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: 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:

In becoming the first major economy in the world to put a target of net zero carbon emissions by 2050 into law, at the advice of the Committee of Climate Change (CCC), the UK set a precedent for the rest of the developed world to follow.
Given the timing of COP26, revising and strengthening the UK's Nationally Determined Contributions (NDC) for the period around 2030 to reflect the Government's 2050 target will undoubtedly act as a further catalyst for others to set similar or more ambitious targets for decarbonisation.

Given the CCC's track record on influencing Government climate change policy, its recommendations for the sixth carbon budget will be of great importance to the updated

NDC and therefore the UK Government's credibility, and concomitant ability to influence at COP26.

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:

While we must support the research and development of innovative new technologies, such as nuclear fusion, to see real changes in the short period of time we have before 2050, and the even shorter period before the years covered by the CCC's sixth carbon budget, we must invest in proven technologies.
Nuclear provides safe, low carbon, non-weather dependent, constantly available electricity which can support a decarbonised electricity mix in the UK, alongside the expansion of intermittent and variable low carbon sources, such as wind and solar. With the technologies available, it is not possible to achieve net zero by 2050 without nuclear forming part of the generation mix, and the CCC should be explicit about that.
Reports from MIT (2018), EIB (2019) and IEA (2019) confirm that nuclear is an integral part of global low carbon electricity generation and without it, we are likely to see a huge increase in CO2 emissions and in electricity bills for consumers.
It is essential that going forward we put more emphasis on commercially viable, proven technologies, such as nuclear power, in order to meet our targets and ensure security of supply through the clean energy transition.
The UK should capitalise on proven low carbon methods deliverable at scale today, and from that platform explore further innovations to meet its climate change goals.

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, the CCC should revisit the level of these budgets. By the CCC's own admission, the UK must reduce its carbon emissions each year by 30% more on average compared to its current progress. Understandably, previous carbon budgets set by the CCC have taken a measured approach, finding a balance between motivating Government but also allowing time to develop new policies and for consumers to adapt.

However, given the legal commitment to net zero by 2050, and lack of progress in meeting

even short-term targets, early action should be prioritised. We agree with the CCC in its last progress report to Parliament that targets are not enough, and that the policy gap must be met and decarbonisation projects delivered as a matter of urgency.
This sentiment should be translated into setting the level of the sixth carbon budget to help transition the UK into a net zero economy as putting the right policies in place today will help benefit the UK in the long run.

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:

The transition to a net zero economy has the potential to create thousands of new skilled jobs in the UK, helping to fuel economic growth across the country. The development and success of the nuclear industry will only help to drive the economy.
The NIA's detailed 2019 survey of its members shows consistent employment levels between 55,000 and 65,000 over the past five years, spread across the UK in both urban and rural regions. Indirect employment in 2016, in an Oxford Economic study for the NIA, rises to 155,000. Nuclear power is the strongest example of creating widespread, long term, skilled jobs and prosperity – both directly and in the supply chain ¬– whilst helping meet 2050 net zero policy objectives.

The development of new capacity to replace our ageing current fleet is critical to ensure the growth of low carbon electricity as the primary source of energy, including in heat and transport. This will require proven large-scale nuclear reactors to be developed, progress on small modular designs and, looking ahead, the development of fusion technology.
The focus on a zero carbon economy is creating excitement and interest in the nuclear industry for a new workforce coming into the sector via apprenticeships and graduate schemes, but it's critical we establish the conditions for further new nuclear power station projects quickly to maintain this positive momentum.

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:

Upgrading of our national grid infrastructure and distribution network is required to meet an expected increased demand from electric vehicles and heating. An increase of renewables in the system must be complemented by more 'firm' power in the form of nuclear, the only proven low carbon, 'firm' electricity generator. Using proven technology for this purpose in the period out to 2030/35 is particularly prudent given the essential need for immediate action.

It is imperative that the necessary financial frameworks are put in place urgently to enable the further development of new nuclear power stations at an acceptable cost to the consumer, and in a way that will attract investors. This is required to allow delivery in time to address the retirement of the majority of our current fleet by 2030. We should aim for nuclear to provide an overall share of the low carbon electricity mix which is at least equal

to its percentage share today, or we will risk placing reliance on currently unproven or unavailable technology.

The priorities include an unambiguous commitment to new nuclear and the implementation of an appropriate financing model – such as the Regulated Asset Base (RAB) the UK Government is consulting on or alternative – to bring down the cost of capital for nuclear new build, and subsequently bring down the cost of clean power for consumers.
A long-term programme of political and financial support for upcoming technologies, such as small reactors and nuclear fusion, is also needed. The former requires clarity over site assessments and a down-selection from the Government's AMR competition, which will help the industry determine how serious the UK Government is about pursuing this promising technology.

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:

The carbon budget, coupled with an unambiguous policy framework, will enable accelerated investment in technology critical to deliver the zero emissions power, and enabling net zero to be achieved. Reducing the cost of capital through successful policy is key to ensuring major infrastructure projects are built at a rate needed to keep the lights on during the period of the sixth carbon budget and in the transition to net zero.
Utilising an appropriate financing model for new nuclear is an example of this within our sector. Successful implementation of a RAB or alternative similar approach for this purpose could lead to the model being used in other low carbon infrastructure projects, further enabling net zero.

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: 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:

The NIA believes the UK Government has already identified the priorities for a different funding approach in its consultation on the RAB model, which makes it possible to significantly reduce the cost of capital by offering investors secure and early revenues at a lower rate of return, avoiding rolled up interest costs. Consumers would be protected from cost overruns through robust regulation requiring appropriate qualifying criteria.
Under the RAB, investors would see a return at earlier stages of the project in a more regulated fashion which would address many of the risks faced by investors under the Contracts for Difference (CfD) model. Securer payments would encourage a wider pool of investors, for example pension funds and the insurance sector.

The RAB is particularly suitable for proven technologies, which do not bear heavy research and development and associated licensing costs. If implemented in a timely manner, the model could have a positive effect across the UK nuclear supply chain through continued business for SMEs.

If a RAB or similarly robust financing model were to achieve a low cost of capital while assuring investors guaranteed rates of return of 6%, projects would need to overrun by approximately 75-100% before the cost would be higher than under the CfD model. If Government were to finance the project and required a 2% return, cost would have to overrun by 400-600% for it to be more expensive than the CfD model that was used for Hinkley Point C.

The timescale of implementing a new financing model is crucial in ensuring industry can capitalise, for example by transferring the workforce between existing projects and restarting dormant ones. At Sizewell C, the current business case relies on a specific timetable, with a Final Investment Decision at end of 2021 or early 2022. This would allow for the smooth transfer of the skilled workers and supply chain from HPC to Suffolk. A smooth transition would maximise the benefits of the repeat-effect. Such a transfer depends on the willingness of Government to facilitate a new financing arrangement to meet the above timetable.

The suspended Wylfa Newydd project meanwhile has retained the capability to ramp back up again, with the main dependency being the establishment of more favourable funding arrangements than the CfD model. Maintaining nuclear supply chain confidence and stability is also essential for the future of a UK fleet, with several promising sites having been identified.

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)
To meet the growing demands for electricity, nuclear must play an integral role in a future decarbonised energy mix. Nuclear is a proven, dependable, technology with lower lifecycle CO2 emissions than solar power and the same as offshore wind.

The countries and regions which have most successfully decarbonised, like Sweden, France and Ontario in Canada have done so by relying on nuclear as a significant component of their energy mix, both for power and enabling heating where electricity is the primary energy. It is also an important economic engine for the UK, creating high quality direct and indirect employment for around 155,000 people (Oxford Economics, 2016). Nuclear currently provides 20% of all the UK's electricity but all but one of our existing fleet will close over the next decade. To maintain this share in a growing market for clean electricity would require a large-scale new nuclear build programme followed by the deployment of small reactors and then Advanced Modular Reactors, in total representing around 40-60GW of capacity. This would enable the country not only to keep up with current demand but to help meet future demand where electricity is increasingly the primary energy source for heating, transport and industrial processes.

The CCC's 2019 Net Zero report advised that a future energy mix should include 38% low carbon 'firm' power. It would be prudent for this to be proven new nuclear capacity to provide resilience and assurance in the event that Carbon Capture and Storage (CCS) is not deliverable at the scale and in the timescales required.

Given the impending closure of the majority of the UK's operating nuclear sites, and that new site Hinkley Point C and other potential sites Sizewell C and Bradwell would only amount to 11% of generation, there is a significant gap to fill in a short timeframe if we are to avoid increasing, rather than reducing, emissions.

The NIA believes that nuclear – the only proven low carbon 'firm' power – plays a vital role in meeting this demand, which should be recognised by the CCC and the UK Government. To capitalise on nuclear's proven track record we need positive policy decisions in 2020.

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 believe that nuclear power will be important in the production of hydrogen. High temperature electrolysis, of which nuclear is capable, has been proven to be the most economic choice for production overall and has the ability to use surplus electricity as a way of providing grid flexibility. Hydrogen produced by electrolysis, either from nuclear or renewables, will also have significantly less lifecycle emissions than hydrogen produced from steam methane reformation.

Therefore, nuclear should be seriously considered as a contributor to hydrogen production as the hydrogen economy continues to grow.

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: 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