Committee on Climate Change

Independent advice to government on building a low-carbon economy and preparing for climate change

The Sixth Carbon Budget and Welsh emissions targets – Call for Evidence

Background to the UK's sixth carbon budget

The UK Government and Parliament have adopted the Committee on Climate Change's (CCC) recommendation to target net-zero emissions of greenhouse gases (GHGs) in the UK by 2050 (i.e. at least a 100% reduction in emissions from 1990).

The Climate Change Act (2008, 'the Act') requires the Committee to provide advice to the Government about the appropriate level for each carbon budget (sequential five-year caps on GHGs) on the path to the long-term target. To date, in line with advice from the Committee, five carbon budgets have been legislated covering the period out to 2032.

The Committee must provide advice on the level of the sixth carbon budget (covering the period from 2033-37) before the end of 2020. The Committee intends to publish its advice early, in September 2020. This advice will set the path to net-zero GHG emissions for the UK, as the first time a carbon budget is set in law following that commitment.

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).

The Act also specifies other factors the Committee must consider in our advice on carbon budgets – the advice should be based on the path to the UK's long-term target objective, consistent with international commitments and take into account considerations such as social circumstances (including fuel poverty), competitiveness, energy security and the Government's fiscal position.

The CCC will advise based on these considerations and a thorough assessment of the relevant evidence. This Call for Evidence will contribute to that advice.

Background to the Welsh third carbon budget and interim targets

Under the Environment (Wales) Act 2016, there is a duty on Welsh Ministers to set a maximum total amount for net Welsh greenhouse gas emissions (Welsh carbon budgets). The first budgetary period is 2016-20, and the remaining budgetary periods are each succeeding period of five years, ending with 2046-50.

The Committee is due to provide advice to the Welsh Government on the level of the third Welsh carbon budget (covering 2026-30) in 2020, and to provide updated advice on the levels of the second carbon budget (2021-25) and the interim targets for 2030 and 2040. Section D of this Call for Evidence (covering questions on Scotland, Wales and Northern Ireland) includes a set of questions to inform the Committee's advice to the Welsh Government.

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Question and answer 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 answers to 400 words per question and provide supporting evidence (e.g. academic literature, market assessments, policy reports, etc.) along with your responses.

A. **Question 33 (Agriculture and Land use):** In Chapter 7 of the Net Zero Technical Report we presented our Further Ambition scenario for agriculture and land use (see page 199). The scenario requires measures to release land currently used for food production for other uses, whilst maintaining current per-capita food production. This is achieved through:

- A 20% reduction in consumption of red meat and dairy
- A 20% reduction in food waste by 2025
- Moving 10% of horticulture indoors
- An increase in agriculture productivity:

- ANSWER: We have to look beyond redistribution of 'business as usual':

Nitrate concentrations in aquifers represent an emerging liability for indirect emissions of N_2O Ascott et al., (2017). The IPCC Tier-1 default for N_2O emissions (combined *indirect* and *direct*) is increasingly shown to be a gross underestimate, with accelerating N_2O emissions worldwide (Thompson et al., 2019). Excess nitrate in agriculture is the main factor in unnecessary N_2O emissions (Conwan et al., 2020). However, studies overwhelmingly focus on reducing emissions of N_2O *directly* from soils, which enables net increases in emissions from *indirect* sources to go undetected (Lam et al., 2017). Therefore, if reductions in total N_2O are to be achieved, redoubled attention must be given to *indirect* emissions of N_2O, and specifically *leaching of soil nitrate*.

Meanwhile, N_2O emissions from crop-based biofuels undermine their place in the transitional economy (Smith 2017) and food production suffers equivalent emissions. However, potential synergies existing between food and fuel industries are overlooked - such as the use of biofuel co-products to improve the efficiency of soil based systems (Kline et al., 2016). More specifically, unrivalled potential exists for co-products of biodiesel manufacture to be used as a soil treatment to reduce leaching of nitrate from soils (Redmile-Gordon et al., 2014). This was found to be more effective than traditional approaches, and has significant implications for reducing indirect N_2O emissions. This biodiesel co-product was shown to stimulate production of biological binding agents in soil

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(Redmile-Gordon et al., 2015), which have been linked to soil stability, soil health, and productivity (Redmile-Gordon et al., 2020).

Reducing CO2-equivalent emissions of N_2O during our transition to a decrabonised transport sector should be a priority for the biofuel industry. However, legislation does not currently support this behaviour. No mechanism currently exists to provide financial incentives to the biofuel industry for co-products that reduce N2O emissions in agriculture or horticulture: holding back the true mitigation potential. Incentives should thus be applied fuel produced where associated co-product is used to limit losses of nitrate from soils.

I recommend:

1) Identify catchments and crops known to be especially problematic for leaching of nitrate (Environment Agency/Natural England) for subsequent targeted deployment.

2) Invest in research of biodiesel co-products to reduce nitrate leaching and improve soil health.

3) Provide industrial incentives that reward the use of co-products for additional carbon savings of improving soil health and reducing nitrate leaching (*and thereby reducing indirect* N_2O *emissions*).

FINISH

References:

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A. Climate science and international circumstances

Question 3 (b) Are there other actions the UK should be taking alongside setting the sixth carbon budget, and taking the actions necessary to meet it, to support the global effort to implement the Paris Agreement?

ANSWER: Yes. The idiosyncrasies of 'carbon equivalence' need to be made clearer.

Currently it is not well understood that C in the biosphere is not equivalent to C sequestered in fossil fuels. This misunderstanding is perpetuated –or even caused- by (UK) legislation governing the claims that industries (e.g. liquid fossil fuel vendors) *are currently permitted to make to the public.*

Fossil-fuel C is effectively *external* to the biosphere - until burned/mineralised to CO_2: at which point it becomes unstable "biosphere C". Accordingly, 2 different types of 'carbon offset' need to be understood:

TYPE 1 (true offset), where a non-carbon greenhouse gas (GHG) emission is prevented. Example: reducing 1 mol of N_2O emissions ≈ saving of 300 mol CO_2 (excl. residence time adjustment)

TYPE 2, where an equivalent quantity of C is removed from the atmosphere *but not the biosphere.* Example: the importance of 1 mass unit of CO_2-C removed from the atmosphere by photosynthesis is *many orders of magnitude smaller* than the equivalent 1 mass unit of C burned as a fossil fuel.

The magnitude of this imbalance is not widely appreciated. The UK has an opportunity to lead with sales and marketing legislation that prevents the 'greenwash' associated with confusion around "TYPE 2" carbon equivalence. This is only possible through legislation levelling the advertising playing field. One cannot technically, or realistically "offset" the emissions related to fossil fuel combustion (moving unstable C into the biosphere) by planting new trees alone, because C in trees (part of biosphere C) cycles over timescales that are not comparable to the timescales for C storage in fossil fuels left undisturbed.

Question 9: Carbon targets are only credible if they are accompanied by policy action. We set out a range of delivery challenges/priorities for the 2050 net-zero target in our Net Zero advice. What else is important for the period out to 2030/2035?

ANSWER: Nitrate concentrations in aquifers represent an emerging liability for indirect emissions of N_2O Ascott et al., (2017). The IPCC Tier-1 default for N_2O emissions (combined *indirect* and *direct*) is increasingly shown to be a gross underestimate, with accelerating N_2O emissions worldwide (Thompson et al., 2019). Excess nitrate in agriculture is the main factor in unnecessary N_2O emissions (Conwan et al., 2020). However, studies overwhelmingly focus on reducing emissions of N_2O *directly* from soils, which enables net increases in emissions from *indirect* sources to go undetected (Lam et al., 2017). Therefore, if reductions in total N_2O are to be achieved, redoubled attention must be given to *indirect* emissions of N_2O, and specifically *leaching of soil nitrate*.

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