

## 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](mailto: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: No comment.

**Question 2 (CO<sub>2</sub> 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: No comment.

### 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:

Climate change is a global issue so when considering the effort share, account should be taken of the greater unilateral progress the UK has already made in reducing its territorial emissions. It follows that UK manufacturing already takes place in compliance with higher environmental standards and emissions reduction programmes than many competing production locations. It is therefore important to consider how the higher carbon footprint of imported goods is reflected in the UK's consumption emissions. And, alongside this, how future reductions in the UK's territorial emissions can be achieved in a way that does not result in carbon leakage and an increase in UK consumption emissions.

**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:

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One means of bridging the gap and supporting UK competitiveness is via the development of international project credits within the Paris Agreement (that can be used in a UK scheme) that allow cost efficient emission cuts elsewhere in the world through international collaboration. In some parts of the chemical industry, this could provide meaningful, cost efficient reductions that UK businesses would be keen to access to.

**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:

Subject to the availability of credible project credits, the UK's chemical industry would support the use of project credits to satisfy the UK's long-term targets, e.g.: under article 6.4 of the Paris Agreement <sup>(1)</sup>.

This would extend the principle of lowest marginal cost abatement, and provide additional private sector climate funding, to countries which need greater assistance to decarbonise. Greenhouse gas emissions are transboundary, a tonne of emissions saved outside of the UK is equal to a tonne saved within the UK. Allowing the saving to be made elsewhere does not place an unnecessary disadvantage on UK industry in the short-term.

Furthermore, support was given to the use of good quality international carbon credits in the UK's Clean Growth Strategy, where the government stated that they are prepared to use this flexibility to meet our domestic carbon budgets, if this presents better value for UK taxpayers, businesses and domestic consumers. The use of carbon offsets is permitted by the UK's Climate Change Act <sup>(2)</sup>.

(1) The Paris Agreement

[https://unfccc.int/sites/default/files/english\\_paris\\_agreement.pdf](https://unfccc.int/sites/default/files/english_paris_agreement.pdf)

(2) Clean Growth Strategy

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/700496/clean-growth-strategy-correction-april-2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf)

### 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?

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**ANSWER:**

The UK's chemical industry has made significant investments in energy efficiency, and as a result the industry has been able to decouple its energy consumption from its production; improving its energy efficiency by 42% since 1990 under the Climate Change Agreements and reducing its greenhouse gas emissions by more than 70% over the same period.

Furthermore, the chemical industry has a strong contribution to make to carbon reduction as a solution provider for many downstream sectors and end consumers. Chemical products (e.g. insulation, efficient lighting, light-weight materials for transport, advanced materials for renewable electricity technologies to name a few) make substantial contributions to reducing energy demand and emissions across many sectors. An independent study compiling several life-cycle analyses <sup>(1)</sup> showed that for every unit of carbon emitted by our sector, chemical products enabled up to 2 tonnes of equivalent savings downstream.

Energy efficiency actions will allow for incremental improvement and are captured in our decarbonisation action roadmap, agreed with the Government <sup>(2)</sup>. These include: clustering, waste heat recovery, embedded generation, demand side response, energy storage, and further process R&D, many of which require external support. The sector is inherently a high energy user. The key (known) technologies required to completely decarbonise the industry are: 1) roll out of carbon capture, usage and storage; 2) the decarbonisation of electricity and heat. Critically, neither of these solutions are in the power of a chemical company alone to develop and implement.

Our industry also uses energy (e.g. natural gas) as an important feedstock (raw material) for products. Switching to a low-carbon (e.g. biogenic) alternative would require a significant improvement in the cost and availability of technologies and fuel sources. This is further outlined in our decarbonisation action roadmap<sup>(2)</sup>. For industries which use hydrogen-rich feedstock (e.g. ammonia production), recent analysis by the IEA suggested that carbon capture and storage would provide a relatively low-cost option for their decarbonisation <sup>(5)</sup>.

A transition to zero emissions by 2050 will entail significant challenges for the chemical industry: availability, affordability and sustainability of low carbon energy and feedstock; investment in new assets that far exceed the typical level of investments in recent years and; uncompetitive production costs <sup>(4)</sup>. To avoid carbon leakage and the loss of jobs in a foundation manufacturing sector in the UK, we would urge the CCC to bear in mind the following studies when making their recommendation to the UK government.

(1) Chemical sector delivering a low carbon future:

[https://www.cia.org.uk/Portals/0/Documents/Publications/Low%20carbon%20brochure\\_2015\\_MR.PDF?ver=2017-01-09-143808-563](https://www.cia.org.uk/Portals/0/Documents/Publications/Low%20carbon%20brochure_2015_MR.PDF?ver=2017-01-09-143808-563)

(2) Chemical sector decarbonisation action roadmap:

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/651230/chemicals-decarbonisation-action-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/651230/chemicals-decarbonisation-action-plan.pdf)

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(3) Chemical sector decarbonisation and energy efficiency roadmap:

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/416669/Chemicals\\_Report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/416669/Chemicals_Report.pdf)

(4) DECHEMA's study on achieving a carbon neutral chemical sector by 2050:

[https://dechema.de/dechema\\_media/Downloads/Positionspapiere/Technology\\_study\\_Low\\_carbon\\_energy\\_and\\_feedstock\\_for\\_the\\_European\\_chemical\\_industry.pdf](https://dechema.de/dechema_media/Downloads/Positionspapiere/Technology_study_Low_carbon_energy_and_feedstock_for_the_European_chemical_industry.pdf)

(5) BEIS CCUS Action Plan:

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/759637/beis-ccus-action-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/759637/beis-ccus-action-plan.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: No comment.

**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:

A tighter long-term emissions target for the UK would only drive technological innovation in sectors which are not highly exposed to international competition. In the chemicals sector, economically unachievable targets risk sending production overseas, to countries with less stringent pollution standards, at a loss to our economy. If the UK market continued to demand the same products, then our emissions footprint.

We support the Clean Growth Strategy's (CGS) cost-effective approach to decarbonisation. As a sector which is an established climate change solution enabler, and is also energy intensive, we welcomed the strategy's dual focus on low carbon opportunities while ensuring affordable and internationally competitive energy. We strongly support increased spending on science research and innovation to address the UK's clean growth challenges. It is critical that low carbon technologies are developed to be cost effective before they are deployed.

We appreciate the funding provided in the CGS for the development and demonstration of CCUS (also an action in the chemical sector decarbonisation plan) and hope that this will help to improve cost effectiveness. With many energy intensive industries (EIs) near or at the limits of abatement on their current processes these technologies could be key to



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minimising competitiveness impacts as climate policies tighten. We also welcome the potential for early support for a regional project under the CCUS Council deployment plan but it is important to recognise that industry alone cannot stand the cost.

We recognise the potential for hydrogen (whether from steam reformation with CCS or electrolysis) and biogas to be mixed into the existing gas network and strongly agree that these need to be tested and to work in a cost comparable basis with existing technologies. As a major user of gas for heat, power and feedstock (raw material) we would underline the need to ensure that any moves to decarbonisation of gas result in supplies which are both affordable and reliable. Furthermore, quality concerns are highly process specific. For example, gas represents ~70% of the variable cost of manufacturing ammonia, and the impact of any changes to its cost would be significant. Furthermore, hydrogen production is a step in the existing ammonia manufacturing process, and so mixing hydrogen into the gas supply would represent an unnecessary duplication of effort. As a consequence, for ammonia production it would be better to continue to supply raw natural gas in its current form, coupled with access to CCS for the CO<sub>2</sub> by-product.. It is important that government and industry work together to develop an understanding of the likely capital and operating cost of gas quality changes, for this and other chemical uses of gas whether as a fuel or a feedstock.

Electricity generation – we generally support moves to further reduce the costs of low carbon generation including nuclear and wind. As with heat, this needs to result in supplies which are affordable and reliable. We would encourage the government to work towards the development and implementation of Dieter Helm's recommendations which we believe provide a robust framework for the cost-effective delivery low carbon electricity.

(1) Clean Growth Strategy

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/700496/clean-growth-strategy-correction-april-2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf)

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[https://dechema.de/dechema\\_media/Downloads/Positionspapiere/Technology\\_study\\_Low\\_carbon\\_energy\\_and\\_feedstock\\_for\\_the\\_European\\_chemical\\_industry.pdf](https://dechema.de/dechema_media/Downloads/Positionspapiere/Technology_study_Low_carbon_energy_and_feedstock_for_the_European_chemical_industry.pdf)

**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: No comment.

**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:

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Dieter Helm's independent review of the cost of energy for BEIS was published in November 2017. It is cited in the Industrial Strategy and Clean Growth Plan as an opportunity to reduce business energy costs. It makes a series of far reaching recommendations for continued progress towards secure low carbon electricity. These recommendations centre on replacing the raft of support mechanisms and regulatory interventions and exempting industry from legacy costs. In their place Helm proposes more economically efficient approaches including carbon pricing and procurement of electricity network investments by independent system operators.

- (1) Cost of Energy Review – Dieter Helm  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/654902/Cost\\_of\\_Energy\\_Review.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/654902/Cost_of_Energy_Review.pdf)

#### 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:

If the UK goes beyond 80% reduction (and even to achieve 80%) we must safeguard UK competitiveness. In particular, for industries which compete in a global market and face comparatively higher domestic compliance costs.

Our member companies are currently facing a perfect storm of high gas, electricity and carbon prices, in addition to the significant uncertainty and potential cost impacts of Brexit. This year global oil and gas prices doubled, affecting UK energy prices via gas imports. EU carbon prices trebled, adding to the UK-only Carbon Price Support tax and electricity costs. Electricity prices were already 80s% above the EU median due to climate policy and network costs, whilst those network costs have risen under RII01 price controls and will rise further post-2020 under RII02.

All of these factors reduce the return on investment in UK chemical manufacturing, making it more likely that investment will go elsewhere. Any tighter targets must be considered in light of real (not displaced) emission savings and what is technically and economically achievable. The UK's ambition for emission reduction must be matched by its ambition to protect industry from those not taking action, and to support industry to decarbonise affordably.

**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: No comment.

#### 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: No comment.

## **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: No comment.