

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?

No response

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?

Efforts on nitrogen – unlike broader climate change issues – are disjointed. The existing regulation through the EU Nitrates Directive is focussed on human health impacts of nitrates in drinking water, delivered to the farming and land use sector through Nitrate Vulnerable Zones. This has acted as a proxy regulatory framework for the broader impacts of nitrogen surplus as both an air pollutant (ammonia) and a greenhouse gas (nitrous oxide).

The volatility and persistence of nitrous oxide as a greenhouse gas requires special attention if we are to meet our long-term climate ambitions. Restrictions through the Nitrates Directive do not consider the emissions impact of synthetic nitrogen-based fertilisers – which have a double emissions burden, in production stage and in run-off / oxidisation. Government should consider restrictions on nitrogen fertilisers from both a public environmental health and a climate perspective. This could be achieved through taxation and/or targets, following the lead of the Scottish Government in the recent [Climate Change Plan](#) which committed to developing 'a SMART (specific, measurable, achievable, relevant and time bound) target for reducing Scotland's emissions from nitrogen fertiliser'.

There is also an inverse relationship between artificial nitrogen inputs and soil carbon sequestration: the more farmers rely on artificial nitrogen fertilisers, the less incentive they have to invest in a healthy soil ecosystem to feed their crops, and the less organic matter they put back into the soil.

We welcome government proposals under the clean air strategy for maximum nitrogen limits, with specialist recommendations on the issue due in November 2019. However, this set of recommendations should be broadened to address the wider environmental and emissions implications of nitrogen pollution.

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?

The UK's broader 'off-shored' carbon footprint must be factored into the overall emissions accounting.

Taking the UK food sector as an example, it is a net-importing sector. The Food Climate Research Network has estimated that [food & farming accounts for 20% of UK emissions](#) once the embedded emissions associated with land use change from imported food are taken into account. Imported plant proteins to feed UK intensive livestock operations are a [well-known driver of deforestation](#), soil erosion and land use change. High meat and livestock product consumption in the UK must be considered a significant driver of these global emission burdens. By not taking non-territorial emissions into account for food and farming we are simultaneously facilitating deforestation and undermining the chances of domestic farmers with higher standards to compete with less regulated imports.

We have concern that the most recent CCC report on UK land use proposes a 50% reduction in beef, lamb and dairy consumption and a 25% increase in pork and poultry consumption. The rationale behind a move to pork and poultry protein from ruminant proteins overlooks the embedded environmental impacts of these systems. Pigs and poultry, though responsible for fewer direct emissions than ruminants, have a greater dependence on concentrated feed than pasture-reared cattle and sheep. We welcome the Committee's commitment to further Life Cycle Analysis on the climate impacts of pork and poultry, taking account of their feed, next year. We would advocate for 'less but better meat' involving a reduction in consumption of all meat types, but particularly white meat from intensive chicken and pig systems, which are systems requiring routine use of antibiotics leading to antimicrobial resistance.

UK and EU trade policy must account for embedded emissions of food and agricultural products. There are various legislative areas through which this could be tackled, including the Trade Bill, the Agriculture Bill and the Environment Bill. Ensuring a truly traceable food supply chain will be essential in meeting this goal.

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?

As mentioned above, the UK consumer market is currently a driver of deforestation and associated land use change emissions. Reducing the drivers for this must be a top priority for the UK food sector to become more sustainable. This would include reduced meat consumption, more domestic and traceable commodities, greater transparency and certainty in supply chains, and global commitments and alliances.

Organic standards offer a comprehensive benchmark for international equivalence and collaboration. One such organic standard is to protect 'high conservation value' (HCV) habitats: the regulation demands that no organic products can be produced on HCV land cleared after 2007. The Leading Organic Alliance is a European group of organic organisations with the highest standards, and works internationally to exchange best

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practice in farming, certification and advocacy. Demands for deforestation-free supply chains could be set by government policy and could be considered part of their broader commitment to reducing habitat destruction and contributing to global climate change mitigation.

Corporate agreements can be useful vehicles for change; for example, the Marine Stewardship Council has succeeded in promoting sustainably sourced fish, other collaborations such as the Consumer Goods Forum have progressed environmental sustainability in food supply chains. Whilst Governments can learn lessons from these corporate agreements they must recognise their limits and not rely on them for delivering climate targets. Governments have a vital role setting a robust regulatory and market framework for meeting climate aims through the economy and ensuring corporate actors prioritise these.

The UK international aid budget should set specific aims to deliver against global climate agreements, such as the Paris Climate Accord and the Sustainable Development Goals. Agroecology is a crucial tool for improving soil health and carbon sequestration globally, contributing to both climate change mitigation and adaptation. [Support for agroecological food production](#) should be front and centre of any Government spending on low-carbon land use internationally. This should follow the ambitions laid in the 25 Year Environment Plan which commits Government to *“Provide international leadership and lead by example in tackling climate change and protecting and improving international biodiversity”* and *“Support and protect international forests and sustainable agriculture.”*

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?

No response

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?

Farming is both a sink and source of GHG emissions. Currently the GHG inventory makes a distinction between agriculture and land use/land use change/forestry, which may be problematic if it means farmers cannot take credit for carbon sequestration via peatland restoration or agroforestry within an agricultural holding. If it is to have the desired impact on a hard-to-reduce sector such as agriculture, the inventory must reflect a more accurate picture of the impact of the agriculture sector, signpost opportunities for policy and payment, and incentivise adaptation and better practice.

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Achieving a net-zero target for the UK agriculture sector will be challenging but the evidence suggests it is achievable by 2050 through a combination of system change towards agroecological/organic farming, dietary change and integrated land use solutions like agroforestry. We recommend scrutiny of the [IDDRl Ten Years for Agroecology in Europe report](#) which models a pathway to normalising agroecological farming in Europe that would result in 40% agricultural GHG reductions and significant soil and biodiversity restoration; although there was a projected 35% drop in overall production (mostly cereals) this was consistent with feeding Europeans healthily and maintaining export capacity. Currently a high proportion of cereals are used inefficiently as animal feed in intensive livestock systems or as ingredients of processed food. The policy response to the global epidemic of diet-related disease is highly relevant to modelling the future requirements for food production.

Addressing demand across all sectors is imperative to meeting our climate targets. Reducing demand for meat and dairy products should be central to any Government targets on agriculture and land use. The demands of other sectors – such as aviation – through biofuel strategies must be treated with caution. Any policies to incentivise a shift towards biofuels must be put in the broader land use context; they must address the knock-on effect for food supply along with capability of the farming and land use sector to meet its broader aims.

We welcome the update to the ghg inventory to be more specific to, for example region and soil type and recognise that this update will be implemented in the CCC's 2019 reporting to government. Considering the significance of the most recent report on UK land use for the food and farming sector, we suggest that these findings are updated in line with the new, more detailed data set in 2019 and targets are adjusted accordingly.

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?

Soil holds more carbon globally than all the forests and atmosphere combined. However, soils in the UK and globally have their functionality severely impaired, with significant impacts on food security, biodiversity and emissions.

Ensuring no further loss of soil carbon must be a top priority in reducing emissions and we must act to restore soil health to support its capacity to sequester carbon. To get there requires rapid action to restore high-carbon peat soils in both the uplands and lowlands. We welcome the recent Government commitment to address the complexities of lowland peat through the Defra lowland peat taskforce. Ambitious and rapid efforts to address emissions from peat soils should be clearly defined in the forthcoming English Peat Strategy. These should consider the role of organic and low-impact farming techniques to restore lowland peat while maintaining productivity.

Building soil organic matter is the clearest and most easily applied method on-farm to achieve huge gains in carbon sequestration. As highlighted by the Paris Climate Accord,

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increasing soil organic matter (or carbon stocks) by 0.4% per year globally would halt the increase in the CO₂ concentration in the atmosphere related to human activities. Though the potential to achieve such gains remains contested, we do know that soil organic matter can be built by on average 20% in 20 years under organic farming systems in north-west Europe; it also has the benefit of keeping the land under productive agriculture while sequestering carbon. We need to support the systems that we know build soil carbon and support soil health such as agroecology, agroforestry, and closed-loop systems such as organic. Normalising organic and agroecological farming methods that sequester carbon and supporting more widespread conversion to organic agriculture should be top priorities in the CCC's recommendations for reaching net-zero by 2050.

As part of their review on greenhouse gas removal to meet net-zero by 2050, the Royal Society propose a [rapid ramp up of soil carbon sequestration and afforestation](#) as their key action. When set alongside technological approaches to carbon capture and storage, the immediate readiness of soil carbon sequestration to achieve gains, and its relative low cost, make it a hugely attractive opportunity.

The Agriculture Bill must include soil health as a public good, recognising it as a non-renewable resource that holds the key to capturing huge amounts of atmospheric carbon and to adaptation and the reduction of flood and drought risks. The Agriculture and Environment Bills should set a net zero emissions target for agriculture and targets for carbon storage via increases to soil organic matter which would incentivise a transition to low-carbon, agroecological farming, delivered through whole farm systems such as organic.

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?

Innovation towards meeting our climate goals must be framed as broader than a technological-fix; it must recognise that innovation is happening all the time through farmer-led adaptation to context-specific circumstances. Current farm productivity grants largely focus on infrastructural adaptations so that farmers can adapt to and adopt new technologies. Though infrastructural updates are necessary to meet climate goals, it fails to support small-scale innovations that allow farmers to practically adapt to their specific contexts and work more closely with nature.

The Innovative Farmers Network facilitates farmer-to-farmer learning with the support of agricultural researchers to develop practical solutions to specific challenges farmers face. These 'field labs' are farmer-led and often address efficiency challenges, one such has been around animal protein crops. Most farmers import their protein in feed from international markets, not only making them vulnerable to price volatility but also potentially complicit in habitat destruction and carbon impacts of protein crops grown in less regulated countries. The [lupin 'field lab'](#) shows how adaptation to closed-loop systems that are in the interests of farmers can act as a significant driver of ghg emissions efficiency in agriculture. Support for farmer-led research and innovation should be incentivised to meet our climate commitments for agriculture.

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?

The Government must begin the process of normalising more sustainable diets, diets that include less and better meat and more veg would be promoted by integrating sustainability fully into healthy eating advice to the public, including the Eatwell Guide. This can be achieved by harnessing public procurement policy and the imminent review of School Food Standards to introduce meat-free days and the use of higher quality British meat in schools, hospitals and other public settings.

A more supportive policy environment for climate friendly farming methods would go some way to addressing the emissions impact of UK diets. Support for domestic horticulture production to increase in-line with Public Health England fruit and veg consumption guidelines of 7-a-day would support a transition in land use away from higher impact animal production, making fresh fruit and vegetables more affordable and accessible is a crucial step in achieving low emission agriculture.

To achieve the level of ambition set out in the CCC UK Land Use report will require significant behaviour change at the farmer / land manager level. Farmers are the stewards of the land, getting their buy in for significant changes in land use priorities is essential. Despite immediate financial rewards take up of [agri-environment schemes is low and falling](#) across the UK. There is a failure of policy to see beyond finances address the broader drivers of change, including farm advice, knowledge exchange and the sociological and cultural connections to livelihoods that many farmers hold.

Finding common ground to support farmers to transition to net-zero is essential, and policymakers must look seriously at the multifunctional methods that can keep land in agricultural practice while mitigating agricultural emissions. Any incentives for agroforestry must push the potential to deliver emissions savings alongside supporting, if not increasing, productivity.

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?

There are a vast number of legislative vehicles either in progress or proposed in 2019, these will need to be climate-proofed to include requirements for addressing our international and domestic obligations to reduce emissions.

Policy can, however only achieve so much, Government must also be pro-active in supporting the cultural shift required to deliver against emissions targets. Addressing consumer behaviour requires governmental leadership and facilitating people to transition to renewable energy, reduced meat consumption and decarbonisation of transport will require cultural and economic stimulus, to incentivise change.

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?

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Agriculture is an exceptional sector when it comes to long-term assurance and supportive policy. For the farming sector to make the adaptations required to contribute to the steps to net-zero it will be necessary for a clear long-term policy framework to provide certainty.

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?

Farming systems cannot adapt overnight to the impacts of climate change. The increased volatility of weather events will have huge implications for food and farming supply. Going above 2C will have huge global ramifications, with knock-on impacts for UK food and farming supplies. At home, as was clear in the launch of the UK Climate Projections 2018, we can confidently predict increased chances of drought and flooding with summers up to 57% drier and winters up to 33% wetter by 2070.

It is necessary to have farming systems that are resilient to this future. Multifunctional systems that can sequester carbon, increase the water holding capacity and health of soils and adapt with nature are essential. Organically farmed soils are [proven to be more effective at improving soil health](#), regulating water flow and making water and nutrients available to crops during droughts. Other systems such as agroforestry hold huge potential to maintain farm productivity while enhancing their resilience.

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?

Whatever targets are made all developed nations will need to comply, but devolved administrations should have the powers and funding to do so in a way that reflects specific socio-economic context and natural assets of each nation. Since agriculture and land use policy is devolved, regulation needs to reflect that there is no simple 'policy lever' to pull, however policy flexibility must not be used as a license for inaction by Governments.

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?

No response