

Building a zero-carbon economy – Call for Evidence

Background

On 15 October 2018 the governments of the UK, Scotland and Wales [asked](#) the Committee on Climate Change (CCC) to provide advice on the UK and Devolved Administrations' long-term targets for greenhouse gas emissions and the UK's transition to a net zero-carbon economy. Specifically: when the UK should reach net zero emissions of carbon dioxide and/or greenhouse gases as a contribution to global ambition under the Paris Agreement; if that target should be set now; the implications for emissions in 2050; how such reductions can be achieved; and the costs and benefits involved in comparison to existing targets.

The advice has been requested by the end of March 2019.

The UK's long-term emissions target is currently for at least an 80% reduction in greenhouse gas emissions from 1990 to 2050. It covers all sectors, including international aviation and shipping and is measured on a 'territorial' basis (i.e. based on emissions arising in the UK). On a comparable basis, emissions in 2017 were estimated to be 38% below 1990 levels.

The current target was set in 2008 based on [advice](#) from the Committee. That advice considered that to avoid the worst impacts of climate change, the central expectation of global temperature rise should be limited "to, or close to, 2°C", while the probability of crossing "the extreme danger threshold of 4°C" should be reduced to an extremely low level. That meant global emissions would roughly have to halve by 2050. The 2008 advice made the assumption that the UK should not plan to have a higher level of per capita emissions in 2050 than the global average.

The long-term target guides the setting of carbon budgets (sequential five-year caps on emissions that currently extend to 2032 and require a reduction in emissions of 57% from 1990 to 2030). 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](#)).

Any change to the long-term targets would therefore be expected to have significant implications, not just in the long-term but on current policies to drive the transition.

The CCC will advise based on a thorough consideration of the relevant evidence. We expect that to cover:

- The latest climate science, including as contained in the [IPCC Special Report on 1.5°C](#).
- The terms of the [Paris Agreement](#).
- Global pathways (including those reported by the IPCC) consistent with limiting global average temperature rise in line with the goals of the Paris Agreement.

- International circumstances, including existing plans and commitments to cut emissions in other countries, actions to deliver on those plans and opportunities for going further.
- An updated assessment of the current and potential options for deep emissions reductions in the UK and emissions removals from the atmosphere, including options for going beyond the current 80% target towards net zero.
- An appraisal of the costs, risks and opportunities from setting a tighter long-term target.
- The actions needed in the near term that would be consistent with achieving the long-term targets.

This Call for Evidence will contribute to that advice.

Responding to the Call for Evidence

We encourage responses that are brief and to the point (i.e. a maximum of 400 words per question, plus links to supporting evidence, answering only those questions where you have particular expertise), and may follow up for more detail where appropriate.

You do not need to answer all the questions, please answer only those questions where you have specific expertise and evidence to share. It would be useful if you could use the question and response form below and then e-mail your response to: communications@theccc.gsi.gov.uk using the subject line: 'Zero carbon economy – Call for evidence'. Alternatively, you can complete the question and answer form on the CCC website, available [here](#).

If you would prefer to post your response, please send it to:

The Committee on Climate Change – Call for Evidence
7 Holbein Place
London
SW1W 8NR

The deadline for responses is 12 noon on Friday 7 December 2018.

Confidentiality and data protection

Responses will be published on our website after the response deadline, along with a list of names or organisations that responded to the Call for Evidence.

If you want information that you provide to be treated as confidential (and not automatically published) please say so clearly in writing when you send your response to the consultation. It would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded by us as a confidentiality request.

All information provided in response to this consultation, including personal information, may be subject to publication or disclosure in accordance with the access to information legislation (primarily the Freedom of Information Act 2000, the Data Protection Act 1998 and the Environmental Information Regulations 2004).

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.

Part 1: Climate Science

Question 1 (Climate Science): The IPCC's Fifth Assessment Report and the Special Report on 1.5°C will form an important part 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:

Question 2 (CO₂ and GHGs): Carbon dioxide and other greenhouse gas gases have different effects and lifetimes in the atmosphere, which may become more important as emissions approach net-zero. In setting a net-zero target, how should the different gases be treated?

ANSWER:

Part 2: International Action

Question 3 (Effort share): What evidence should be considered in assessing the UK's appropriate contribution to global temperature goals? Within this, how should this contribution reflect the UK's broader carbon footprint (i.e. 'consumption' emissions accounting, including emissions embodied in imports to the UK) alongside 'territorial' emissions arising in the UK?

ANSWER:

Question 4 (International collaboration): Beyond setting and meeting its own targets, how can the UK best support efforts to cut emissions elsewhere in the world through international collaboration (e.g. emissions trading schemes and other initiatives with partner countries, technology transfer, capacity building, climate finance)? What efforts are effective currently?

ANSWER: Given how carbon and, to a lesser extent, resource use are measured at an international level – namely that countries are only held accountable for the emissions and extraction that occur within their borders – the UK could have a large impact on emissions that occur in other countries through greater resource efficiency domestically.

The Centre for Industrial Energy, Materials and Products (CIEMAP) has shown in a report for Defra that, of the roughly one billion tonnes of raw materials used throughout the global supply chains that meet final UK demand, more than 80 per cent are sourced outside the UK. An increasing share is coming from places like India and China.¹

These materials and the resulting products are associated with considerable carbon

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emissions. A joint report with Green Alliance, *Less in, more out*, for instance, calculated the carbon savings that could be achieved through resource efficiency in five key sectors: construction, vehicles, food and drink, electronics and appliances and clothing and textiles. The report focused on the impact of resource efficiency on domestic carbon budgets and found that, by 2032, resource efficiency measures in those sectors could save nearly 200MtCO₂e in the UK. Given the international nature of supply chains, resource efficiency in the UK would result in at least the same amount of carbon savings abroad, as well.²

1. CIEMAP, August 2018, *Resource efficiency metrics – initial findings*, http://sciencesearch.defra.gov.uk/Document.aspx?Document=14321_ResourceEfficiencyMetrics.pdf
2. Green Alliance and CIEMAP, May 2018, *Less in, more out*, https://www.green-alliance.org.uk/less_in_more_out.php

Working down supply chains via a carbon consumption lens may provide a new tool to support traditional climate finance, capacity building, and technology transfer strategies.

Question 5 (Carbon credits): Is an effective global market in carbon credits likely to develop that can support action in developing countries? Subject to these developments, should credit purchase be required/expected/allowed in the UK's long-term targets?

ANSWER:

Part 3: Reducing emissions

Question 6 (Hard-to-reduce sectors): Previous CCC analysis has identified aviation, agriculture and industry as sectors where it will be particularly hard to reduce emissions to close to zero, potentially alongside some hard-to-treat buildings. Through both low-carbon technologies and behaviour change, how can emissions be reduced to close to zero in these sectors? What risks are there that broader technological developments or social trends act to increase emissions that are hard to eliminate?

ANSWER: Improving how products are made and used could have a major effect on their embodied emissions and help decarbonise difficult sectors. In the manufacturing and construction industries, a number of factors could reduce emissions, including: designing products and building to use less material, more efficient supply chains, longer lasting products, and increased product reuse and sharing. Research by CIEMAP and Green Alliance, shows that action across just five sectors – construction, vehicles, food and drink, electronics and appliances and clothing and textiles – would reduce the carbon overshoot in the fourth carbon budget completely and in the fifth by at least 79 per cent. This could be an important step towards achieving net zero, especially in these hard to reduce sectors.

Looking at construction in particular, the industry has succeeded in reducing operational emissions by 32 per cent since 1990, but in the same time there has only been a six per

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cent decrease in the embodied emissions associated with constructing and disposing of buildings. The CIEMAP research showed that three techniques could have a large impact: reducing material inputs through design optimisation, increasing the reuse of construction material – especially high carbon material like structural steel – and substituting low carbon materials for high carbon materials wherever appropriate. Doing this across the UK construction sector would reduce emissions by 79.14 MtCO₂e between 2023 and 2032.¹

Looking at evidence from beyond the UK, similar analysis by ECF and Material Economics suggests that pursuing resource efficiency and circular economy strategies can more than halve carbon emissions from hard-to-treat sectors, significantly reducing the need for more expensive mitigation measures like CCS.²

1. Green Alliance and CIEMAP, May 2018, *Less in, more out*, https://www.green-alliance.org.uk/less_in_more_out.php
2. <https://europeanclimate.org/wp-content/uploads/2018/06/MATERIAL-ECONOMICS-CIRCULAR-ECONOMY-WEBB-SMALL2.pdf>

Question 7 (Greenhouse gas removals): Not all sources of emissions can be reduced to zero. How far can greenhouse gas removal from the atmosphere, in the UK or internationally, be used to offset any remaining emissions, both prior to 2050 and beyond?

ANSWER: Drawing on the Royal Society's work on greenhouse gas removal, Green Alliance analysed what the UK could do to get on track (by 2032) to achieving a net zero economy before 2050. The analysis found that GGR from habitat restoration, soil carbon sequestration, and afforestation could sequester between 36-93MtCO₂e by 2032.

1. [https://www.green-alliance.org.uk/resources/How the UK can stop contributing to climate change.pdf](https://www.green-alliance.org.uk/resources/How_the_UK_can_stop_contributing_to_climate_change.pdf)

Question 8 (Technology and Innovation): How will global deployment of low-carbon technologies drive innovation and cost reduction? Could a tighter long-term emissions target for the UK, supported by targeted innovation policies, drive significantly increased innovation in technologies to reduce or remove emissions?

ANSWER: Yes. In particular, Green Alliance has identified a 2030 phase out of petrol and diesel vehicles (and shift to EVs), resource productivity (as explained above), and innovation in building efficiency (Green Alliance analysis forthcoming) as opportunities to decarbonise more rapidly. Taken together, these three approaches could save and additional 285MtCO₂e over the course of the 5th carbon budget period.

1. [https://www.green-alliance.org.uk/resources/How the UK can stop contributing to climate change.pdf](https://www.green-alliance.org.uk/resources/How_the_UK_can_stop_contributing_to_climate_change.pdf)

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2. Green Alliance, *Reinventing Retrofit* (forthcoming)

Question 9 (Behaviour change): How far can people's behaviours and decisions change over time in a way that will reduce emissions, within a supportive policy environment and sustained global effort to tackle climate change?

ANSWER: Policies around energy and resource efficiency that are adopted by businesses and the government have to be designed to be acceptable to the public. Green Alliance's joint report with CIEMAP *By popular demand* found that across the board the public recognised the need for a more resource efficient economy. Nearly 90 per cent of people surveyed said that there was a strong or very strong need to shift towards a society that uses resources more efficiently, while on 0.4 per cent said that there was no need at all. However, some policies are currently more popular than others as they better match people's values and expectations. Policies that are currently popular offer considerable carbon savings: Encouraging the design of resource efficient products could reduce the embodied emissions of products by nearly 20 per cent. This saving could rise to nearly 40 per cent if used in combination with policies that extend product lifetimes and encourage product sharing.

Much more radical lifestyle changes are likely to be needed to achieve net zero than the small 'nudges', like reducing plastic bag use, that have been successful so far. *By popular demand* found that, while 60 per cent of those surveyed said they would support a drastic shift towards resource efficiency even if it would change their own lifestyle, not all radical changes are currently palatable to the public. Material allowances, for instance, were only supported by 30 per cent of people surveyed, although 48 per cent of people said they would be in favour of material or carbon based taxes to replace VAT.¹

1. Green Alliance. November 2018, *By popular demand*, https://www.green-alliance.org.uk/by_popular_demand.php

Question 10 (Policy): Including the role for government policy, how can the required changes be delivered to meet a net-zero target (or tightened 2050 targets) in the UK?

ANSWER: The UK can get on track to net zero emissions in line with its Paris agreement commitments, by either 2050 or 2045. Our analysis shows what this would mean for activity before 2032, the end of the 5th carbon budget.

The UK could do this via four straightforward policies:

1. making all new car and van sales electric or plug-in hybrid by 2030
 - In July 2017, the UK announced it would ban sales of diesel and petrol vehicles by 2040. However, electric vehicles (EVs) are now cheaper than conventional vehicles on a total cost of ownership basis. So, EVs could be deployed more rapidly than originally planned.

Question 10 (Policy): Including the role for government policy, how can the required changes be delivered to meet a net-zero target (or tightened 2050 targets) in the UK?

- Our analysis shows that bringing forward the 2040 ban to 2030 would result in -42MtCO₂e by the 4th carbon budget and -98MtCO₂e by the 5th.¹
- 2. upgrading all homes to meet EPC C levels of efficiency by 2035
 - Verco and Cambridge Econometrics have modelled that this would results in -66MtCO₂e by the 4th carbon budget and -96MtCO₂e by the 5th.²
- 3. adopting 'best practice' resource efficiency in industry
 - Designing products and buildings to use less material, and encouraging more efficient supply chains, longer lasting products, and increased product reuse and sharing would reduce the carbon overshoot in future carbon budgets by -67MtCO₂e by the 4th carbon budget and -92MtCO₂e by the 5th.³ These savings are associated with specific resource efficiency measures modelled in just five key sectors. There would likely be additional measures that could be implemented even within the sectors modelled and would certainly be additional resource efficiency opportunities in other sectors.
- 4. returning to 1970s levels of afforestation alongside habitat restoration and farm payments for soil carbon sequestration.
 - These approaches could sequester between 36 and 93 MtCO₂e over the 5th carbon budget period.

These policies fit well with the UK's existing climate narrative: they would increase economic growth, pay for themselves, require limited industrial and behavioural change are supported by many businesses. They are also readily achievable, and require only limited, incremental changes to existing government policies. Action in the four areas we have outlined would put the UK on track to reach net zero emissions before 2050, using existing technology and business models.

1. Green Alliance, March 2018, *How the UK can lead the electric vehicle revolution*, https://www.green-alliance.org.uk/How_the_UK_can_lead_the_electric_vehicle_revolution.php and Vivid Economics for WWF, March 2018, *Accelerating the EV transition*, <https://www.wwf.org.uk/sites/default/files/2018-03/Final%20-%20WWF%20-%20accelerating%20the%20EV%20transition%20-%20part%201.pdf>
2. Verco and Cambridge Econometrics, October 2014, *Building the Future: The economic and fiscal impacts of making homes energy efficient*, <http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf>
3. Green Alliance and CIEMAP, May 2018, *Less in, more out*, https://www.green-alliance.org.uk/less_in_more_out.php

Part 4: Costs, risks and opportunities

Question 11 (Costs, risks and opportunities): How would the costs, risks and economic opportunities associated with cutting emissions change should tighter UK targets be set, especially where these are set at the limits of known technological achievability?

ANSWER: Overall, not beginning to cut emissions at the required rate now would mean a 70-120 per cent increase in effort in the 2030s and 2040s in order to reach net zero by 2045 or 2050. By contrast, lowering emissions now would make ending the UK's contribution to climate change by 2050 achievable, using policy that is both attractive and implementable today.

In terms of increased industrial efficiency there would be side effects that would reduce the costs associated with cutting emissions, by raising economic productivity in the UK's lagging manufacturing regions¹.

The UK could also benefit massively from increased electric vehicles production, the UK is the best placed country in Europe to move rapidly to EVs, with 88% of automotive jobs and value in EV-ready production. It would also reduce the UK's reliance on non-domestic oil, reducing oil imports by half by 2035.²

A comprehensive building retrofit programme would also cut bills by an average of £408 per year, which would raise GDP by 0.6% a year. And Cut UK gas imports by a quarter by 2030.³

1. Green Alliance and CIEMAP, May 2018, *Less in, more out*, https://www.green-alliance.org.uk/less_in_more_out.php
2. Green Alliance, March 2018, *How the UK can lead the electric vehicle revolution*, https://www.green-alliance.org.uk/How_the_UK_can_lead_the_electric_vehicle_revolution.php
3. Verco and Cambridge Econometrics, October 2014, *Building the Future: The economic and fiscal impacts of making homes energy efficient*, <http://www.energybillrevolution.org/wp-content/uploads/2014/10/Building-the-Future-The-Economic-and-Fiscal-impacts-of-making-homes-energy-efficient.pdf>

See also: https://www.green-alliance.org.uk/resources/How_the_UK_can_stop_contributing_to_climate_change.pdf

Question 12 (Avoided climate costs): What evidence is there of differences in climate impacts in the UK from holding the increase in global average temperature to well below 2°C or to 1.5°C?

ANSWER:

Part 5: Devolved Administrations

Question 13 (Devolved Administrations): What differences in circumstances between England, Wales, Scotland and Northern Ireland should be reflected in the Committee's advice on long-term targets for the Devolved Administrations?

ANSWER:

Part 6: CCC Work Plan

Question 14 (Work plan): The areas of evidence the Committee intend to cover are included in the 'Background' section. Are there any other important aspects that should be covered in the Committee's work plan?

ANSWER: