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 <u>400 words</u> 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

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

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: Delivering net-zero by 2050 will be expensive, with different pathways to deliver and hard choices. Transparency of the likely costs to both the economy and individuals (such as energy cost impacts, finished goods price increases, food price increases etc.) should be in the public domain to allow an informed debate.

The current UK focus on the level of domestic emissions is fundamentally misguided if it results in driving manufacturing industry (and its associated emissions) out of the UK to locations with less strict carbon reduction targets. We see evidence in ONS reporting that the offshoring of carbon emitting manufacturing is a fact. The CCC needs to readdress this issue and support a strategy to ameliorate to avoid and reverse UK de-industrialisation.

The remit of the Committee should be amended to focus on reducing the total impact of UK activities on global emissions – so including the reduction of emissions associated with consumption.

The CCC has previously recognised that UK-based energy intensive manufacturing cannot be internationally competitive if it faces energy costs substantially higher than elsewhere as is currently the case. If new decarbonisation polices are instigated that increase the cost of energy, then this point should to be recognised and policy support designed into schemes to support industry in the transition to a net zero economy. We specifically

highlight the decarbonisation of gas as an area of concern. We need joined up government to deliver both net zero and a rebalanced economy where manufacturing plays a critical role in supporting left-behind areas.

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

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: One of the drivers for political action is public pressure and it follows that at least part of the community will seek to support decarbonisation through their purchasing choices. At present the actual carbon content (and the associated cost of carbon – varying depending on the manufacturing location) is not signalled at the point of purchase. How the carbon content of different products can best be signalled to consumers should the subject of future consultation.

Stronger markets for low carbon products will support and encourage manufacturers to supply low carbon goods.

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: Global actions to deliver emission reduction remain the over-riding priority. Higher costs imposed on UK manufacturing operating in internationally competitive markets can only result in the loss of the UK manufacturing base and the opportunity to support these sites to decarbonise and allow the UK to become a global leader in delivering industrial decarbonisation policies and processes that will attract more industry to the UK.

Again we reiterate that the genuine UK contribution to global carbon emissions, must include consumption emissions that should be reported together with simple domestic emission numbers. Reducing carbon emissions from UK manufacturing achieves nothing globally if the UK is simply switches to imports potentially from areas with greater levels of carbon intensity.

Moving existing installations to new technologies and fuels will entail additional costs and potentially risk. Support will be needed through this transition period.

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 – policy stability is important. If budgets are revisited, then support must be offered to deliver revised and potentially tightened targets. We also highlight that long-term investment decisions have to be made in the light of existing targets, other investment pressures and in the international context. Again this reinforces the importance of long-term policy stability.

Moving towards the next phase of tightening targets will require huge investment in infrastructure, energy networks and carbon storage. To have the justification to deliver such investment requires confidence in policy stability will require working in partnership between a number of different organisations – such as energy suppliers and users. Such an approach takes time to develop and deliver.

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: n/a

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: We reiterate the importance of policy stability. Energy intensive manufacturing sites are characterised by their capital intensive nature and long-term investment cycles. It follows that investment decisions can only be made when informed by having long-term clarity over policy developments. Likewise if such policy signals are that higher operating costs are to be imposed on UK based installations (vs those outside the UK), then result must be that the UK will lose investment opportunities with emissions simply being exported alongside jobs and wealth creation.

Of critical important is joined up Government to deliver net zero. We need consistent policy signals, which are also benchmarked against the policy signals from likely competitor nations.

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: There is a potential danger in local policies adding extra emission reduction pressure to installations affected by a quirk of geography. A better policy is for industrial sites across the UK to be addressed by the same policies.

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: Very difficult, but potentially possible. Fundamentally, if companies operating in markets served by a variety of internationally based suppliers are to manufacture in the UK, then they must be competitive. Polices placing additional costs on UK-based manufacturers is not sustainable in the long-run.

As an example of urgent policy changes required to address issues such as these, a complex programme to offset part of the cost impact of the Carbon Price Floor had to be developed at short notice to minimise the industrial damaged caused by a policy that essentially guaranteed that UK electricity prices would be higher than elsewhere in the EU. Such a policy to support industry through an energy transition could (and should) have been designed into the policy from its inception.

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 always a challenging issue. However, if the UK is truly determined to retain energy intensive manufacturing, then policy costs cannot be loaded onto industry to protect domestic customers. In this context, we again highlight the considerably higher electricity costs paid by industry in the UK compared to competitor locations such as France and Germany. We also note that the European Commission is currently establishing huge funding to support a 'Just Transition' that involves supporting industry. The UK must have a similar initiative to direct support to industry through the transition to a low-carbon economy.

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: n/a

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

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

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

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: It would be very unhelpful if different parts of the UK were to bid against each other with different carbon policies, when essentially the issue needs to be addressed at an international level.

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

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

ANSWER: n/a

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: We note that industrial operations rely on logistics, and as with other operational costs, they must be internationally competitive.

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: Options must be both technically feasible and economic.

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: Policies must be designed to ensure that UK industry does not face significantly higher costs than if it were based elsewhere – offshoring UK emissions by substituting UK manufactured goods for imported ones does nothing to reduce the level of global emissions even if a fall in direct UK is reported.

We also endorse the argument that more energy intensive manufacturing should be brought to the UK, where strict and supportive carbon policies can be developed to support such installations in decarbonising faster than would be the case elsewhere – with such knowledge being deployed to support decarbonisation outside the UK.

Specifically we support the development of polices that support decarbonisation, rather

than simply adding cost. In this context, schemes such as Climate Change Agreements provide a template for individual installations to identify (and agree with Government) cost-effecting investments linked to energy efficiency and carbon reduction. A revised CCA could provide a template for support to be provided to specific installations to drive changes through a variety of measures including direct fiscal support.

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: We would highlight the development by the European Commission of the huge Just Transition Fund intended to support the economic transition to a low-carbon economy. The UK must deliver a similar level of ambition through a similar set of programmes. This should include the use of revenue from CCL taxation and the auctioning of ETS allowances that draws revenue from the energy use of industry. Some of all of this income should be deployed back to support the necessary changes required from industry.

With long investment cycles, long-term planning is needed to move towards net-zero. There is an opportunity (maybe through a revised Climate Change Agreement) for site specific plans to be developed and agreed. Appropriate Government support could be part of the agreement to help deliver the long-term plan.

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

ANSWER: The UK papermaking industry (largely drawing on a feedstock of recycled fibres as part of the circular economy) is predominantly supported by gas-fired heat and (at larger sites) gas-fired CHP. We have previously highlighted to the Committee that there are currently no fully economic alternatives to the use of natural gas across the sector. Our analysis suggests that none of the commonly proposed alternatives (technical breakthroughs; on site-renewables; decarbonised natural gas; switching to electricity; switching to biomass; CCS; or industrial clustering) offer a full alternative. A wider (and economically sustainable) further roll-out of these technologies will need additional research supported by capital and possibly revenue support.

Further, we also highlight that major investments have been made to provide on-site gas-fired CHP plant delivering considerable carbon saving vs the alternative of stand-alone (or grid suppled) power and heat boilers. Under older polices, gas was clearly recognised as an important transition fuel to a low carbon economy and we question if this role should be abandoned as quickly as some are suggesting in the absence of economic alternatives and existing investment in equipment.

If government is determined that gas should be phased out more quickly, then this is precisely the sort of area where such change must be supported by a Just Transition Fund.

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: We do not hold such data. However we note that continued investment in gas-fired CHP indicates that this technology remains the most cost-effective investment choice. We also note that while hydrogen is a technical alternative to natural gas, none of the present alternatives offer revenue cost equality with natural gas. Driving up the cost of gas (to seek cost equality) would make UK industry uncompetitive unless transitional support is designed into the proposals.

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

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: We note that a skills shortage is an endemic issue across the UK economy that needs to be addressed.

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

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: Unlike the manufacturing sector, the energy sector can pass costs through to customers. While CfD contracts can support the deliver of low-carbon energy, the additional costs need to be passed through to customers or picked up by Government (as

per the current RHI). If costs are passed to customers, then the higher cost imposed on UK industry needs to be understood and the damage caused to UK competitiveness. Support to offset additional costs should be built into the scheme.

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: We endorse the comments about nuclear power – though we do have reservations about the cost. Clearly intermittent renewables need back-up and we endorse the role for interconnectors, and batteries – especially if technologies continue to develop. However we again question if hydrogen is technically and economically ready for widespread deployment. There still remains a role for natural gas as a transition fuel, especially if the proposed back-up generation is needed to operate at such a low level. If this is the case, then the requirement for CCS and hydrogen production infrastructure would not be cost effective when the alternative use of small amounts of natural gas remains an option.

DSR. Industry has long been recognised as having potential to provide back-up for energy networks, both the electricity and gas (potentially hydrogen) networks by flexing use and/or generation of power from auto generation. Unfortunately polices have not been developed to support this role, with a number of regulatory changes making it more difficult. We urge that the opportunity if further considered. The scale of the opportunity is difficult to assess as it depends on the relative value of reward vs the level of interruption risk and disruption.

Energy efficiency. This still remains a relatively neglected policy area and should become a focus of attention. We acknowledge that some progress is being made in this area (we await final detail of the Energy transformation Fund), but urge that more attention is paid. Specifically a new Climate Change Agreement Programme represents a huge opportunity to explore energy efficiency in detail with each installations.

There are hard policy choices to be made in this area. In particular domestic consumers may have to own less, do less, travel less and fly less otherwise the net zero target simply isn't going to happen and industrial energy use will be transformed. These choices might be provoked by taxation or banning certain products (like petrol and diesel cars) but to be sustainable there really needs to be a culture shift on what is socially acceptable, akin to smoking, drink driving and seat belts.

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: We note that hydrogen is being promoted as an alternative to natural gas, either manufactured from natural gas (with carbon capture) or using renewable electricity to electrolyse water. At present neither of these technologies are economically viable and we support research to further explore this issue.

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

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

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: We support a programme of woodland planting that can offer a number of benefits including both carbon capture and providing raw materials to support a bio-based economy. We note that there is an opportunity post-Brexit for the UK to re-target agricultural support towards forestry.

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

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

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: This is an area where additional research is required to inform policy making. Specifically the suitability of existing networks (and combustion equipment where appropriate) to transport hydrogen and carbon dioxide needs to be assessed. Existing networks may require substantial investment to make then suitable for new or altered use.

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