

The Fifth Carbon Budget - Call for Evidence

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Question and Response 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 response to a maximum of 400 words per question.

Questions for consideration:

A. Climate Science and International Circumstances

Climate science and international circumstances are important criteria in setting carbon budgets.

- The science indicates the impacts associated with different levels of climate change and the limit on emissions globally if these risks are to be contained.
- International circumstances inform the prospects of future action to reduce emissions globally, potential requirements of the UK to contribute to those actions, and prospects for low-carbon technology development and carbon pricing.
- The EU places obligations on Member States to reduce emissions to contribute to reductions in the bloc as a whole. These imply a minimum level of effort for the UK's carbon budgets.

The Committee intends to draw primarily on the work of the IPCC, as published in the Fifth Assessment Report, in assessing the implications of climate science for the budget advice

The Committee's advice is based on a climate objective to limit central estimates of temperature rise to as close to 2°C as possible, with a very low chance of exceeding 4°C by 2100 (henceforth referred to as "the climate objective"). This is broadly similar to the UNFCCC climate objective, and that of the EU.

In order to achieve this objective, global emissions would have to peak around 2020, before decreasing to roughly half of recent levels by 2050 and falling further thereafter.

The UNFCCC is working toward a global deal consistent with such reductions. Individual parties are submitting pledges for effort beyond 2020, with the details of the agreement to be discussed in Paris late in 2015.

The EU has agreed a package that requires a reduction in emissions of at least 40% on 1990 levels by 2030, on the way to an 80-95% reduction by 2050. The UK Government supported this package, while arguing for an increase to 50% in the context of a global deal.

The US and China have jointly made pledges for the period beyond 2020. The US has pledged a reduction of 26-28% by 2025 versus 2005, requiring a doubling of the rate of carbon reduction compared to 2005-2020 and on a trajectory to economy-wide cuts of the order of 80% by 2050. China has pledged to peak CO₂ emissions around 2030, and to make best efforts to do so earlier.

Question 1 *The IPCC's Fifth Assessment Report will form the basis of the Committee's assessment of climate risks and global emissions pathways consistent with climate objectives. What further evidence should the Committee consider in this area?*

ANSWER: Substantial evidence exists that the IPCC AR5 understates the severity of the climate situation, and that 2°C (let alone a chance of exceeding 4°C) is in no sense a scientifically justified 'safe level' of warming.

For example, Hansen and Sato have laid out the climatology case as to why "goals to limit human-made warming to 2°C are not sufficient – they are prescriptions for disaster". [1]

More recent papers have found that the Ipswichian/Eemian interglacial period of stable climate (130,000-115,000 years ago) – when sea levels were higher than present by at least four metres, and probably over six metres– was less than 2°C warmer than pre-industrial. Hansen *et al* are currently finalising a detailed update paper, "Evidence...that 2°C Global Warming is Highly Dangerous", incorporating these recent findings, which should be considered, if possible. [2]

Noting that the Tyndall Centre have previously made submissions, we would defer to their greater professional specialism in climatology. They have previously noted that "2°C now more appropriately represents the threshold between 'dangerous' and 'extremely dangerous' climate change". [3]

Stepping into the social sciences, it is also relevant to note the important arguments to the effect that selecting and communicating a specific target may itself be counter-productive. [4]

Overall, as laid out by Oliver Geden in *Nature* this month, there is a real danger of climate policy becoming divorced from climate science, with climatologists under pressure to adapt their results to politics, rather than the other way around. This leads not to evidence-based policy making, but to 'policy-based evidence making'. [5]

It is imperative that the CCC not succumb to this pressure. If political and scientific reality are not reconciled, only one will pull rank. For the carbon management community to allow this would represent perhaps the greatest abrogation of responsibility ever seen.

References:

[1] Hansen J, Sato M. Paleoclimate Implications for Human-Made Climate Change. *Springer Vienna* (2012).

[2] Implications of the five references below summarised in:

Hansen J, Hearty P, Ruedy R *et al.* Ice Melt, Sea Level Rise and Superstorms: Evidence from Paleoclimate Data, Climate Modeling, and Modern Observations that 2°C Global Warming is Highly Dangerous (forthcoming 2015).

Kuhl N and Litt T. Quantitative time series reconstruction of Eemian temperature at three European sites using pollen data, *Veget. Hist. Archaeobot.*, 12, 205-214 (2003).

Bazin L, Landais A, Lemieux-Dudon B *et al.* An optimized multi-proxy, multi-site Antarctic ice and gas orbital chronology (AICC2012): 120-800 ka, *Clim. Past*, 9, 1715-1731 (2013).

Galaasen EV, Ninnemann US, Irvani N *et al.* Rapid reductions in North Atlantic deep water during the peak of the last interglacial period, *Science*, 343, 1129-1132 (2014).

Pol K, Masson-Delmotte V, Cattani O *et al.* Climate variability features of the last interglacial in the East Antarctic EPICA Dome C ice core, *Geophys. Res. Lett.*, 41, 4004-4012, doi:10.1002/2014GL059561, (2014).

Jackson LC, Kahana R, Graham T *et al.* Global and European climate impacts of a slowdown of the AMOC in a high resolution GCM, *Clim. Dyn.*, publ. online 11 March, doi:10.1007/s00382-015-2540-2 (2015).

[3] Anderson K, Bows A. Beyond dangerous climate change: emission pathways for a new world. *Philosophical Transactions of the Royal Society A* 369: 20-44 (2011).

[4] Shaw C. Choosing a dangerous limit for climate change: Public representations of the decision making process. *Global Environmental Change* 23.2: 563-571 (2013).

[5] Geden, O. Policy: Climate advisers must maintain integrity. *Nature* 521.7550: 27 (2015).

Question 2 To what extent are the UN talks in Paris likely to have implications for the Committee's advice beyond the pledges and positions announced in advance of the talks?

ANSWER:

Question 3 *Based on the available evidence, does the EU 2030 package reflect the best path to its stated 2050 ambition? How might this package change, specifically its targeted emissions reduction, either before the end of Paris or after Paris?*

ANSWER:

Question 4 *How does the UK's legislated 2050 target affect its ability to support international efforts to reduce emissions, including its position in negotiations? Does the level of UK carbon budgets have any additional impact (over-and-above the 2050 target) for the UK in international discussions?*

ANSWER: The legislated 2050 target could put the UK in a powerful position to lead international negotiations, if there were not significant doubts that the target will actually be achieved. The pathway to 2050 and 'policy gap' for meeting later budgets currently undermines the UK's ability to state boldly "we are acting, so must you".

B. The cost-effective path to the 2050 target

The carbon budgets need to set a path that is achievable from today without being over-optimistic about what is achievable in later periods to prepare for the 2050 target.

The Committee has previously set out scenarios for 2030 that balance effort before 2030 with potential opportunities from 2030 to 2050. The scenarios aim to include ways of reducing emissions that are likely to be relatively low cost and actions that will develop options that may need to be deployed at scale by 2050.

These scenarios, reviewed in detail in the Committee's report *The Fourth Carbon Budget Review – the cost-effective path to the 2050 target*, include substantial investment in low-carbon power generation, roll-out of low-carbon heat (heat pumps and district heating), development of the markets for ultra-low emissions vehicles and a combination of energy efficiency measures and fuel switching in industrial sectors.

The scenarios also reflect detailed assessments of what is practically deliverable, and the Committee monitors progress towards them as part of its statutory duties. The *2014 Progress Report to Parliament* indicated that current policy would not be

enough to meet the fourth carbon budget, but that the 'policy gap' could be closed at affordable cost.

The set of policy options required to close the gap include:

- Strengthening the EU Emissions Trading System.
- Setting a clear objective for Electricity Market Reform (EMR) beyond 2020.
- Focusing on low-cost residential energy efficiency.
- Simplifying policies targeting commercial energy efficiency.
- Tackling financial and non-financial barriers to low-carbon heat.
- Pushing for strong EU targets for new vehicle efficiency in 2030.

The Government has subsequently published various documents, including its formal response, as required under the Climate Change Act, and the National Infrastructure Plan. The Plan includes investments of around £100 billion in low-carbon power generation in the 2020s, in line with the scenarios from the EMR Delivery Plan that reach 100 gCO₂/kWh by 2030. It also has significant investments in offshore oil and gas and in the road network. This includes £15 billion of new spending on roads and around £50 billion on offshore oil and gas.

Question 5 *In the area(s) of your expertise, what are the opportunities and challenges in reducing emissions to 2032, and at what cost? What may be required by 2032 to prepare for the 2050 target, recognising that this may require that emissions in some areas are reduced close to zero?*

ANSWER:

Question 6 *What, if any, is the role of consumer, individual or household behaviour in delivering emissions reductions between now and 2032? And, separately, after 2032?*

ANSWER: Consumer behaviour is core to both. Between now and 2032 the majority of infrastructure will be that which we already have, meaning that demand reduction has an essential role to play in delivering emissions reductions.

Household fuel and electricity use alone accounts for around 40% of national emissions.

After 2032, many of the 'low-hanging fruit' will have been taken, meaning that lifestyle changes and adjusting to different infrastructure will be necessary. Although new, more efficient, infrastructure is projected to exist, evidence shows that efficiency gains from new technologies can be severely undermined without behavioural incentives to utilise them in resource optimising ways. These risks are often excluded from projections around efficiency gains from technology.

A policy framework is required that can engage the whole of society in the challenging transition to a low-carbon future without undermining public/political support for ambitious carbon budgets. Extensive research, summarised in [this paper](#), evidences that TEQs (Tradable Energy Quotas) could be an appropriate framework, providing a clear, stable direction of travel for businesses, Local Authorities, citizens and the whole economy, that encourages collaboration and creative solutions with a view to the long-term. [1]

Reference:

[1] Chamberlin S, Maxey L, Hurth V. Reconciling scientific reality with realpolitik: moving beyond carbon pricing to TEQs—an integrated, economy-wide emissions cap. *Carbon Management* (2015).
DOI: 10.1080/17583004.2015.1021563

Question 7 *Is there evidence to suggest that actions to further reduce emissions after 2032 are likely to be more or less challenging to achieve than actions in the period up to 2032?*

ANSWER:

Question 8 *Are there alternatives for closing the 'policy gap' to the fourth carbon budget that could be more effective? What evidence supports that?*

ANSWER: The TEQs (Tradable Energy Quotas) framework is an alternative policy framework that could enhance the effectiveness of current policy and benefit the public/political acceptability of more ambitious carbon budgets. See the recent

paper 'Reconciling scientific reality with realpolitik: moving beyond carbon pricing to TEQs', which explains the scheme and its importance, referencing the extensive research that has been conducted into it. [1]

Reference:

[1] Chamberlin S, Maxey L, Hurth V. Reconciling scientific reality with realpolitik: moving beyond carbon pricing to TEQs—an integrated, economy-wide emissions cap. *Carbon Management* (2015).

DOI: 10.1080/17583004.2015.1021563

Question 9 *Are the investments envisaged in the National Infrastructure Plan consistent with meeting legislated carbon budgets and following the cost-effective path to the 2050 target? Would they have wider implications for global emissions and the UK's position in international climate negotiations?*

ANSWER:

C. Budgets and action

The UK's statutory 2050 target requires actions across the economy to reduce emissions. Many of these actions will be driven by (UK and devolved) Government policy and implemented by businesses and consumers. There will be an important role for Local Authorities in successful delivery.

Although the carbon budgets do not require specific actions, they provide an important indication of the overall direction that policy will take in future. Once set, carbon budgets can only be changed if there has been a significant change in the relevant circumstances set out in the Climate Change Act.

Feedback from businesses as part of the Committee's 2013 Call for Evidence for the review of the fourth carbon budget was that stability is an important and valuable characteristic of carbon budgets.

Question 10 *As a business, as a Local Authority, or as a consumer, how do carbon budgets affect your planning and decision-making?*

ANSWER: See answer to Q6 above.

Question 11 *What challenges and opportunities do carbon budgets bring, including in relation to your ability to compete internationally? What evidence do you have for this from your experience of carbon budgets to date?*

ANSWER:

Question 12 *What would you consider to be important characteristics of an effective carbon budget? What is the evidence for their importance?*

ANSWER: The key challenge for any effective carbon budget is to ensure emissions reductions in line with climate science while remaining politically sustainable. [This recent academic paper](#) examines this challenge and concludes in support of the TEQs (Tradable Energy Quotas) framework as our best chance for reconciling scientific reality with political realities. [1]

Reference:

[1] Chamberlin S, Maxey L, Hurth V. Reconciling scientific reality with realpolitik: moving beyond carbon pricing to TEQs—an integrated, economy-wide emissions cap. *Carbon Management* (2015).
DOI: 10.1080/17583004.2015.1021563

D. Other issues

The Climate Change Act requires that in designing the fifth carbon budget we consider impacts on competitiveness, fiscal circumstances, fuel poverty and security of energy supply, as well as differences in circumstances between UK nations. High-level conclusions on these from our advice on the fourth carbon budget were:

- **Competitiveness** risks for energy-intensive industries over the period to 2020 can be addressed under policies already announced by the Government. Incremental impacts of the fourth carbon budget are limited and manageable.
- **Fiscal impacts.** The order of magnitude of any fiscal impacts through the 2020s is likely to be small, and with adjusted VED banding and full auctioning of EU ETS allowances could be neutral or broadly positive.

- **Fuel poverty.** Energy policies are likely to have broadly neutral impacts on fuel poverty to 2020, with the impact of increases in electricity prices due to investment in low-carbon generation being offset by energy efficiency improvement delivered under the Energy Company Obligation. Incremental impacts through the 2020s are likely to be limited and manageable through a combination of further energy efficiency improvement, and possible income transfers or social tariffs.
- **Security of supply** risks due to increasing levels of intermittent power generation through the 2020s can be managed through a range of flexibility options including demand-side response, increased interconnection and flexible generation. Decarbonisation of the economy will reduce the reliance on fossil fuels through the 2020s and thus help mitigate any geopolitical risks of fuel supply interruption and price volatility.
- **Devolved administrations.** Significant abatement opportunities exist at the national level across all of the key options (i.e. renewable electricity, energy efficiency, low-carbon heat, more carbon-efficient vehicles, agriculture and land use).

Question 13 *What evidence should the Committee draw on in assessing the (incremental) impacts of the fifth carbon budget on competitiveness, the fiscal balance, fuel poverty and security of supply?*

ANSWER: See Q12 above, with particular regard to fuel poverty.

Question 14 *What new evidence exists on differences in circumstances between England, Wales, Scotland and Northern Ireland that should be reflected in the Committee's advice on the fifth carbon budget?*

ANSWER:

Question 15 *Is there anything else not covered in your answers to previous questions that you would like to add?*

ANSWER: It is important to be aware of not only the benefits but also the limitations of carbon pricing as a framework for a task as demanding as stimulating the ambitious socio-technical transitions necessary to rapidly limit emissions. These limitations, and an alternative, complementary framework are explored in the below-referenced paper. [1]

Reference:

[1] Chamberlin S, Maxey L, Hurth V. Reconciling scientific reality with realpolitik: moving beyond carbon pricing to TEQs—an integrated, economy-wide emissions cap. *Carbon Management* (2015).
DOI: 10.1080/17583004.2015.1021563