

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:

The contributions of the three IPCC working groups to the Fifth Assessment Report all had cut-off dates that mean some aspects of their reviews of the research literature are no longer up-to-date. In particular, since the cut-off date for the contribution of Working Group I, several studies have been published suggesting that the land-based ice sheets in West Antarctica and Greenland may be less stable than previously thought. The Committee should ensure that it takes account of the most up-to-date research on this and other important issues.

In addition, the IPCC Fifth Assessment Report did not distinguish clearly between pathways consistent with the international target of limiting global warming to no more than 2°C above its pre-industrial level with respect to assumptions about significant use of negative emissions technology. However, the United Nations Environment Programme (2014) did make a distinction and found, for instance, that the pathways that do not assume significant use of negative emissions technology typically have much lower values for 2030 than those that do. The Committee should take into account both sets of pathways when considering the UK's fifth carbon budget, and should be explicit about the different implications of these two sets of pathways for the UK's contribution towards global efforts to avoid dangerous global warming.

Reference

United Nations Environment Programme, 2014. *The Emissions Gap Report 2014*. Nairobi, Kenya. Available at:

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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:

Key points:

The emissions reduction target and reform of the European Union emissions trading system (EU ETS) proposed by the EU 2030 package are encouraging. Research by the Grantham Research Institute suggests that the package could be strengthened in the following ways:

- The reform of the EU ETS bought forward
- The package should give more explicit support to CCS development and deployment
- The uncertainty around the level of funding that will be made available for low-carbon innovation via the Innovation Fund (NER 400) should be reduced.

Early reform of the EU ETS

Delaying the introduction of a Market Stability Reserve (MSR) for the European Union Emissions Trading System (EU ETS) until 2021 risks undermining investment in clean technology was the key finding of a recent report by a consortium of European research institutes (Climate Strategies, 2015)

The report by finds the European Commission's proposal to retain surplus allowances in a Market Stability Reserve (MSR) is an appropriate response to restore the consistency and credibility of the carbon price. However, the report found that implementing the reform in 2021 as planned will not deliver a carbon

price signal that is compatible with the cheapest route to a 40 per cent emissions reduction target for 2030.

A start 2019 start date now appears likely. This should be welcomed, though a reform of the market starting in 2017 was shown to be the best option in the study.

More explicit support for CCS

CCS is making slow-progress in Europe. The Impact Assessment of the Energy Roadmap 2050 (EC, 2011) assumes between 0.6 and 2.1 per cent of the European Union's electricity generation will be fitted with CCS by 2030. To meet this ambition, action is required to accelerate the development and deployment of CCS technology. The EU 2030 package proposes some helpful measures, such as the reform of the EU ETS and an Innovation Fund, but alone these are insufficient. A clear strategy and stronger policy must be a priority for the European Commission during its current five-year term (Bassi at al., forthcoming).

Reducing the uncertainty of innovation funding

The level of funding that will be available via the Innovation Fund will be dependent on the revenues of EUA auctioning. The variability in the price of EUAs creates uncertainty on the size of funding available. Carbon price movements bear no relation to the socially desirable amount of low-carbon support. The amount of funding should rather depend on some estimates of the total amount of investment required to bring costs down in the timeframe desired.

A better approach to innovation funding would be for revenues ring-fenced from EUA auctioning to contribute towards a fixed-amount fund.

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Bassi, S., Boyd, R., Buckle, S., Fennell, P., Mac Dowell, N., Makuch, Z. and Staffell, I., Forthcoming. Bridging the gap: improving the economic and policy framework for Carbon Capture and Storage in the European Union. Centre for Climate Change Economics and Policy, Grantham Research Institute for Climate Change and the Environment at the London School of Economics and Political Science, and Grantham Institute at Imperial College.

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:

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:

Reducing emissions by 2032 and beyond will affect the structural evolution of the UK and global economy. As technologies and consumers' demand evolve, relative prices will change leading to factor resources being re-deployed to exploit changes in comparative advantage.

Economies with flexible institutions are better able to cope with structural adjustment associated with change, including those with open trade markets, effectively-regulated competition policy and flexible labour markets. Policies that encourage, or at least do not inhibit, the flow of resources from declining and less productive activities to growing and more productive activities are most likely to exploit such global transitions. Aghion et al (2014) argue that once innovation is taken seriously in economic modelling, a whole set of new policy conclusions emerge related to the impact of green innovation on growth.

Many reforms which increase an economy's productivity in the long term can be initially unpopular and blocked by vested interests. Labour market reform, competition policy or trade openness can drive long-term growth, but are often either costly to impose or subject to opposition by special interests in

the short term. The same can be said for many climate change policies.

Yet there remain strategic reasons to support low-carbon investment. The green economy covers several sectors, including transport, energy, buildings, industry and land use. The UK Department for Business Innovation & Skills (2013) values the green market at £3.4 trillion annually worldwide (£128.1bn for the UK).

A key challenge for the UK government would set up the right policy mix to stimulate investment in strategic areas of the economy while facilitating the decarbonisation process. The energy sector will be particularly crucial. The Confederation of British Industry (CBI, 2012) estimates an investment of £150 billion is required in the energy sector over the next 20 years in the UK. Solar photovoltaic and onshore wind technologies are already competitive with gas and coal in a number of global locations, even without a strong carbon price. The likelihood is that the costs of new energy systems, especially for a variety of solar technologies, will fall further, and close the gaps with conventional energy sources, even without the application of a strong carbon price – especially as energy storage and energy distribution technologies improve (see, for example, Bloomberg NEF, 2011; EPIA, 2011). Supporting these sectors will accelerate cost reductions, and in doing so will increase cost-effective opportunities to substitute out of carbon-intensive activities.

The development and deployment of carbon capture and storage is also a priority. Stronger policies are required to accelerate its deployment and better coordination is required at the European level to ensure that Member States are considering CCS as part of their future energy portfolio and that fossil fuel companies make a fair contribution (Bassi et al., forthcoming).

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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:

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 UK could meet its emissions targets more cost effectively by reforming its environmental taxation structure.

The UK has a complex system of energy taxes which affect the business sector. Overlaps between taxes mean that carbon prices are uneven across sectors and fuels, and result in some businesses paying for their greenhouse gas emissions several times over. Merging and simplifying instruments such as the Climate Change Levy, Climate Change Agreements and CRC Energy Efficiency Scheme into a single instrument would improve consistency, while reducing administrative burdens (Bassi et al., 2013b). The new instrument should retain the design of the Climate Change Levy.

Determining the appropriate carbon price for such an instrument is a sensitive issue and, ultimately, a political choice. In principle, there is an argument for aligning the carbon price for businesses towards a single value for all sectors of the economy, whether or not they are covered by the European Union Emissions Trading System (EU ETS), and in line with the overall UK carbon budgets. A reform along these lines could result in higher tax rates for several businesses, and increase fiscal revenues for the Government. There is a case for recycling these additional revenues back to businesses whose international competitiveness would be impacted, provided these can be accurately identified. Compensation options could include lump sum payments or reductions in business taxes. Revenues could also be used to cover the expenditures associated with other climate-related policies, for instance by reducing the burden of the Renewable Obligation, Contracts for Difference or Feed-in Tariffs on energy bills.

Low-carbon innovation also warrants increased public support. Evidence shows that low-carbon patents tend to have particularly broad applications in other areas of the economy (Dechezleprêtre et al., 2013) suggesting that ‘cleantech’ provides broad economic benefits and can create economic growth. Public expenditure on research and development should be increased gradually during the next parliament and accompanied by investment in

education and skills.

References:

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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:

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:

An effective carbon budget should provide a 'long, loud and legal policy framework'. The link between policy certainty and a country performance is well documented in several areas. For instance, evidence shows that environmental policy uncertainty is associated with negative effects at both firm level (lower investment and hiring) and country level (loss of GDP, unemployment) (Baker, 2012). Similarly, the rigour and structure of environmental regulations are proven to have a strong impact on a country's environmental performance (Esty and Porter, 2005).

Long-term certainty: Lack of certainty about the continuing commitment to agreed long-term objectives is the greatest threat to investment in the UK's

low-carbon future. Failing to show clarity and confidence, for instance by being or appearing shaky on climate policy commitments, will damage private sector investment in low-carbon technologies and the prospects for growth (Romani et al., 2011). Analysis by the IEA (2007) indicates that climate policy risks may be brought down to modest levels compared to other risks if policy is set over a sufficiently long timescale into the future. It is important therefore that climate change targets and policies provide long term credible signals, while frequent revisions and weakening of agreed measures (such as changes to the carbon price floor or revisions of the carbon budgets) should be avoided, especially if they are ad hoc. Ideally, institutions should be designed to garner cross-party support.

‘Loud’, ambitious and robust objectives: The Institute supports the Committee on Climate Changes recommendation for a ‘loud’ carbon intensity target for the electricity sector, in the flexible range of 50-100g CO₂/kWh (Bassi et al., 2013) by 2030. Evidence shows that credible early action to set the UK economy on a low carbon trajectory is likely to be cheaper than delay (Aghion et al., 2014); therefore this target should be set no later than 2016.

Legally-binding framework: Legally-binding framework: The UK’s 2008 Climate Change Act (and its associated carbon budgets) is widely praised as a trailblazing piece of legislation. This legislation has inspired other countries to give legal form to their climate change policies, for example Mexico. Thanks to its forward planning it provides certainty and forward guidance to investors. It is important that the body of legislation complementing the Climate Change Act provides a similar level of long-term certainty (see point above), is cost-efficient and effective at implementing the Act’s objectives. The UK currently has 22 pieces of legislation setting up climate change policy mechanisms (for examples, the Climate Change Levy, the Climate Change Agreements, the Carbon Price Floor etc.). This large number of laws corroborates the view that the climate change landscape in the UK is relatively, and perhaps unnecessarily, complex (Bassi et al, 2014). There is therefore scope for streamlining and improving some of the existing pieces of legislation – this is further discussed in question 8.

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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:

The impacts of climate policies – as of economic and structural reform more broadly – are asymmetric. Whereas the costs are immediate, narrowly focused, and often fall upon incumbent firms with vested interests, the benefits typically are thinly spread, and tend to accrue only slowly.

Opposition from firms can be strong, and the lobbying powerful, often accompanied by claims that they risk being put out of business - whether as a result of activity moving elsewhere (e.g. to locations with lax regulations, as with so-called 'carbon leakage' due to differential climate policies), or by additional costs. For some globally traded carbon-intensive sectors these risks are real. However, recent empirical studies of carbon and energy policies – generally focused on the impacts of US and EU policy, including the EU Emissions Trading System – suggest that, whether in terms of carbon leakage, economic growth, employment, or consumer prices, whole-economy impacts have thus far at least generally been very small.

A recent policy paper (Bassi and Zenghelis, 2014) forms part of a broader series of policy papers which explore issues associated with the review of the Fourth Carbon Budget. It found that current policies to tackle climate change by reducing UK annual emissions of greenhouse gases, including the Fourth Carbon Budget for the period 2023-2027, have not damaged the competitiveness of businesses.

A companion paper by Bassi et al. (2014) focuses on what the UK's trading partners are doing in terms of climate change policy and legislation, with the aim of exploring the extent to which the UK can be argued to be acting unilaterally on climate change. The paper finds that the UK is a global leader on climate change policy action, but it is not alone. Rather, it is part of a leading group of nations which are taking policy action on climate change. Also in this group are many of the UK's major trading partners, including France, Germany, Norway, Korea, Mexico and China.

A forthcoming paper by Grover et al (forthcoming) uses the latest National Accounts Supply Use tables to determine what impact a hypothetical carbon price above current levels would have on UK industries, identifying which sectors would be most acutely affected. Once published (June 2015), this information will be sent to the Committee as an addendum to this submission.

In considering how the fifth carbon budget might affect the UK's competitiveness, the Committee should take account of the intended nationally determined contributions which are being submitted by Parties to the United Nations Framework Convention on Climate Change about post 2020 actions, including limits and cuts to annual emissions.

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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:

The fifth carbon budget is likely to be the first carbon budget set in the context of a new global climate agreement, expected to be negotiated in Paris in late 2015. The agreement will be based on countries' Intended Nationally-Determined Contributions (INDCs). It is inevitable that there will be some gap between the collective INDCs pledged by countries for the purpose of the Paris agreement and the emissions reductions needed by 2030 to stay on a plausible 2°C pathway.

This could create political challenges for setting the budget.

The gap identified between aggregate intended contributions and the goal of limiting global warming to no more than 2°C above its pre-industrial level could be addressed through at least four courses of action:

- hard work over the next few months by all countries to find credible ways of achieving bigger emissions reductions which can be included in INDCs to be submitted to the UNFCCC secretariat, and/or achieved through additional efforts by partnerships (e.g. through specific decarbonisation initiatives among willing countries);
- an intensification of efforts to increase investment and innovation, particularly in relation to the development of cities, energy systems and land use, that could help to close the gap between intentions and the goal before and after 2030;
- the creation of a mechanism, to be included in the agreement emerging from COP21 in Paris in December 2015, for countries to review their efforts and to find ways of ramping up the ambition of their emissions reductions by 2030 and beyond; and
- concerted efforts by all countries to build strong and transparent domestic bases for the implementation of their INDCs, setting countries on a path to decarbonisation and enabling them to ramp up their

ambitions.

The INDCs that are submitted in 2015 should be regarded as the starting point, rather than the end point, of what will be delivered by each country. The period following the summit in Paris in December 2015 will be crucial, not just to bridge the gap in 2030 between aggregate intentions and the goal, but also to lay the foundations for even greater action after 2030.

The INDCs put forward by countries in 2015 should be assessed not just on whether they are consistent with the goal of avoiding global warming of more than 2°C, but also on their credibility. In this context, it is also important to note that the contributions and other announcements made by the European Union, United States and China are based on the implementation of existing or planned domestic policies. They have also established legal and administrative structures to deliver their plans, including decisions of the European Council, the powers of the United States Environmental Protection Agency, and China's five-year plans. And they are on target to meet the commitments they made at COP15 in 2009 and COP16 in 2010 to limit their emissions by 2020. For all these reasons, the post-2020 contributions and other announcements made by the European Union, United States and China should be regarded as more credible than they would be in the absence of these factors.

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