

## 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

**Question 2:** How relevant are estimates of the remaining global cumulative CO<sub>2</sub> 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:** One of the most important uncertainties to consider is the speed at which our energy system can adapt to the transition to alternative fuels. The key to ensuring speed of transition is looking at the energy system holistically rather than through the lens of separate energy vectors; this is essential to devising policies that are mutually supportive of one another.

In practice this means acting to ensure the system has sufficient flexibility built in. This includes investing in storage technologies – not just battery but the likes of pumped-storage – and facilities to convert electricity to hydrogen and vice versa according to demand, for example. The Committee on Climate Change references what ABB regards to be a good example of how a holistic approach can work in practice in Imperial College London’s Analysis of Alternative UK Heat Decarbonisation Pathways. Heat provides a natural space for implementing joined up, hybrid solutions to decarbonisation.

Another important aspect of flexibility is investment in digital technologies, including smart grids and Demand Side Response (DSR) tech. These are beneficial whether Net Zero is achieved by 2050 or not; they represent no regret solutions, but the investment is an enabler to delivering the smart energy services required to meet the net zero target..

There must be enough up-front investment in flexibility to provide certainty that the energy system can be an enabler of and not a hindrance to achieving Net Zero. The short-term costs of this must be borne so the long-term benefits can be realised.

**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:** Yes, they must be revised to ensure Net Zero can be reached by 2050.

**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 share the CCC's analysis of the key challenges. We would put a significant emphasis on the need to digitise the grid, so it is capable of supporting DSR solutions in a way that allows them to operate in a commercially viable way. However, the current regulatory conditions do not encourage the kinds of pre-emptive investment needed to ensure future readiness. For example, there are instances of it taking up to five years to secure a grid connection for EV charging points – this must be reduced but illustrates the delays in only investing at the point of need

RIIO-2 is an opportunity to change the regulatory framework so it takes into account, values and rewards decarbonisation.

**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:** Investment naturally flows to locations where there is likely to be the highest return. However, this approach could mean the geographies that need the most support lose out. Pump priming will likely be needed to stimulate business investment in these areas, and success of any investment of public money may need to be judged on a broader basis than financial ROI, in line with the current debate on reforming HM Treasury's Green Book.

**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:** see some of these points addressed in the answer below

**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:** To reiterate the points made in our answer to Question 10, investment will need to be well targeted to ensure less commercially viable locations are supported through the transition. This may require a broader interpretation of what represents a good return on investment to include societal and environmental indicators. Installing EV charging in rural areas, for example, is less likely to be commercially viable, but it is necessary for a complete transition that does not leave communities behind.

Transmission system costs must also be managed so as not to leave regions behind. If, for example, the South East of England were to operate with its own system in the future, the cost of the rest of the system would be prohibitive. System operating costs must be considered in evaluations of the cost of decarbonisation, as part of a holistic approach to understanding the implications of transitioning to Net Zero.

## 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: Lack of and patchiness in the provision of vehicle charging structure feeds range anxiety. More investment is needed to ensure provision stays ahead of the uptake of electric vehicles so it does not become a limiting factor, and the infrastructure needs to be smart, reliable, and connected to the grid more quickly than the current five year lead time.

Vehicle supply, however, is potentially a bigger constraint on demand than infrastructure at present. This is not an area that ABB is able to expand further on.

**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:** Businesses need clarity and certainty over which options will be pursued. There will likely be a range of solutions deployed depending on their suitability for different locations and industries, but there is a common need for the infrastructure to be in place ahead of time to provide assurances that the transition will be practicable. For example, hydrogen facilities must be positioned near the large distribution centres of companies such as Amazon, in order to facilitate the switch to hydrogen HGVs.

**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:** Energy efficiency is a vital part of decarbonisation that is often overlooked by businesses.

We support a range of methods to encourage businesses to invest in energy efficiency. One of these is making it easier for businesses in the same industry to compare their performances. High level energy usage data, such as the data from bills or smart meters, can be used for initial benchmarking and would provide a first level screening to identify potentially beneficial improvement areas. However, successful improvement projects need more granular data and more detailed benchmarking to confirm the potential improvements. A government supported data tool that allowed users to enter their more granular energy data, in return for benchmarking their performance against other relevant installations, could provide a significant volume of useful data for targeting improvements.

In manufacturing, one barrier that is difficult to overcome is that processes that run continuously can't be shut down without losing production, and the limited shutdown time creates a barrier to installing energy efficiency projects, which are often lower priority than output related projects. In these cases, energy investments must give a significant improvement and be very low risk.

Additionally, the payback period for many energy improvement projects may be 5-7 years and this is often not attractive enough for UK companies. Interim financial incentives from government to discourage short-termism would be welcome. The current Enhanced Capital Allowance scheme for energy-saving technologies still does not do enough to encourage businesses to invest, partly because it is out of step with business investment cycles.

**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: Norway has some good examples of best practice in decarbonising power-from-shore for its offshore fossil fuel industry, such as at its Johan Sverdrup oil field, for which ABB supplied the HVDC equipment for two of the scheme's converter stations. The size of this project required several suppliers from within and outside Norway.

In the UK, offshore facilities are commonly powered by diesel or gas generators; a more established system of financial incentives will likely be needed to encourage the transition in this country.

**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 £/tCO<sub>2</sub>e basis)?

ABB can provide 2 typical examples of recent energy saving projects to illustrate the savings potential.

The application of high efficiency motors and variable speed drives to water pumps led to an annual reduction in CO<sub>2</sub> of 649 tonnes at a cost of £220/tonne

The application of a variable speed drive on a fan led to an annual reduction in CO<sub>2</sub> of 7 tonnes at a cost of £430/tonne

**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: 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: 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: n/a

**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: Interconnection, battery storage and flexible demand will undoubtedly be important tools in the transition to Net Zero. However, other forms of storage should be considered, such as pumped-storage, which can be released very quickly at times of high demand.

Interconnection, as well as offshore wind, requires DC connections. In order to cut costs and improve efficiency, consideration should be given to the benefits of a DC grid which could be started in the North Sea. .

**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:** The most likely early applications for hydrogen are injection into the existing gas grid and in the form of fuel cells for vehicles.

**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:** ABB believes that digitisation is key to the future of the UK maritime sector. In our discussions with the maritime sector, there is clearly a desire to move to greater shore-to-ship charging, and indeed there has been progress in some areas. However, projects have often moved slowly, and in some cases are not getting off the ground. This is because the infrastructure costs are so huge, and the ports and ferry companies do not want to take on those costs. Indeed, some UK ports, such as Liverpool, London Gateway, Bristol and Teesport have made significant investment and are setting a world class benchmark. If the UK is going to remain competitive and open to trade, we need more ports to follow that lead.

Ports should be treated as transport hubs. Their ecosystems include shipping, rail and HGVs, and as such should be planned holistically. Port operators must be supported so they make investment decisions in the round on, for example, building import facilities for locally generated low carbon fuels. Decisions should be taken locally as to what solutions work for any given port, depending on the surrounding infrastructure; there can be no nationally standardised approach.

Consideration should also be given to the extensive time it takes to get planning and consent approval for large projects at ports. Ports are often constrained and reluctant to invest the time and resource that is required to go through approval processes.

ABB urges the CCC to help expedite this process, so that the UK maritime sector can bring forward the technology for a greener and more efficient shipping industry. Through ABB's work in other countries, as well as with different parts of the sector in the UK, we know there are ways of connecting to the grid that are much cheaper than more traditional methods, for instance through the standardisation of technologies. ABB would be happy to offer further advice on this issue.

**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<sub>2</sub>?

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<sub>2</sub> transport and storage infrastructure over the period to 2030?

ANSWER: n/a