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.

Since 1978, the Solar Trade Association (STA) has worked to promote the benefits of solar energy and to make its adoption easy and profitable for domestic and commercial users.

A not-for-profit association, we are funded entirely by our membership, which includes installers, manufacturers, distributors, large scale developers, investors and law firms.

Our mission is to empower the UK solar and storage transformation. We are paving the way for solar to deliver the maximum possible share of UK energy by enabling a bigger and better solar industry.

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: n/a

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: n/a

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: n/a

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: n/a

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: n/a

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: n/a

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: n/a

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: n/a

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: n/a

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: n/a

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

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: n/a

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

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

ANSWER: n/a

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

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:

a) STA 'Leading Lights' highlights innovative pilots implemented around the UK by local authorities. Examples related to the decarbonisation of heat one includes: **Nottingham City Council and Nottingham City Homes** are the first outside the Netherlands to pioneer the Energiesprong ('energy leap') approach to retrofitting homes, with ten homes completed in early 2018. **Bickleigh Down Eco Village** development of 91 new homes and apartments on the edge of Dartmoor National Park and six miles from the centre of Plymouth, that are built to an exceptionally high environmental standard. **City of Cardiff Council** included a 143kW(th) solar thermal system as part of its £5.5 million regeneration of a leisure centre, featuring a 25-metre swimming pool. **Mid Devon District Council** has installed solar thermal on nearly 100 council homes off the gas grid.

There will be no one size fits all approach for the future of low carbon heating in the UK. Technologies that provide flexibility on timing will enable the country to use low-cost, low-carbon energy from renewable sources at times of high generation and low demand. Buildings that can be flexible about when energy is used will be able to reduce carbon emissions, primary energy use and energy bills by responding to signals from smart electricity grids. As the grid tends towards zero carbon, buildings that have higher energy use, but use it at the right time, will have lower emissions than more efficient buildings (measured on total energy consumption) that cannot supply this flexibility.

It is important that low carbon heating technologies, such as heat pumps, are considered in combination with other low carbon technologies and that building regulations and the associated methodologies behind it (such as SAP) remain up to date with the rapid rate of innovation taking place within the heat sector. Heat pumps are configured to run at low intensity over long periods and are less capable of dynamically responding to pricing/carbon signals. Public awareness, understanding and perception of technologies such as heat pumps must also be tackled. For instance, even with higher standards in Scotland, developers have demonstrated reluctance to incorporate heat pumps into designs. Heat networks are not easily low carbon and zero-carbon supply must be considered during design phase to ensure heat networks can become so. Heat networks should have their distribution temperatures lowered and raised at point of use to reduce losses.

b) Transitioning to a smart, flexible energy system is widely understood as necessary to support cost-effective decarbonisation and the increasing electrification of transport and heat. There is yet insufficient recognition for the responsibility to ensure homes are incorporated within a smart, flexible system. This is at odds with the growing consensus for the smart agenda supported by expert analyses demonstrating the economic value. ARUPS "Energy Systems: A view from 2035"[1] noted the decentralised, disaggregated and multi-

[1] https://www.arup.com/perspectives/publications/research/section/the-future-of-energy-2035

vector nature of the 2035 energy system 'will make flexibility (in system architecture, system operation and the regulatory framework) essential to achieving the Government's three objectives of decarbonisation, security and affordability'. Imperial's analysis of the residential sector's flexibility potential suggests whole system cost savings of £6.9bn are possible, through reducing investment requirements in network infrastructure and opting for cost-effective wind and solar instead of more expensive low carbon generation like nuclear and CCS[2].

Analysis done by Aurora into the 2025 proposal to use electricity to heat new build homes suggested there could be an increase power demand from the sector from 27TWh/year to 100TWh/year by 2050[3]. National Grid have suggested that a deep penetration of EVs, smarter charging and V2G could increase peak electricity demand 3-13GW by 2050[4], both highlighting the potential scale of flexibility if maximised. The increased demand for clean power and renewable deployment is already hindered by an outdated and heavily constrained grid, which is costly and prohibitive towards renewables connecting and transporting the generation to where it is needed. Energy generated and stored at a local level, if not onsite, will be critical to mitigating increases in demand and localised constraint issues. STA attaches the latest cost updates of C&I rooftop.

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

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:

Local governments have led the way in declaring climate emergencies, carbon targets, higher building regulations and local projects, acting as a driver for innovation, skills and supply chains. It is important that "coordination" is not equated to "standardisation", however, it is agreed that coordination between national and regional governments could be improved.

It is arguably the case that greater coordination could be elicited through a national government leading by example and proactively implementing ambitious policies to back announced targets, as this would minimise the need for local authorities to individually seek their own answers. The most notable example is the removal of the zero carbon homes policy.

Secondly, greater coordination and effectiveness of policy decisions set at a national level also need to reflect local authorities' available resources. For instance, the 2018 implementation of MEES required local authority enforcement. STA members highlighted that the low EPC ratings within LAs'

[2] https://www.ovoenergy.com/binaries/content/assets/documents/pdfs/newsroom/blueprint-for-a-post-carbon-society-how-residential-flexibility-is-key-to-decarbonising-power-heat-and-transport/blueprintforapostcarbonsocietypdf-compressed.pdf
[3] https://www.reuters.com/article/us-britain-energy-demand/uk-power-demand-to-soar-on-plans-to-end-gas-home-heating-research-idUSKCN1R00V3
[4] https://www.carbonbrief.org/rise-uk-electric-vehicles-national-grid-doubles-2040-forecast

own portfolio of buildings has hindered the enforcement of these regulations. For the set target to be meaningful, it will be necessary for local authorities to have adequate personnel and budget resource for enforcement and sufficient incentive. Whilst many local authorities have declared their own climate emergencies, and many have the capital to invest in energy efficiency and generation technologies or are able to take advantage of PPA's and cheap financing arrangements, local authorities can be held back by bureaucracy, inefficiency and red tape.

The STA does not have expertise on successful governance models for decision making toward heat decarbonisation, STA reports[5],[6] highlight leading case studies around the UK that could be indicative of supportive governance models.

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:

In a post-subsidy world in which solar PV has been effectively excluded from CfDs since 2015, the solar energy sector has been at the forefront of developing innovative business models that continue to drive deployment while minimising costs. However, achieving a clean energy transition will require major regulatory reforms and major corporate and institutional change at a rapid rate.

First, the STA supports the CCC's recommendations to support increased capital investment in renewable and low-carbon energy sources, particularly through expanding the UK's green finance capabilities and minimising risk through clear long terms goals and Government commitments.

However, there is much more that can be done to drive rapid deployment of renewable technologies. In the absence of CfDs, Power Purchase Agreements (PPAs) are a critical route to market for solar projects in the near term and have proven effective at reducing costs. HMT should clarify that PPA-contracted solar is exempt from the Climate Change Levy (CCL) to support wider uptake. Government can also do more to increase the availability of public-sector PPAs by increasing net zero targets for the civic estate.

Solar PV, thermal, and storage technologies should also be excepted from business rates, as is the case for gas-fired Combined Heat & Power (CHP). The current structure disproportionately disadvantages the zero-carbon technology and penalises businesses and domestic consumers who install solar generation and storage equipment with the primary purpose of on-site consumption.

The Government must also immediately restore VAT rates on solar PV to pre-October 2019 rates. Currently, where the cost of materials exceeds 60% of the total installation cost, the rate of VAT on the material element rises from 5% to 20%. That these technologies can attract a 20% VAT rating while fossil fuels such as coal and fuel oil enjoy a reduced rate cannot be justified under current circumstances. Further, battery storage should be added to the Energy Saving Materials list to minimise costs for co-located storage and generation. Co-located storage and solar generation increases efficiency by minimising transmission losses and can increase overall grid flexibility.

[5] https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[6] https://www.solar-trade.org.uk/wp-content/uploads/2019/10/The-Good-The-Bad-and-The-Leading-Lights-WEB.pdf

Lastly, the fundamental realignment of business drivers across the energy sector toward a clean energy system will require bold and collaborative action on the part of Ofgem and BEIS. At a high level, Ofgem's remit should be revised to incorporate specific net zero targets and objectives. The development and implementation of the RIIO-T2 and RIIO-ED2 price controls will also be central to enabling the transition to clean energy. They must fundamentally realign the business drivers of DNOs with the objective of a lower-cost, more efficient, low-carbon and secure power system, where the benefits of technology change can benefit all, including vulnerable consumers. That means DNOs earning revenues based on achieving operational objectives, rather than a Regulated Asset Base, specifically through customer service, low-carbon and network utilisation factors. Further, access to transmission and distribution networks is essential to support the roll out of clean energy in the medium term.

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:

a) Recent research from LUT University and Energy Watch Group suggests that solar PV could contribute up to 62% of total energy supply in Europe in a zero-carbon 100% renewable energy generation mix by 2050.[7] This same study showed that solar PV could account for 32% of the generation mix in 2030.

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

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

[7] http://energywatchgroup.org/wp-content/uploads/EWG_LUT_100RE_All_Sectors_Global_Report_2019.pdf

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: n/a

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: n/a

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