Committee on Climate Change

Independent advice to government on building a low-carbon economy and preparing for climate change

The Sixth Carbon Budget and Welsh emissions targets – Call for Evidence

Background to the UK's sixth carbon budget

The UK Government and Parliament have adopted the Committee on Climate Change's (CCC) recommendation to target net-zero emissions of greenhouse gases (GHGs) in the UK by 2050 (i.e. at least a 100% reduction in emissions from 1990).

The Climate Change Act (2008, 'the Act') requires the Committee to provide advice to the Government about the appropriate level for each carbon budget (sequential five-year caps on GHGs) on the path to the long-term target. To date, in line with advice from the Committee, five carbon budgets have been legislated covering the period out to 2032.

The Committee must provide advice on the level of the sixth carbon budget (covering the period from 2033-37) before the end of 2020. The Committee intends to publish its advice early, in September 2020. This advice will set the path to net-zero GHG emissions for the UK, as the first time a carbon budget is set in law following that commitment.

Both the 2050 target and the carbon budgets guide the setting of policies to cut emissions across the economy (for example, as set out most recently in the 2017 Clean Growth Strategy).

The Act also specifies other factors the Committee must consider in our advice on carbon budgets – the advice should be based on the path to the UK's long-term target objective, consistent with international commitments and take into account considerations such as social circumstances (including fuel poverty), competitiveness, energy security and the Government's fiscal position.

The CCC will advise based on these considerations and a thorough assessment of the relevant evidence. This Call for Evidence will contribute to that advice.

Background to the Welsh third carbon budget and interim targets

Under the Environment (Wales) Act 2016, there is a duty on Welsh Ministers to set a maximum total amount for net Welsh greenhouse gas emissions (Welsh carbon budgets). The first budgetary period is 2016-20, and the remaining budgetary periods are each succeeding period of five years, ending with 2046-50.

The Committee is due to provide advice to the Welsh Government on the level of the third Welsh carbon budget (covering 2026-30) in 2020, and to provide updated advice on the levels of the second carbon budget (2021-25) and the interim targets for 2030 and 2040. Section D of this Call for Evidence (covering questions on Scotland, Wales and Northern Ireland) includes a set of questions to inform the Committee's advice to the Welsh Government.

Question and answer form

When responding, please provide answers that are as specific and evidence-based as possible, providing data and references to the extent possible.

Please limit your answers to 400 words per question and provide supporting evidence (e.g. academic literature, market assessments, policy reports, etc.) along with your responses.

A. Climate science and international circumstances

Question 1: The climate science considered in the CCC's 2019 Net Zero report, based on the IPCC Special Report on Global Warming of 1.5°C, will form the basis of this advice. What additional evidence on climate science, aside from the most recent IPCC Special Reports on Land and the Oceans and Cryosphere, should the CCC consider in setting the level of the sixth carbon budget?

ANSWER: No comment

Question 2: How relevant are estimates of the remaining global cumulative CO_2 budgets (consistent with the Paris Agreement long-term temperature goal) for constraining UK cumulative emissions on the pathway to reaching net-zero GHGs by 2050?

ANSWER: No comment

Question 3: How should emerging updated international commitments to reduce emissions by 2030 impact on the level of the sixth carbon budget for the UK? Are there other actions the UK should be taking alongside setting the sixth carbon budget, and taking the actions necessary to meet it, to support the global effort to implement the Paris Agreement?

ANSWER: UK chemical plants provide high value jobs and revenue in regions of the UK targeted for growth in the Conservative manifesto[6]. But we face comparatively high energy and climate-related costs which are rendering us increasingly uncompetitive in global trade. Furthermore, the economic and political uncertainty associated with Brexit has squeezed inward investment.

The UK Government should consider how the European Union has updated their 2030 ambition in the European Green Deal[7]. The Deal recognises the difficulties that EU industry will face, if international climate action is heterogenous, and seeks to mitigate negative impacts:

- **Additional funding:** The Commission estimate their 2030 targets will require €260bn p.a. extra (1.5% of GDP) and has proposed a Sustainable Europe Investment Plan accordingly[8].

[6] https://assets-global.website-files.com/5da42e2cae7ebd3f8bde353c/5dda924905da587992a064ba_Conservative%202019%20Manifesto.pdf

[7] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1576150542719&uri=COM%3A2019%3A640%3AFIN

[8] https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_24

Question 3: How should emerging updated international commitments to reduce emissions by 2030 impact on the level of the sixth carbon budget for the UK? Are there other actions the UK should be taking alongside setting the sixth carbon budget, and taking the actions necessary to meet it, to support the global effort to implement the Paris Agreement?

This includes: a Just Transition Fund; the EU ETS' Innovation Fund; 35% of the Horizon Europe budget, and; European Innovation Council funding.

- **Protection for industry:** The Commission acknowledges additional protection is required for industry, including: a border adjustment mechanism; a secure and competitive energy supply (with renewables deployed at "lowest cost"); enhanced support for decarbonised gas and CCUS; an industrial strategy, and; state aid to build innovative value chains (e.g. batteries) through the Important Projects of Common European Interest programme.
- **Leadership:** The Commission recognises that it is necessary to develop international carbon markets (including via Article 6 of the Paris Agreement) and intends to make the Paris Agreement an essential element of future trade agreements.

The EU is not the only market for our sector. The UK must also consider the US' withdrawal from the Paris Agreement and the distortive effect this could have on global trade.

If carbon leakage from the UK has the impact of increasing global emissions, then the UK is in a strong position to reduce global emissions by providing industrial investment zones with access to affordable and reliable clean heat and power, alongside emission removal infrastructure. This will attract investment from overseas, increase production of low carbon goods for export, and thereby reduce the global footprint of consumption. This would require significant investment in public goods, including clean electricity, decarbonised gas and CCUS networks.

The greatest contribution we can make to global emission reduction would be to supply the world with zero-carbon goods at a price which out-competes their carbon intensive equivalent. This is the opportunity to export a success story.

See also Question 4 on the UK's emission footprint.

Question 4: What is the international signalling value of a revised and strengthened UK NDC (for the period around 2030) as part of a package of action which includes setting the level of the sixth carbon budget?

ANSWER: The UK cannot solve climate change alone and we have, so far, largely failed to reduce our emission footprint. Where industry is concerned, we have measured our success against the wrong indicator (territorial emissions) and have seen poor results (an increase in global emissions). We have become leaders in deindustrialisation, not decarbonisation, setting a poor example for the industrialised economies expected to follow. The value of a strengthened NDC would be low, if its impact was to continue this trend.

Modelling by the Sustainability Research Institute, University of Leeds, shows that decarbonisation in the UK has largely been achieved by offshoring industry[9]:

> *The UK reports Greenhouse Gas Emissions from a territorial basis… However, the UK is one of the largest net importers of emissions embodied in trade in the world. While emissions continue to decline (albeit at a relatively slow rate) within the UK, the emissions associated*

[9] http://www.emissions.leeds.ac.uk/

Question 4: What is the international signalling value of a revised and strengthened UK NDC (for the period around 2030) as part of a package of action which includes setting the level of the sixth carbon budget?

> *with the imports of products consumed by the UK continues to rise. These emissions are not included in the UK 2050 carbon target to reduce 1990 level emissions by 80%[10].*

This was supported by a recent ONS report[11]:

> *We find that the UK is a net-importer of CO_2 emissions, with most of the imported CO_2 emissions coming from China. Therefore, any apparent decline in territorial CO_2 emissions is overestimated.*

The UK stands to gain in the long-term, if we can provide clean, reliable and competitively priced energy to consumers. However, the right policies are required to ensure global emissions are reduced, whilst UK businesses are afforded a competitive investment environment. Carbon pricing applied asymmetrically to trade-exposed UK intensive industries will drive carbon leakage, increasing global emissions.

If consumption emissions reflect the true environmental cost of production, then to achieve our global emissions targets we should make the UK a global exporter of competitively priced zero-carbon goods. To do this, our international commitments must be underpinned by support for the decarbonisation of our power and heat supply at the lowest cost to industrial consumers. The Government could initiate this process now, by implementing the recommendations of Dieter Helm's Cost of Energy Review[12]. Helm's recommendations would deliver more competitive and secure energy supplies, as well as the carbon reduction objectives outlined in the Clean Growth Strategy[13] and wider Industrial Strategy[14].

See also Question 3 on the need to decarbonise industry "onshore".

B. The path to the 2050 target

[10] http://www.emissions.leeds.ac.uk/files/Policy%20Brief%20-%20Consumption%20based%20emissions.pdf

[11] https://www.ons.gov.uk/economy/nationalaccounts/uksectoraccounts/compendium/economicreview/october2019/thedecouplingofeconomicgrowthfromcarbonemissionsukevidence

[12] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/654902/Cost_of_Energy_Review.pdf

[13] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf

[14] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf

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?

ANSWER: Consumer behaviour is critical to delivering emission reduction (see Questions 3 and 4). Chemical products underpin modern life and will continue to do so, whether they are made here or elsewhere. Our products also have a uniquely important role to play in the creation of a low-carbon, circular economy[15], but they are energy intensive to make.

If consumers are willing to pay more, or are obliged to pay more, for low-carbon goods then the market will meet that demand. The Government should therefore seek to create a market for low-carbon goods. In their Masterplan for a Competitive Transformation of EU Energy-intensive Industries, the High-Level Group on Energy-intensive Industries outline a number of measures for the creation of markets for climate-neutral, circular economy products[16]:

- **Demand-side measures:** Full life cycle environmental footprinting; Product labelling; Financial support (i.e. subsidy); Public procurement.
- **Supply-side measures:** Support for early deployment (e.g. state aid); Product standards.

On carbon pricing, the Group highlight that, whilst there is fragmented international climate action, carbon pricing mechanisms need to account for their impact on investment at the EU level as well as their impact on global emissions, to ensure that they deliver emission reductions globally and promote the competitiveness of EU EIIs.

For example, soda ash made in the UK has a carbon footprint of 0.65 tCO_2e, compared with 0.70 tCO_2e in the US, 1 tCO_2e in the EU, and >1 tCO_2e in Asia. Yet, high energy and emission costs make this sort of plant less competitive and if it ceased to operate, global emissions would increase when the product is made elsewhere.

If carbon pricing is to be applied to trade-exposed EIIs then a border adjustment mechanism, to raise the price of high-carbon imported goods, could create a level playing field for UK businesses. This would also create a price signal for manufacturers outside of the UK, to encourage them to decarbonise their production. Under this approach industry could bear the cost of emission reductions, because they could pass through the cost to the consumer in higher prices, without competitiveness impacts. Such a border adjustment mechanism is outlined in the EU's Green Deal[7].

There is no one-size fits all approach and different combinations of incentives may be required to encourage demand for low-carbon goods, dependent on the sector.

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?

ANSWER: Maintaining a chemical manufacturing base in the UK will ensure our country has the power to reduce its own consumption emissions. If we offshore our chemical assets, we will no

[15] https://chemistrycan.com/app/uploads/2017/10/SD-Report2017.pdf

[16] https://ec.europa.eu/docsroom/documents/38403

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?

longer have jurisdiction over the way in which everyday products are made, including their carbon footprint.

We can retain and improve our ability to influence the global emission footprint of consumption, by designing and implementing a just transition strategy for industry. Such a strategy would need to be monitored and improved throughout the low-carbon transition. Leadership will be required from government at a national level, to establish long-term policy certainty on the decarbonisation of transport, power and heat and on CCUS. The Energy White Paper, HMT Net-zero Review and Comprehensive Spending Review should initiate this process.

Within the energy market, technological uncertainties will be an important factor. Energy must be decarbonised at the lowest possible cost. This means that investment in energy assets must be cost-effective and technology neutral, in line with the recommendation of the Helm Review[12]. The government should avoid locking the UK into reliance on a particular technology, where there are multiple options. There should be a rapid transition away from technology-specific subsidy mechanisms to a single capacity auction route, based on carbon price signals and de-rated capacity.

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?

ANSWER: No. The business models needed to deploy the technologies required, for a total decarbonisation of industry, are not yet available. The government must design effective policy mechanisms and then impose appropriate targets accordingly. However, if the Committee is to revisit the fourth and fifth carbon budgets, then they must consider what is achievable for industry within these timescales.

There are significant barriers to decarbonising chemical manufacturing. The exhaustion of low-hanging fruit energy efficiency and emission abatement options in the UK chemical sector means we are now reliant on significant infrastructure developments (i.e. the development of clean energy and CCUS networks), the cost and timing of which are out of our control. The result is that, in a world without offshoring, emissions for industry would likely continue a modest incremental decline, before making a rapid reduction to net-zero once such infrastructure is available.

The Committee's advice must therefore consider the time required to deploy the technologies to decarbonise our industrial base (e.g. affordable clean energy, low-carbon feedstock such as biogas and CCUS). The below documents summarise the pathway and barriers to decarbonisation of our sector in the UK:

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?

- Chemicals Sector - Joint Industry - Government Industrial Decarbonisation and Energy Efficiency Roadmap Action Plan[17]
- Industrial Decarbonisation & Energy Efficiency Roadmaps to 2050 – Chemicals[18]

The below refer to the industry in a European context:

- Industrial Transformation 2050 - Pathways to Net-Zero Emissions from EU Heavy Industry[19]
- Low carbon energy and feedstock for the European chemical industry[20]

It is important to note that the actions outlined in the sector's Action Plan[17] were not achievable in the timescale envisioned by the Government and many remain outstanding.

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?

ANSWER: No comment.

C. 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?

ANSWER: All pathways to net-zero require the use of new chemical production processes that increase cost 20- 115%[19]. This cost difference cannot be borne by companies facing international competition, so policy support is essential. 2050 is one investment cycle away and delaying will complicate the transition. The following policies are priorities for EIIs to meet net-zero:

1. **Consumption emission targets:** Our asymmetric territorial emission targets penalise UK manufacturers in favour of more carbon intensive manufacturers overseas, leading to the offshoring of emissions. The government must focus on monitoring and reducing

17 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/651230/chemicals-decarbonisation-action-plan.pdf

18 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/416669/Chemicals_Report.pdf

19 https://materialeconomics.com/publications/industrial-transformation-2050

20 https://dechema.de/dechema_media/Downloads/Positionspapiere/Technology_study_Low_carbon_energy_and_feedstock_for_the_European_chemical_industry-p-20002750.pdf

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consumption emissions, through measures to encourage low-carbon consumption. This would also incentivise manufacturers overseas to reduce emissions.

2. **Cost-mitigation measures:** If a carbon price is levied on sectors like chemicals, which are exposed to carbon leakage and have limited emission abatement options, then cost-mitigation measures should be provided, such as: offsets through Article 6 of the Paris Agreement; benchmark adjustment and; cost-containment measures (see Question 23). Furthermore, compensations and exemptions, covering the pass-through cost of climate policy on energy bills, must be made available more easily to all EIIs.
3. **Streamline carbon monitoring, reporting and pricing:** The current policy regime comprises complex, overlapping requirements: the Energy Saving Opportunity Scheme (ESOS), Streamlined Energy and Carbon Reporting (SECR), Climate Change Agreements (CCAs), the EU Emissions Trading Scheme (EU ETS), the Carbon Price Support (CPS) and the Climate Change Levy (CCL). Complying with numerous schemes drains staff resources and creates significant expenditure, disproportionate to the value added.

The Chemistry Council's proposal for a sector deal outlines a £200bn opportunity for UK industry to drive economic growth from disruptive technology, to support the creation of new jobs in the regions, and to facilitate a move to net-zero through the development of materials for "Clean Growth" and the "Future of Mobility", two of the Grand Challenges from the UK's Industrial Strategy[21].

Our products underpin a net-zero economy. For every 1 tCO_2e emitted by our industry, our products enable over 2 tCO_2e emissions savings[22], e.g.: building insulation, low-carbon fertilisers and crop protection, lightweight components for cars and planes, low temperature detergents, biofuels and materials for wind turbines. These chemical products are all made in the UK, supporting low-carbon jobs and generating UK exports. Another recent report outlined 137 low-carbon chemical technologies, which could mitigate 5-10 $GtCO_2e$/year by 2050[23].

See also Questions 29 and 31 on energy cost and hydrogen deployment.

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?

ANSWER: It would be sensible to look at cluster decarbonisation as a cost-effective way of initial, large-scale emission reduction. An economy of scale can be achieved by deploying step-change technologies, like hydrogen and CCUS, where energy intensive consumers are clustered.

The timescales for cluster decarbonisation should respect what is challenging but achievable and must avoid drawing a straight line of emission reduction to net-zero, if access to clean heat, power and CCUS networks will only become available late in the transition.

[21] http://ukchemistrygrowth.com/wp-content/uploads/2019/11/Chemistry-Council-Sector-Deal-041119-1.pdf

[22] https://www.cia.org.uk/Portals/0/Documents/Publications/Low%20carbon%20brochure_2015_MR.PDF?ver=2017-01-09-143808-563

[23] https://www.icca-chem.org/wp-content/uploads/2019/12/Enabling-the-Future.pdf

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It is also critical that the government avoid distorting domestic competition. For example, the initial decarbonisation of one cluster, as per the Government's Industrial Clusters Mission[24], means that businesses in only that cluster will have access to relief from EU Emission Trading Scheme carbon pricing. Furthermore, depending on the funding model, this may be subsidised by businesses elsewhere. The roll out of step-change technology infrastructure must be fair across the UK.

A number of chemical industrial clusters have already developed strategies for how decarbonisation could be achieved:

- Study of the Humber Energy Intensive Industries Cluster[25]
- Humber Clean Growth White Paper[26]
- The North West Energy and Hydrogen Cluster[27]
- Teesside Collective Report: A business case for a UK Industrial CCS support mechanism[28]

There will be no one-size fits all solution to industrial decarbonisation. The Government must engage with local cluster bodies that are developing regional decarbonisation plans, to facilitate local action, whilst setting targets at the national level to ensure a level playing field.

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?

ANSWER: No comment.

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?

ANSWER: The CCC estimate that reaching net-zero will cost £50bn per year (1-2% of GDP). BEIS puts the figure at a much higher £70bn per year. Given this price tag and the barriers industry face, the existing funding landscape is inadequate (i.e. Industrial Energy Efficiency Accelerator, Industrial Energy Transformation Fund, Industrial Heat Recovery Support, Industrial Strategy Challenge Fund).

The Government should start by fully implementing its manifesto commitments to[6]:

[24] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/803086/industrial-clusters-mission-infographic-2019.pdf

[25] https://www.catchuk.org/wp-content/uploads/2018/04/Humber-EII-Cluster-Study-Summary.pdf

[26] https://www.humberlep.org/wp-content/uploads/2019/11/Humber-Clean-Growth-White-Paper.pdf

[27] https://nwblt.com/wp-content/uploads/2019/06/The-North-West-Energy-and-Hydrogen-Cluster-Prospectus-1.pdf

[28] http://www.teessidecollective.co.uk/wp-content/uploads/2017/02/0046_TVCA_ICCSBusinessModels_FinalReport_v200.pdf

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?

- Invest £800m to build the first fully deployed carbon capture storage cluster by the mid-2020s;
- Invest £500m to help energy-intensive industries move to low-carbon processes;
- Establish a Foundation Industries Sector Council to provide a clean and long-term future for existing heavy industries;
- Fund R&D into newer technologies like hydrogen and carbon capture and storage;
- Lower energy bills by investing £9.2bn in the energy efficiency of homes, schools and hospitals;
- Support clean transport including consulting on the phasing out of new conventional petrol and diesel cars;
- Ask partner countries to match our ambition for net-zero by 2050.

However, this will not get us to net-zero. The cost of achieving our target must be under constant review and adequate funding must be put forward to pay for it.

If we get this right, the prize for our country is the creation of strong, regional, low carbon foundation industries, underpinning a successful green economy. This is, for our members, successful UK climate change leadership.

However, if we drive up the price of carbon and energy through exclusive attention to territorial emissions, then we risk losing our foundation industries, increasing global emissions and simultaneously decreasing UK GDP. This sort of leadership would be a hollow victory – failing to mitigate climate change and damaging the UK's economic future. It also sends a poor message to the rest of the world, that there is a trade-off between having a manufacturing base and subscribing to global emissions targets.

See Question 9 on climate policy, Question 29 on energy cost and Question 31 on hydrogen deployment.

D. 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, and how could these be reflected in our advice on the UK-wide sixth carbon budget?

ANSWER: No comment.

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?

ANSWER: No comment.

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?

ANSWER: No comment.

Question 16: Do you have any evidence on the appropriate level of Scotland's interim emissions reduction targets in 2030 and 2040?

ANSWER: No comment.

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?

ANSWER: No comment.

E. Sector-specific questions

Question 18 (Surface transport): As laid out in Chapter 5 of the Net Zero Technical Report (see page 149), the CCC's Further Ambition scenario for transport assumed 10% of car miles could be shifted to walking, cycling and public transport by 2050 (corresponding to over 30% of trips in total):

a) What percentage of trips nationwide could be avoided (e.g. through car sharing, working from home etc.) or shifted to walking, cycling (including e-bikes) and public transport by 2030/35 and by 2050? What proportion of total UK car mileage does this correspond to?

b) What policies, measures or investment could incentivise this transition?

ANSWER: No comment.

Question 19 (Surface transport): What could the potential impact of autonomous vehicles be on transport demand?

ANSWER: No comment.

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?

ANSWER: No comment.

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?

ANSWER: No comment.

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

ANSWER: Policy mechanisms, to support decarbonisation of manufacturing sectors at risk of carbon leakage, are listed in Question 9 on climate policy, Question 12 on "Just Transition", Question 29 on energy cost and Question 31 on hydrogen deployment.

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

Question 23 (Industry): What would you highlight as international examples of good policy/practice on decarbonisation of manufacturing and fossil fuel supply emissions? Is there evidence to suggest that these policies or practices created economic opportunities (e.g. increased market shares, job creation) for the manufacturing and fossil fuel supply sectors?

ANSWER: The below are examples of good policy, on decarbonisation of industrial emissions, in the context of a carbon pricing scheme:

- **Cost containment measures:** The Alberta Carbon Competitive Incentive Regime allows an installation relief from carbon costs, where unavoidable compliance costs exceed a threshold percentage of sales or profitability for the affected business. This would support businesses which lack affordable routes to decarbonisation, until measures can be developed to support low-carbon consumption, or until funding for decarbonisation becomes available.
- **Benchmark review:** Benchmark review should be considered where there are no existing economic decarbonisation pathways. For example, in several of the Canadian carbon pricing schemes, the ammonia benchmark has been split to recognise that the process emissions are unavoidable without CCS. In these schemes, the unavoidable process emissions are given 100% allocation and are exempt from the scheme.

Question 24 (Industry): How can the UK achieve a just transition in the fossil fuel supply sectors?

ANSWER: No comment.

Question 25 (Industry): In our Net Zero advice, the CCC identified a range of resource efficiency measures that can reduce emissions (see Chapter 4 of the Net Zero Technical Report, page 115), but found little evidence relating to the costs/savings of these measures. What evidence is there on the costs/savings of these and other resource efficiency measures (ideally on a £/tCO2e basis)?

ANSWER: No comment.

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?

ANSWER: No comment.

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?

ANSWER: No comment.

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?

ANSWER: No comment.

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?

ANSWER: The UK's energy markets are subject to a complex regulatory system which makes it extremely challenging for chemical businesses to operate in an optimal way. Moreover, as an EII competing in a global market, we are faced by rising cumulative energy and climate related costs which are eroding our international competitiveness. The following is required to decarbonise our energy system at the lowest cost:

1. **Fair and appropriate energy cost sharing:** Energy costs must be fairly and appropriately distributed amongst consumers. As advised by Dieter Helm's Cost of Energy Review[12], legacy climate policy cost should be ring-fenced and itemised in consumers bills and industrial consumers should be made exempt from legacy and future costs. The UK should then benchmark domestic energy costs relative to competitor nations and proactively maintain a competitive investment environment for UK business.
2. **Cost and carbon effective energy assets relative to "firm" provision:** Future energy asset investment must be cost-effective and technology neutral, as per Helm's Review. Transition away from technology-specific subsidy mechanisms (e.g. Nuclear RAB) to a single capacity auction route, based on carbon price signals and intermittency de-rating. This will ensure we decarbonise the grid at the lowest cost to all consumers.

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?

3. **Reform outdated energy regulatory frameworks:** The regulatory framework should rapidly move away from increasingly outdated and rigid industry structures, geographic monopolies and regulatory funding frameworks. This would enable the energy system to adapt in a more agile manner to the evolving landscape, reducing the cost burden to consumers.
4. **Ensure effective competition:** Ensure that competition is effective in the energy retail market as well as the services surrounding the supply of electricity, including demand management services, data collection and provision. This would enable the market to drive down costs for all consumers.
5. **Improve the transparency of energy supply costs:** Improve the clarity and accessibility of all elements of cost associated with the provision of power. This would allow the energy market to regain consumer confidence and would facilitate effective competition amongst providers.
6. **Make it a priority that Ofgem protect industrial consumers:** This will help ensure that UK industry remains competitive. If UK industry is offshored due to high energy cost, it would ultimately drive up costs for other consumers, who would inherit industry's share of the cost to maintain the network.

See Question 31 on domestic gas supplies.

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?

ANSWER: No comment.

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: Hydrogen could be key to reducing the carbon footprint of our industry's energy and feedstock supply, if the cost is affordable[29]. The following is required to make it cost competitive with traditional fuel and feedstock:

1. **Significant and long-term financial support:** Hydrogen and CCUS, required to decarbonise heat and process emissions, have a high capital and operational cost that would make operators uncompetitive. Current funding is comprised of small, distributed pots of funding (i.e. the Low-carbon Hydrogen Fund, the Industrial Fuel Switching Competition, the Hydrogen Supply Programme, the Industrial Energy Transformation Fund, and the Industrial Strategy Challenge Fund) which are burdensome to apply for and insufficient for the transformation required. Significant and long-term financial support is required for the development, deployment and operation of these technologies. See Question 3 on the scale of support available in the EU.
2. **Funded projects:** Demonstration plants should be funded and deployed as a priority, to demonstrate the safety and feasibility of hydrogen and CCS in an industrial context, and to allow the market to begin to drive cost and efficiency improvements.
3. **Demand-side measures:** Demand for hydrogen can be boosted through the amendment of the Gas Safety Management Regulations to facilitate hydrogen injection into the domestic grid, and; through policy support for hydrogen vehicles. This would cross-subsidise the development of a hydrogen market, allowing market forces to engage to bring down the cost of supply.
4. **Support domestic shale extraction:** The Committee forecast that the UK would require 600 TWh (55bcm) of natural gas in 2050. This equates to a 32% reduction in UK gas demand from today. Based on forecasts by the Oil and Gas Authority for UK Continental Shelf offshore gas production, the UK would be reliant upon imported gas to meet 86% of demand by 2050. Such a level of imports represents a significant increase from 50% today. The UK should source gas with the lowest upstream emission footprint. According to UKOOG, UK indigenous gas (including shale gas) emissions are at least half that of LNG or long-distance pipeline (see Appendix 1 and Appendix A[30]). A cheaper domestic gas supply could form the basis of a more affordable hydrogen supply chain.

Low-carbon gas technologies must be developed past the innovation stage, to the point at which they are cost competitive, to avoid the need for ongoing subsidies.

[29] https://cefic.org/app/uploads/2019/11/Cefic-position-on-Hydrogen-November-2019.pdf

[30] Appendix 1 and Appendix A of: https://www.northyorks.gov.uk/sites/default/files/fileroot/Planning%20and%20development/Minerals%20and%20waste%20planning/Examination%20Library/High%20court%20judgement/3997%20UKOOG%20resp%20High%20Court%20Judgment%20consultation%2010.7.19.pdf

Question 32 (Aviation and Shipping): In September 2019 the Committee published advice to Government on international aviation and shipping and Net Zero. The Committee recognises that the primary policy approach for reducing emissions in these sectors should be set at the international level (e.g. through the International Civil Aviation Organisation and International Maritime Organisation). However, there is still a role for supplementary domestic policies to complement the international approach, provided these do not lead to concerns about competitiveness or carbon leakage. What are the domestic measures the UK could take to reduce aviation and shipping emissions over the period to 2030/35 and longer-term to 2050, which would not create significant competitiveness or carbon leakage risks? How much could these reduce emissions?

ANSWER: No comment.

Question 33 (Agriculture and Land use): In Chapter 7 of the Net Zero Technical Report we presented our Further Ambition scenario for agriculture and land use (see page 199). The scenario requires measures to release land currently used for food production for other uses, whilst maintaining current per-capita food production. This is achieved through:

- A 20% reduction in consumption of red meat and dairy
- A 20% reduction in food waste by 2025
- Moving 10% of horticulture indoors
- An increase in agriculture productivity:
  - Crop yields rising from the current average of 8 tonnes/hectare for wheat (and equivalent rates for other crops) to 10 tonnes/hectare
  - Livestock stocking density increasing from just over 1 livestock unit (LU)/hectare to 1.5 LU/hectare

Can this increase in productivity be delivered in a sustainable manner?

Do you agree that these are the right measures and with the broad level of ambition indicated? Are there additional measures you would suggest?

ANSWER: No comment.

Question 34 (Agriculture and Land use): Land spared through the measures set out in question 33 is used in our Further Ambition scenario for: afforestation (30,000 hectares/year), bioenergy crops (23,000 hectares/year), agro-forestry and hedgerows (~10% of agricultural land) and peatland restoration (50% of upland peat, 25% lowland peat). We also assume the take-up of low-carbon farming practices for soils and livestock. Do you agree that these are the key measures and with the broad level of ambition of each? Are there additional measures you would suggest?

ANSWER: No comment.

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?

ANSWER: No comment.

Question 36 (Greenhouse gas removals): Is there evidence regarding near-term expected learning curves for the cost of engineered GHG removal through technologies such as bioenergy with carbon capture and storage or direct air capture of CO_2?

ANSWER: No comment.

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?

ANSWER: There is no one-size fits all solution to heat decarbonisation. Those sectors with process emissions or who use gas as a feedstock, will not be able to decarbonise through fuel switching to hydrogen or clean electricity. Government, the regulator and energy networks must engage closely with industry to understand how local industry will be impacted by investment decisions. The following factors will apply:

- **Gas as a fuel:** Use of gas in our sector is highly process specific; there is no typical use, as there is for heating of commercial or domestic buildings. The impact of even blending low carbon gas into our supply will depend on the stability of the gas composition, its calorific value and its consumption. Companies manufacturing similar products may use gas very differently, operating furnaces or other equipment with different tolerances, temperature and safety requirements. It cannot be assumed that changes to gas specifications will be benign for all companies within our sector, even where there is evidence that this is not problematic for most. The practicality and cost of replacing equipment to meet new standards would need to be addressed in any technical or economic impact assessment.
- **Gas as a feedstock:** Natural gas is not just a source of energy but an essential feedstock (raw material) for chemical manufacturing, and therefore the impact to industry of any switch to low carbon gas must be considered. Quality concerns are highly process specific and price impact is a critical sensitivity. For example, gas represents around 70% of the variable cost of manufacturing ammonia, and therefore the impact of any changes to its cost would be significant. Furthermore, hydrogen production is a step in the existing ammonia manufacturing process, and so mixing hydrogen into the gas supply would represent an unnecessary duplication of effort. As a consequence, for ammonia production it would be better to continue to supply raw natural gas in its current form, coupled with access to CCS for the CO_2 by-product. It is important that government and industry work together to develop an understanding of the likely capital and operating cost of gas quality changes, for this and other chemical feedstock uses.

Question 38 (Infrastructure): What scale of carbon capture and storage development is needed and what does that mean for development of CO_2 transport and storage infrastructure over the period to 2030?

ANSWER: No comment.