather than 'local' ownership.** Shared ownership is a partnership between the developer and another local party such as a community group, council or local business. A **careful assessment of the trade-offs of local versus shared ownership** could help establish the extent to which it may reduce, delay or increase the costs of renewables deployment and consequently weaken Wales' ability to address climate change.

Question 15: Do you have any further evidence on the appropriate level of Wales' third carbon budget (2026-30) and interim targets for 2030 and 2040, on the path to a reduction of at least 95% by 2050?

The Welsh Government has a target to meet 70% of Welsh electricity demand from renewables by 2030. Since that target was set, Wales has increased 2050 ambition to 95% reduction (vs 80%). Therefore we believe **there is scope to review the 70% renewables target to ensure it is consistent with increased ambition.**

Question 17:

In what particular respects do devolved and UK decision making need to be coordinated?

How can devolved and UK decision making be coordinated effectively to achieve the best outcomes for the UK as a whole?

Overall, we expect the UK Government to set the trajectory to net zero through strong forward policy, and where these policies touch on devolved matters, for nations to take over and implement the delivery of such policies in the way they see fit and most appropriate.

Central Government should also provide central funding to devolved administrations to supplement local and private funding, to ensure all parts of the country are in a position to deliver on Government policy.

Due to the challenge, complexity and costs deep decarbonisation presents, we believe that strong coordination and communication will be needed, in the same way as between Government and Industry and customers. **Welsh and Scottish carbon budgets are defined on a gross basis whilst UK is on a 'net basis'. Therefore, if decision making process between UK and the devolved regions is not coordinated effectively, this could create a risk of leakage of activity, jobs and emissions at the expense of no net reduction in overall emissions.**

In relation to sectors that compete in national markets, such as power and gas, **there is a need to ensure devolved and UK decision making is coordinated to avoid outcomes that could distort these markets and/or lead to higher costs.** Retaining clear accountability for national markets at a UK level, alongside consultation with devolved administrations, should help to achieve this. The process on developing the future UK carbon pricing policy in 2019 provides an example of this coordination.

As noted in Q5, Energy UK is asking Government to publish a Heat roadmap in 2020, setting out its policies and trajectory. We believe that local approaches to decarbonisation could deliver national reductions at lower cost to consumers and as such local areas should be able to bring forward low carbon heat solutions that are funded by private partners and central Government. **Funding from Central Government should be allocated to local areas competitively in order to enable large-scale deployment of low carbon heat solutions.**

The UK government should seek to support the ambitions of the Welsh and Scottish Government in enabling more devolved decision making at a local level to facilitate the acceleration of the decarbonisation of heat and transport.

D. Sector-specific questions

Question 20 (Surface transport): The CCC recommended in our Net Zero advice that the phase out of conventional car sales should occur by 2035 at the latest. What are the barriers to phasing out sales of conventional vehicles by 2030? How could these be addressed? Are the supply chains well placed to scale up? What might be the adverse consequences of a phase-out of conventional vehicles by 2030 and how could these be mitigated?

Energy UK fully supports moving the date of phase out to 2035 at the latest and an exploration of the feasibility of an earlier date. We are confident in the ability of the energy industry to adapt to meet the needs of increased uptake of low carbon transport across the UK.

Barriers to the phase out of conventional vehicles by 2030 include:

- **Upgrading our energy networks to ensure the physical assets can meet peak demand,** as well as ensuring that monitoring capabilities and data quality and access are improved across all network levels to increase visibility of the state of the network.

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- **Ensuring that adequate generation capacity is brought online** to meet increased overall demand for both gas and electricity.
- **Developing network charging and market frameworks that enable and encourage flexibility** to ensure that smart charging is utilised, reducing costs for consumers in terms of aiding excess investment in network reinforcement and generation capacity development.
- **Enabling consumers to understand what their options are** in terms of low carbon vehicle models, refuelling methods, and contractual arrangements including energy tariffs.

These concerns are being examined across a range of workstreams already in order for the energy system to be prepared for a 2040 target and wider decarbonisation. These workstreams may need to be accelerated to ensure market growth and certainty is adequate by 2030 for the private sector to deliver the required investment in charging infrastructure, generation assets, network infrastructure and consumer offerings.

To **address the above barriers** it will be important to:

- **Set short term milestones to a full phase out**, for instance an interim 2025 or 2028 target (depending on the end phase out date).
- **Introduce clear and ambitious policy levers** that are consistent with fully phasing out conventional vehicles by the chosen date. In particular **greater visibility and certainty of the fiscal and regulatory environment is needed**, notably with regards to support for the upfront cost of EVs and chargepoints, **long term visibility on benefit in kind rates**, and **clarity on the future of vehicle excise duty and fuel duty**.
- **Take a market-based approach to smart charging**, to ensure that providers are able to bring forward innovative and compelling smart charging offerings. This will be key to delivering widespread participation in smart charging and optimising the use of energy system assets.
- **Improve monitoring of network capacity, in particular low voltage distribution networks.** The data should be made publicly available and combined with the creation of local flexibility markets that are accessible to EVs, creating an additional revenue stream.
- **Network regulation should allow for well justified anticipatory investment to ensure that networks can support a rapid transition to electric vehicles.** Smart charging and flexible markets will be very important in reducing the scale of network investment needed for electrification of transport but some significant investment/re-inforcement will still be needed alongside that.

Question 21 (Surface transport): In our Net Zero advice, the CCC identified three potential options to switch to zero emission HGVs – hydrogen, electrification with very fast chargers and electrification with overhead wires on motorways. What evidence and steps would be required to enable an operator to switch their fleets to one of these options? How could this transition be facilitated?

Large scale trials are required to give fleet operators the confidence required to invest in low carbon HGVs. Beyond this, we expect fleet operators to be given confidence that appropriate public refuelling infrastructure would be available for the technology they choose. This would require **significant public and private investment in fuelling stations and charging technologies.**

Question 21 (Surface transport): In our Net Zero advice, the CCC identified three potential options to switch to zero emission HGVs – hydrogen, electrification with very fast chargers and electrification with overhead wires on motorways. What evidence and steps would be required to enable an operator to switch their fleets to one of these options? How could this transition be facilitated?

The UK government should support initial demonstration facilities in low-carbon hydrogen production – both methane reformation with CCUS, and electrolysis to better understand costs associated with these technologies. The use of other low carbon gasses should also be explored, with many already feasible for use in HGVs. As referenced in response to question 20, **industry will require long term certainty and visibility of the direction of travel** with an appropriately robust and coherent policy and regulatory framework.

It is also important that **the CCC begin to assess the likely demand for a range of fuel sources to understand if the UK will have access to enough of each fuel to meet demand across transport, heat, power, and industry**. For example, if the UK's capabilities in hydrogen production are fully occupied in delivering low carbon gas for industrial processes and power generation, hydrogen may not be a viable option for HGV decarbonisation.

Question 22 (Industry): What policy mechanisms should be implemented to support decarbonisation of the sectors below? Please provide evidence to support this over alternative mechanisms.

- a) Manufacturing sectors at risk of carbon leakage
- b) Manufacturing sectors not at risk of carbon leakage
- c) Fossil fuel production sectors
- d) Off-road mobile machinery

a) and b)

Energy UK supports the principle that all sectors should be subject to an appropriate carbon price. However, there are several options for the mechanism to apply a carbon price and some are more effective for a particular sector than others, depending on its characteristics.

Manufacturing sectors not at risk of carbon leakage should be participating in the UK ETS linked to the EUETS without free allocations. These sectors can be further incentivised to decarbonise through the creation of a low-carbon market. **Initiatives such as certification, public procurement of green products and end-use regulations can help stimulate demand and assist the decarbonisation of manufacturing sectors.**

Energy UK has a long-held concern over the continued use of energy bills to pay for national social and environmental policies. **We strongly believe that the fairest and most progressive method of funding social and environmental policies is through general taxation.** Importantly, **it would address the regressive nature of existing obligations and ensure that people on low incomes, households in or vulnerable to fuel poverty and those below the tax threshold are not required to contribute,** but can still access and benefit from these policies.

In particular, **we are especially keen to avoid placing the cost of decarbonising non-power sectors on electricity consumer bills.**

Question 26 (Buildings): For the majority of the housing stock in the CCC's Net Zero Further Ambition scenario, 2050 is assumed to be a realistic timeframe for full roll-out of energy efficiency and low-carbon heating.

- a) What evidence can you point to about the potential for decarbonising heat in buildings more quickly?
- b) What evidence do you have about the role behaviour change could play in driving forward more extensive decarbonisation of the building stock more quickly? What are the costs/levels of abatement that might be associated with a behaviour-led transition?

As mentioned in Q6 and Q12, **to make energy efficiency a success, retrofitting buildings will need to be avoided in future by ensuring that all new builds are fully energy efficient from day one.** This requires a fabric first approach which can only be achieved by tighter standards and regulations and making low carbon installations the norm by 2025.

Cost optimisation of low carbon heat technologies will only occur through mass market deployment, which may require continued incentives and re-balancing of energy subsidies between gas and electricity. The RHI scheme should be followed in 2021 with a low carbon heat incentive designed to achieve maximum deployment of low carbon heat options including heat pumps. This should be supported by incremental targets and a governance framework to ensure the incentive is more effective than the RHI has been.

For existing building, Energy UK call for energy efficiency to be delivered via a national energy efficient programme, centrally administered and funded by general taxation for people who are not able to pay for their own energy efficiency measures.

For those that can afford to make energy efficiency investments in their own property, they should be incentivised and rewarded for doing so. Energy UK believes that **long-term regulation, such as banning the sale or rental of any property with a poorer efficiency rating below EPC C, subject to practical limitations, should form a core part of the transition.**

Regulatory and policy frameworks as well as incentives are also needed to make low carbon heating options/alternatives an affordable and cost competitive option for households versus their existing gas boiler, otherwise there will be large resistance to change.

In developing its Future of Energy publication, Energy UK consulted with a range of manufacturers, technology providers, suppliers and other stakeholders to explore the timeframes for a sustainable transition to decarbonised heating. A common theme across these organisations was an understanding of the need to decarbonise and a general willingness to implement changes to business models to meet that need.

The one requirement for all organisations is for clear and detailed incremental targets to be laid out to give certainty over the required rate of change. This will enable long, medium, and short term planning to be accurate, enabling the supply chain to adapt and develop sustainably as we transition.

Planning should also be mentioned as it **is vital to ensure that delivery is effective, efficient and coordinated.** **Energy UK is exploring approaches to regional decarbonisation, focussing on heat,** and will continue to engage with the CCC as this develops. It is vital that, where a sensible approach is defined, local authorities and devolved bodies are given the appropriate powers and funding to deliver decarbonisation at scale.

Engagement will be required in order to encourage consumers to take on low carbon heat and energy efficiency measures where appropriate, and to ensure consumers are aware of and prepared for any required disruption in the transition. This will be vital to a smooth transition, but cannot be expected to result in a holistic transition to net zero. **Engagement and behavioural change must be accompanied by regulation and standards** if the UK is to meet its ambition, particularly in such a challenging area.

Question 27 (Buildings):

Do we currently have the right skills in place to enable widespread retrofit and build of low-carbon buildings?

If not, where are skills lacking and what are the gaps in the current training framework?

To what extent are existing skill sets readily transferable to low-carbon skills requirements?

[Please note that the response to this question was put together in collaboration with Energy and Utility Skills].

With regulatory and market frameworks that make low carbon buildings and low carbon heat networks more economically viable and attractive commercial propositions, the market will respond by developing new offers and services and will hire and train people and will thus help to build the national skills base.

Generally, **we currently do not have the skills to support the transition to net zero and we need to put in place a strategy to ensure we have the right level of training, skills and workforce in the pipeline for the deployment of low carbon technologies in the early 2030s.**

The energy and utilities sector directly employs over half-a-million people, and about 65,000 are employed in the supporting sub-contractors. **It is important to ensure that, if a new initiative in low-carbon construction or retrofitting is rapidly implemented, a potential labour squeeze is avoided** as this would create upward pressure on costs, ultimately passed on to customers.

Government, via the Infrastructure & Projects Authority, **should urgently update the National Infrastructure Plan for Skills** dating back to 2015 **to incorporate everything required by current UK government law and policy to deliver on the carbon budgets and ultimately net zero.**

We would also recommend that Apprenticeship Standards, and T-Level programmes which are new, post-GCSE, two-year courses due to be launched later this year, **should include modules on low-carbon design and installation wherever relevant.** Both are developed in collaboration with employers and businesses to ensure the content meets the needs of industry and as such are best placed to train future workforce for the low carbon future.

We note the need to differentiate between retro-fitting, i.e. energy efficiency applications to existing properties and new low-carbon buildings. Issues with retro-fit include pre-assessment/survey of building needs and adaptability which in itself requires a specific workforce and a range of skills and knowledge. The installer will come into a household's property and create some disruptions to their lives. This combined with the fact that the household pays for the installation, is a different approach to working on a building site and must be covered during training. Industry-wide quality assurance is also essential to engage customers and create public trust. Customers need to be assured that any investment they make will result in high-quality installations and a positive customer journey.

Government needs to learn from previous experience, such as the Green Deal and ECO when developing schemes and programmes to ensure that the supply chain feels confident enough that it should invest in skills and equipment. As noted in the National Audit Office's report published back in 2016, '[a] lack of consistency in the Department's actions on household energy efficiency has created uncertainty with its main stakeholders [...]. Enterprises in the supply chain require a higher return where there is a risk they are investing in skills and equipment that the government could deprioritise in the next round of schemes'.

Question 28 (Buildings): How can local/regional and national decision making be coordinated effectively to achieve the best outcomes for the UK as a whole? Can you point to any case studies which illustrate successful local or regional governance models for decision making in heat decarbonisation?

Energy UK believes that a significant amount of delivery of decarbonisation in buildings will need to be delivered under plans targeted to regional or local attributes. Existing initiatives and programmes like local growth deals and the Regional Growth Fund have demonstrated mechanisms by which local areas can bid for funding from central government departments. Learnings from these should be used to develop a national framework under which decarbonisation plans can be delivered.

The Scottish government's approach of Local Heat and Energy Efficiency Strategies will be a valuable exercise in gathering information on the impact of local planning on delivery of decarbonisation. Similarly, **the approach to local authority delivery of heat network infrastructure** has seen the coordination of many buildings and assets in a single project.

Both approaches **must be incorporated into a more significant framework that enables those able to decarbonise at a faster rate to deliver, enabling others to learn from the progress made and reap the benefits of economies of scale.** This will be important to the efficiency and effectiveness of UK decarbonisation efforts, but must be overseen by a national body to ensure limits on diversification to limit the amount of complication in future.

Question 29 (Power): Think of a possible future power system without Government backed Contracts-for-Difference. What business models and/or policy instruments could be used to continue to decarbonise UK power emissions to close to zero by 2050, whilst minimising costs?

The CfD framework has been a successful tool for delivering investment and bringing forward low cost, low-carbon generation. It is important that going forward the CfD regime is maintained (based on competitive auctions) and continues to drive the decarbonisation of the power sector and deliver low cost electricity to homes and businesses. This joint industry and Government effort has helped to deliver the cost reduction targets set for offshore wind (£100/MWh) four years ahead of target and the last auction saw clearing prices well below expectations at £39.65/MWh (2012 prices).

As costs continue to reduce, the two-way nature of the scheme will not only underpin future low-carbon investments but also 'pay back' to the bill payer against the wholesale price. We, therefore, **support the continuation of the current two-way CfD framework so as to provide the stable investment climate that developers and the supply chain need.**

Evidence exists of successful merchant and corporate PPA renewable projects and we support this activity. However, **given the low marginal cost, capital intensive nature of renewable projects, it is clear that it will not be possible to achieve the renewables build out needed to reach net zero purely on a merchant and corporate PPA basis.** In the context of net zero, it is vital that any evolution/replacement of the CfD framework in the future maintains the combination of least cost capital and mass deployment. However, **whilst the scheme could need amending in the future, the focus right now should be on maintaining the CfD regime and getting allocation rounds scheduled for the 2020s.**

A strong carbon price also remains important for future market design and will be required to **support the development of low carbon sources of capacity and flexibility**, and for the progressive **decarbonisation of gas through CCUS and incremental blending of low carbon gasses.**

Out of subsidy renewable capacity is eligible to compete in the Capacity Market. Emissions limits are also being introduced in to the Capacity Market. **Further evolution of the Capacity Market to**

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deliver an equivalent firm power commitment, for example, between renewable generation supported by low carbon gas fired generation could be considered.

New technologies such as Bioenergy with Carbon Capture and Storage (BECCS) will come on to the market and need to be appropriately supported. BECCS has two products, low-carbon electricity and negative emissions, and it is important that these products are funded in the most appropriate manner when the UK requires negative emissions. We believe that electricity consumers should fund the low-carbon electricity element and that the negative emissions should be paid for by those industries that benefit from negative emissions (i.e. shipping, aviation, agriculture).

Question 30 (Power): In Chapter 2 of the Net Zero Technical Report we presented an illustrative power scenario for 2050 (see pages 40-41 in particular):

- a) Which low-carbon technologies could play a greater/lesser role in the 2050 generation mix? What about in a generation mix in 2030/35?
- b) Power from weather-dependent renewables is highly variable on both daily and seasonal scales. Modelling by Imperial College which informed the illustrative 2050 scenario suggested an important role for interconnection, battery storage and flexible demand in a future low-carbon power system:
 - i. What other technologies could play a role here?
 - ii. What evidence do you have for how much demand side flexibility might be realised?

a) **Energy UK believes in a technology neutral approach and that the generation mix of the UK in 2050 is dependent upon a wide range of factors, particularly:**

- **The viability of large scale CCUS technology.**
- **The cost and efficiency of hydrogen production technologies,**
- **Investment signals and policy and regulatory direction from government,**
- **Technological developments outside of existing understanding.**

For these reasons among many others, it is impossible to be completely accurate in any prediction about the generation mix in 2050. The scale of the challenge, however, is clear. According to the Net Zero Report, low-carbon power will be required to quadruple its supply by 2050. To achieve this ambitious build out, **we believe all forms of low-carbon power generation should be progressed in the near-term to ensure we have the capacity and optionality required.**

- **For 2050 – there could be greater deployment of Hydrogen gas turbines for flexible baseload capable power generation.** For example there are plans for conversion of a 400MW Hydrogen gas turbine in the Netherlands.
- **As per the Net Zero Technical Report, renewables are likely to be a predominant technology, although it's important to note that penetration of renewables is directly reliant on system flexibility.** As long as the correct investments are made in flexibility, the contribution of renewables might have to potential to be even greater than what is suggested in the report. These investments will also need to **include storage technologies** for both long-term and short-term storage.
- **Should the government agree on a funding model for new large-scale nuclear power and cost savings are realised through replication, then nuclear could play a more**

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significant role in the 2050 generation mix. Proposed new build sites at Sizewell, Wylfa, Oldbury and Bradwell could add 11GW by 2050 giving a total nuclear contribution of at least 114 TWh at 2050, this could be higher still if Sizewell B is still operational and the small modular reactor sector expands.

- For 2030/35: To our knowledge, no data or analysis is publicly available that outline the potential generation mix in any net-zero compliant scenarios in 2030/35. We are aware of increasing work in this area, for example in new CCGTs being deployed to be capable of blending up to 30% hydrogen.
 - **Energy UK agrees that it was sensible for the CCC to leave at least 23% of the generation mix in 2050 open for uncertainty**, recognising that this share could be filled with a number of technologies, e.g. more variable renewables if system flexibility allows it, more nuclear, or for example gas with CCUS (which was the chosen technology in the CCC's analysis).
- b) Energy UK would again note the complexity of making any prediction for the 2050s energy system, but we do note the **development of potentially significant technologies in future**.
- i) Trials continue to **explore the role that could be played by excess renewable generation in Power to Gas** (hydrogen production) **and then Gas to Power** (using said hydrogen as a flexible source of electricity). These trials will require close monitoring to ensure that the UK is at the forefront of adopting this technology once it has been proven to be worth the investment to deploy at scale, and could provide valuable sources of inter-season storage through conversion of the UK's gas storage capacity.

Power to gas is one of many wider energy storage technologies outside of those most commonly used in the UK (Pump storage hydro and Batteries). This ever increasing range of technologies, including Compressed Air Energy Storage and Power to Gas, will play a role in future. **These technologies among others will deliver the required levels of flexibility across the energy system if they are able to compete in robust competitive markets.**

There will further be a need to continue to ensure a wide mix of flexible technologies are available. Importantly, a value for firm capacity should be continued to ensure firm generation capacity and longer duration storage assets are deployed to meet anticipated increases in peak demand.

- ii) Energy UK cannot estimate the amount of demand side flexibility that will be utilised in future, but **we anticipate that DSR will play a significant role given its potential in keeping costs low for consumers in the transition to net zero**. The exact extent to which the demand side is flexible is **dependent on appropriate price signals** enabling companies to develop a range of attractive customer propositions to encourage uptake of flexible technologies and more reactive tariffs.

This is **dependent on reflective network charging** being rolled out and on the **development of a smart flexible energy system able to send the right signals** and

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requests to the demand side. **The actions set out in the Smart Systems and Flexibility Plan**, published by BEIS and Ofgem, **should effect the right changes** to enable this kind of communications capability and develop revenue streams for demand side flexibility.

It should be noted that **while the demand side will play a role in future, there will continue to be a core role for other flexible technologies including flexible generation and storage assets of a range of technologies and sizes**. It is **vital that the market be focussed on the capabilities of those offering flexibility, and retain technology neutrality as a core principle to enable competition to reveal the lowest cost solution**.

Question 31 (Hydrogen): The Committee has recommended the Government support the delivery of at least one large-scale low-carbon hydrogen production facility in the 2020s. Beyond this initial facility, what mechanisms can be used to efficiently incentivise the production and use of low-carbon hydrogen? What are the most likely early applications for hydrogen?

ANSWER TO BE PROVIDED SEPARATELY

Question 35 (Greenhouse gas removals): What relevant evidence exists regarding constraints on the rate at which the deployment of engineered GHG removals in the UK (such as bioenergy with carbon capture and storage or direct air capture) could scale-up by 2035?

The rate of deployment of engineered GHG removals in the UK is primarily constrained by a lack of supportive government policy. It is crucial that the Government sets out clear ambitions and policy support for the technology including specific targets in line with a net-zero pathway to attract domestic and overseas investment and capitalise on a uniquely favourable environment.

Bioenergy with Carbon Capture and Storage (BECCS) is a process rather than a single technology, and all elements of that process are currently technically viable and in operation. Negative emissions from BECCS can provide a level of optionality to decarbonisation. For example, Drax plans to add CCUS to its biomass generation assets, which from 2033 should deliver c.16MtCO₂ of negative emissions. However, this rate of **deployment is dependent on the introduction of stable policy mechanisms to support power CCUS and negative emissions which can only be delivered through strong policy in these areas early on**.

Question 37 (Infrastructure): What will be the key factors that will determine whether decarbonisation of heat in a particular area will require investment in the electricity distribution network, the gas distribution network or a heat network?

Planning will be vital to decarbonisation of heat at lowest cost. Wherever possible, **expected requirements in terms of network reinforcements to meet heat demand should be coordinated to ensure efficiencies are achieved to the benefit of consumers.** Deciding what options to deploy across any given area will be dependent on the housing stock, local industry, geographical location and attributes, and a range of other factors.

The ambition of local decarbonisation plans and respective roadmaps for decarbonisation of heat will impact on the approach taken, given the range of local authorities making ambitious net zero commitments above and beyond those taken by national government. These will impact upon the decisions made by each region.

More information is required to understand what impact each factor could or should have on the deployment of investment across all network vectors. The benefits of heat network deployment were noted in the CCC's net zero advice, and should be further explained and set out to enable local authorities and other bodies to use heat networks in an optimal manner.

There is a level to which the availability of low carbon energy sources will impact decisions about which networks to invest in. Where an excess of low carbon generation and effective energy storage are available, for example, it may be sensible to focus on investment in electricity networks. Where a region anticipates a high volume of low carbon gas production to be locally developed, it may be more appropriate to invest in gas fired heat networks connected to a future-proofed gas network.

Beyond this, other factors include the **impact of wider decarbonisation efforts.** For example, if **EVs uptake** is particularly rapid in an area, an electricity network upgrade may already be required. Where this is the case, investment should aim to future-proof the network to minimise disruption to consumers.

Another example is in locations where **industrial clusters develop their own low carbon gas production capabilities**, wishing to pump the excess gas (and waste heat) into the gas network or into heating systems for those in the surrounding area, requiring investment in heat networks and the gas network.

Energy UK is working closely with a range of organisation including the Energy Systems Catapult to explore this question in more detail. **Whole systems planning will be core to delivery of net zero, reducing costs and complexity for a wide range of decarbonisation decisions.**

Question 38 (Infrastructure): What scale of carbon capture and storage development is needed and what does that mean for development of CO₂ transport and storage infrastructure over the period to 2030?

Carbon Capture, Usage & Storage (CCUS) is essential technology for delivering Net Zero. There are proven solutions, ready to deliver, at a scale that makes a difference across all parts of our economy. CCUS can deliver low carbon power, industrial decarbonisation and the development of a 'hydrogen economy'. But **there is a need to act urgently now to benefit from our natural advantages so that we can lead the world in whole-economy decarbonisation.**

It is clear that **CCUS will be needed to decarbonise industry and to facilitate negative emissions**, however the scale of overall deployment will depend on the build out of other low-carbon technologies in the power sector. **Energy UK agrees with the CCC's estimate that between 75-175 MTCO₂ of aggregate annual capture and storage will be needed by 2050 to achieve net zero.** Achieving just the lower end of this target would require the full development of the 5 existing clusters and more.

Question 38 (Infrastructure): What scale of carbon capture and storage development is needed and what does that mean for development of CO₂ transport and storage infrastructure over the period to 2030?

Government and industry have been working closely together to develop business models to support the deployment of CCUS at scale. **Urgent action is now required to progress cluster plans, business models, legislation and delivery capability necessary to meet this deadline, so that the first projects can be operating by the mid-2020s.** BEIS will need to augment its delivery capability early in 2020 to progress CCUS.

Funding of £400 million could be sufficient to progress the initial projects at all the clusters to Final Investment Decision. Government has a choice to make as to how that preparatory expenditure is funded; funds could be allocated for that expenditure to start now. In addition, **some of the funding of an additional £800 million announced in November 2019 could be used to install T&S on both East and West Coasts of the UK, providing a route to storage for all five of the largest Clusters.** It is clear that in order to have a scaled up T&S system, which will be required to facilitate CCUS by 2030, specific policy development is needed now to support final investment decisions in the early 2020s.

It is also important to note that T&S infrastructure will benefit more than just energy consumers and therefore the costs of the system should be distributed proportionally across all users of the system.