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: N/A for CEP

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: N/A for CEP

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: N/A for CEP

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: N/A for CEP

B. 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?
ANSWER: This question must be set in the context of ensuring a 'just' and politically viable transition. That is, one for which public/societal permissions can be secured. It must also be set in the context of fiscal sustainability, where imposing additional costs on different types of consumers, individuals, households can have implications on the disposable

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?

incomes people have to spend in the economy (and, thus, tax revenues generated), and on the needs of low-income households for government support. Consideration of the role played by consumers, individuals and households must also be set in the wider context that ultimately costs borne by other actors in the economy will be passed on where possible through the prices of goods and services, or through taxation where policy interventions take place/government support is provided (i.e. when costs are socialised).

The transmission of costs for net zero actions to consumers, individuals and households is complex. However, this does not mean that net negative impacts will always ultimately result for households. Crucially, there is a need to explore pathways by which opportunities for economic expansion and real income gains can be realised in different timeframes. For example, in our own recent EPSRC CESI-funded research around 'who ultimately pays and gains' from electricity network upgrades to support the projected EV roll-out to 2030, suggests that reduced fuelling costs and wider economy gains triggered by enabled EV uptake could deliver net positive impacts on average household incomes (see paper forthcoming in Energy Policy). Distributional impacts need to be more fully explored as this work continues. On the other hand, our more extensive EPSRC EUED funded work to date, on the impacts of enabling and realising household energy efficiency gains, suggests that even costly retrofits can trigger impacts that deliver net gains to all household income groups, if instruments are effectively designed and targeted (see Dec. 2017 paper in Energy Policy). But, again, uncertainties in the wider economic and policy landscape can have crucial impacts (see our new UKERC research on the potential impacts of Brexit on energy efficiency actions)

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: Some of the most important uncertainties do not pertain to technologies, technological readiness or feasibility. Rather, some of the key uncertainties will arise in a political economy context: Who will be making decisions in government? How will electorates react to Net Zero actions and other developments in the landscape, including but not limited to Brexit? How will the ageing of our population impact public revenues and spending demands and the health of the economy? For this reason, it is crucial that at least the principles underlying decision making with economic implications are analytically robust and can withstand changes in government and fiscal conditions. It is also crucial to properly consider the extent to which different policy levers are and will continue to be politically viable (for example, there must be limited space for further 'pushing through energy bills'). It is crucial not to 'box in' optionality in pathways, but equally to ensure a reliable policy landscape without too much 'chop and change'. Thus, the question is a good one in focussing on the identification of strategies that are robust to uncertainties, including 'low regrets' options that maintain optionality. The crucial issue is that the starting point is to focus on the most important and impactful uncertainties, including (but not limited) to those we have set out above, and that more attention is given to how achieving net zero is intrinsically a political economy and societal challenge rather than a purely technological one.

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: Undoubtedly, yes. It is clearly important that the economy shift onto a net zero pathway as soon as possible and signalling is important in that regard. The Carbon Budgets constitute an important signalling element so the CCC should be revisit the 4th and 5th budgets. However, caution must be exerted in how outcomes are reported. Investment decisions may already have been made, or are currently being made, on a basis that incorporated information and signalling set out in earlier publications of these budgets. It is important that any revisiting of the 4th and 5th budgets does not exacerbate uncertainty in investment and policy landscapes. On the other hand, clarifying the impact on previously stated carbon budgets could help stimulate action in key areas that move from 'optional' to 'required' status in a net zero context (e.g. support of carbon capture and storage)

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: There is a need to clarify what is meant by 'co-benefits'. This often extends to claims about GDP trajectories that are heavily dependent on context, benchmarking and framing. Not only is this problematic, but wider economic and socio-economic benefits should not be relegated to a secondary status. Rather, they are central to enabling the transition. Therefore, we recommend, that the definition of 'co-benefit' should be broaden to focus on where there are opportunities to create, unlock and sustain value when considering which emission abatement solutions/options are adopted. This introduces huge information challenges and evidence gaps. But is also reflects the urgent need to ensure that social science research is considered a central and integral part of providing evidence to support the transition and net zero priorities and needs to be effectively funded. In this context, wenote the recent Times Higher report that only 5% of climate change research funding over the last 20 years has been directed to the social sciences (see https://www.timeshighereducation.com/news/social-sciences-miss-out-climate-change-research-funding.

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: There is a crucial need to align, or at least make consistent, the approaches of different areas of policy action. For example, as a member of SP Energy Networks RIIO-T2 Business Plan User Group (co-creating the report at https://www.spenergynetworks.co.uk/pages/our_riio_t2_business_plan.aspx) it was very clear that investment planning is constrained by Ofgem's responsibility to ensure that consumers do not incur costs associated with investment ahead of need. However, our own research (see aforementioned paper forthcoming in Energy Policy) shows that spreading investment spending over longer timeframes is less disruptive to the wider economy, preventing wider CPI pressures from adding to the impacts of investment costs being passed on through consumer bills. That is, if the need to meet the 2050 net-zero

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?

target is an established need, this must figure into how the regulator constrains and enables effective business planning on those parties who need to act to enable the transition in the next price control period (which moves into the 2030-2035 timeframe). At the same time, this brings into question the nature of uncertainties that may impact whether the need actually materialises. For example, will EV manufacturers produce enough vehicles to support the rollout of EVs? Will meeting our heat needs in a low carbon way involve a shift to more electric heating? The answers to these questions will depend on a wider range of policy actions, signals and landscapes, conditions in the political economy and societal attitudes. It is entirely correct that Ofgem protect consumers from unnecessary price rises, which sits at odds with the demands of net-zero. Thus, the approach to paying for early anticipatory investment must be reconsidered, and/or the demands of net zero be set as much as possible through 'low regrets' options, even if these do not necessarily relate to, or turn out to be, technologically optimal pathways.

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: Local and regional action and 'buy In' is crucial, so it is important that local areas and cities set their own targets and ambitions. However, as with the challenges of meeting global emissions reductions on the basis of national targets and actions, there is a real risk that emissions will simply be redistributed rather than reduced. That is, there is a real risk of off-shoring (see our own analysis of the potential risks of increased global emissions, combined with impacts on jobs and GDP, in a 2018 CEP policy brief). Moreover, even more than individual nations, cities and local areas are very open economies, relying heavily on imports from other areas of the country to support their consumption, and the health of the wider economy more generally. That is, achieving net zero will be more straightforward for a city or area, for example with no manufacturing activity. For this reason, what is meant by a 'net zero' ambition for any one local area or city, and what impact this may have on the 'just transition' and emissions in other parts of the country would have to be carefully considered.

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: This is a very important question (in two key parts) and not one that can be effectively answered at this time. Climate change/energy policy research has simply not been directed to date to address these types of questions in a cross-cutting way. Our portfolio of research at CEP has addressed such questions in a range of areas (see references within responses above, and we are happy to direct CCC to other papers and briefings). But, given the lead of EPSRC on most energy and climate policy research, this has involved setting these types of questions a (mainly technology-focussed) challenge at a time. We have just begun a new programme of research in partnership with the NGO Bellona that sets out to address these types of questions more systematically in the context of industrial decarbonisation (where the biggest risks are likely to emerge in terms of competitiveness, fiscal and wider economic prosperity). We are already engaging with

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?

HM Treasury in using this work to inform that body's Net Zero Review and would be keen to engage regularly with CCC (and any other policy stakeholder) on a regular basis also.

But, in terms of providing some insight at this stage, the fundamental general principles adopted must lie in the recognition that our economy must change, and we must make it work for all citizens. Thus, policy design and pathway choices must focus on the central question of how can the UK invest in decarbonisation in a way that unlocks benefits and delivers prosperity? The answer to this question and those set out in Q11 is likely to depend very much on policy decisions regarding the approach to determining 'who pays' for different actions? This is not a moral decision. In some cases, it may be less damaging to the economy and the distribution of incomes therein if costs of some actions are socialised and impacts mitigated by other net zero actions where benefits can be more easily unlocked. If such a comprehensive approach – and associated economy-wide multi-sectoral analyses - are not undertaken, we are likely to fall back on solutions where households either meet costs through taxation, levies on what they consume or through income losses as particular sectors within the economy contract. It is crucial to identify solutions that could generate opportunities for growth and net gains (to industry, household real incomes, the public purse), how policy can be designed to maximise gains (while minimising damaging losses to particular groups in different time frames), and consider how such 'returns' could offset net losses/costs borne to support other necessary actions.

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: This is the challenge of achieving a 'just transition', which is a key focus of CEP's activity, given the Director's role as one of Scotland's Just Transition Commissioners, and our new project (in partnership with the NGO Bellona) titled 'Delivering Prosperity: Industrial Decarbonisation and the Just Transition'. But these are relatively new initiatives, addressing questions that have not been given sufficient attention in research funding to date. Thus, as with Q11, this is not a question that can be effectively and fully answered at this stage (i.e. further research is required). We would certainly urge CCC colleagues to engage with us in our own work, with others engaged in activities in this area, and to support increased funding of research directed at this very important and ultimately central question.

However, what can be said now is that the answers may not be obvious. For example, if one were to pose the question "is it fair to ask taxpayers to pay for actions to reduce the emissions of heavily polluting but high value multi-national industries operating in the UK", many people would instinctively give a negative response. But, particularly where we are concerned with vulnerable workers and consumers, this may prove to deliver the best outcomes in a 'just transition' context. For example, under our new Bellona project, we are currently conducting scenario analyses of different ways that the costs of costly capital solutions to support industrial decarbonisation may be borne (an initial policy brief should be published soon, which we are happy to share). If we adopt a 'polluter pays' approach, impacts are likely to include GDP contraction combined with the loss of relatively high wage manufacturing and supply chain jobs. If the costs are socialised through subsidy to

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?

prevent a loss of industry competitiveness funded by income taxes, the GDP loss is likely to be reduced, but with more job losses in lower wage sectors. But, given that losses triggered by income tax changes (which will have less impact on the most vulnerable households) are associated with reduced household spending, there is potential for these impacts to be offset by the outcomes of other actions that deliver real household income benefits. While a full range of such actions are yet to be identified, we have already analysed how sustained growth opportunities and net income gains can be achieved through actions to improve residential energy efficiency, reduce mobility costs etc. (and where we have published and which are cited above, available through the CEP web-site or on request from cep@strath.ac.uk).

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: The recommendations of emissions pathways or emission reduction targets need to be set alongside ensuring continued economic resilience and delivering societal valued outcomes. For example, a large part of the UK Oil & Gas industry is serviced through Scottish supply chains (extending beyond the 'hub' of Aberdeenshire). The main Scottish industrial cluster at Grangemouth in Falkirk houses the majority of the different Scottish Chemical industries These are emission intensive industries that are targets for decarbonisation, but they are also high value industries that support and promote competitive supply chain activity, much of which is embedded within the Scottish economy. Our own research reflects this type of concern and the need to carefully consider the value delivered by these industries not just in terms of creating/retaining jobs but also the quality of those jobs, as these types of industries are required to act in response to to the industrial decarbonisation and wider net zero challenges. We would also highlight the possibly obvious point that different industry contexts will face particular challenges in addressing the net zero challenge depending on trade and supply chain conditions. Thus, there is unlikely to be a uniform solution (or 'a one-size-fits–all' solution) for any sector at any one location within the UK and careful focussed analysis will be required in considering how any one type of action may impact at industry and economy-wide level (over different timeframes) in any particular context

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: N/A for CEP

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: N/A for CEP

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

ANSWER: N/A for CEP

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: The simple answer is the need to ensure that devolved responsibility aligns with the devolved authority to act. For example, while the Scottish Government has the devolved authority to legislate on its approach to mitigating Climate Change, many of the levers required fall within a broad 'energy policy' context. In strict constitutional terms, energy plicy is largely reserved to the Westminster Parliament for Scotland and Wales (with some exceptions). However, the relationship between the UK and devolved levels

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?

may be thought of as sharing rather than the division of power, because there are no powers which are exclusively devolved. The UK Parliament retains the power to legislate for Scotland in devolved areas, or even to take back devolved powers to the UK level, subject only to a political requirement (normally) to gain the consent of the Scottish Parliament. This power has been exercised in relation to energy when the Scottish Parliament agreed to relinquish its (executively-devolved) powers over the setting of renewable energy subsidies in favour of a Great Britain-wide approach (Energy Act 2013). Thus, particularly given the ambition required on Scotland's part (the 2045 target) to enable UK delivery of net zero by 2050, there would seem to be a crucial need for devolved and national governments to work effectively together particularly where formal and clear devolution of authority is not in place. See our collaborative UKERC analysis for fuller discussion of these issues (with particular consideration of the Brexit context).

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: N/A for CEP

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

ANSWER: N/A for CEP

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: N/A for CEP

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: N/A for CEP

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: We are not yet in a position to effectively answer this question, but the type of issues raised here are the focus of our new programme of research in partnership with the NGO Bellona. We expect answers to emerge within the next few months and we would be keen to share and discuss with CCC colleagues. However, there are two key and related points that we'd flag now. First, there are few manufacturing sectors or firms that would fully fall under (a) or (b). For example, while Scotch Whisky may be geographically bounded (i.e. it has to be produced in Scotland to be called Scotch Whisky), many firms will also produce other spirits. Anecdotal evidence is already beginning to emerge over how firms are beginning to off-shore those elements, particularly given the trade pressures (tariffs) impacting the competitiveness of the whisky side of the business. This leads to the second point, where an industry has a traded output, even if cannot off-shore/leak carbon/jobs/GVA, there will still be competing products (e.g. Scotch whisky cannot off-shore but people can chose alternative whiskies and other spirits).

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: N/A for CEP

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

ANSWER: We have produced evidence (partly through a Scottish Enterprise funded political economy narrative development exercise) on how there is potential for a fossil fuel supply sector such as Oil and Gas to evolve in a way that delivers both net zero and just transition outcomes. However, the key point to recognise and accept is that there is no scientific definition of a just transition. Determining what a just transition would look like for the UK fossil fuel supply sectors requires effective consultation with all the stakeholders (direct and indirect) who will be impacted by the required change in activity. On this basis,

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

we would urge that the UK Government follow the example of the Scottish Government and establish a process that captures the role currently being undertaken by the Scottish Just Transition Commission.

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: N/A for CEP

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: N/A for CEP

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: N/A for CEP

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: N/A for CEP

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: N/A for CEP

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: N/A for CEP

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: N/A for CEP

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: N/A for CEP

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: N/A for CEP

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: N/A for CEP

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: N/A for CEP

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: N/A for CEP

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: N/A for CEP

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: N/A for CEP