Buildng a zero-carbon economy – Call for Evidence

SUBMISSION to CCC by Richard A Shirres

REVIEW FRAMEWORK TO ASSESS ZERO GHG EMISSIONS' TARGET TO BE SET UNDER THE 2008 CC ACT AND AS PART OF THE UK AMBITION TO SERVE THE PARIS AGREEMENT

The following headers, with reasoned justification, are advocated: these are considerations the CCC needs to examine and address within its process of assessment for setting a Zero Carbon target for the UK. These will be copied to other actors who may exercise oversight of the CCC.

The answers to CCC reply form are contained within the first part of this document and references to the CCC Form are indicated for Parts 1 to 6 at the end.

A. **UK's Historical Role in contributing to Anthropogenic Climate Change to date**
B. **UK Ambition for a Zero Carbon Target to be informed by considerations of Global Equity, & Justice**
C. **UK to aim to remain a world leader on CC given its historical responsibility to date**
D. **The IPCC Remaining Global Carbon Budget and UK's Equitable Share**
E. **Assessment of suitable UK target must acknowledge key uncertainties: need for a precautionary approach**
F. **Precautionary assessment of potential CO2 Reduction (CDR) before 2040 essential**
G. **Need to set Two 'Zero Emissions' – For National and Local Government**
H. **Zero Carbon Innovation & Dissemination Oversight Commission**
I. **Built Infrastructure; Town Planning: Public Services; Public Utilities**
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L. **References**

A. UK's Historical Role in contributing to Anthropogenic Climate Change to date

The UK represents 0.88 per cent of the global population. Yet, it is responsible for about 5 per cent of the temperature rise suffered to date since preindustrial times (Matthews, 2014). This historical legacy is important context and needs to be acknowledged by the CCC in discussion

about the possible UK ambition, its potential international leadership role, and in terms of international equity (See below).

B. UK Ambition for a Zero Carbon Target to be informed by considerations of Global Equity, & Justice

The UN Framework Convention on Climate Change (1994) calls for States to protect future generations and to take action on climate change, 'on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities'.

Following the 2015 Paris Agreement, there is a confirmed duty to consider the issue of global equity in how each country responds to the Agreement. Negative climate impacts will increase exponentially according to the degree of climate change. These will take place to a diverse geographical extent across the planet, affecting countries differentially as well as disproportionately affecting individuals, groups and peoples in vulnerable situations including, women, children, older persons, indigenous peoples and the poor.

While climate change affects people everywhere, those who have contributed the least to greenhouse gas emissions (i.e. the poor, children, and future generations) are those most affected. Equity in climate action requires that efforts to mitigate and adapt to the impacts of climate change should benefit people in developing countries, indigenous peoples, people in vulnerable situations, as well as future generations.

Approximately 30 per cent of the world's most affluent population are associated with almost 80 per cent of global emissions. As the sixth richest country in the world, the UK has a duty to consider the human rights of the least affluent on the planet. Key extracts of the Agreement that assert this are:

Parties to the Agreement will in pursuit of the objective of the Convention be guided by its principles . . . 'including the principle of equity and common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.'

Under Article 2 of the Agreement it: 'will be implemented to reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.'

Under Article 4, Parties undertake to: 'aim to reach global peaking of greenhouse gas emissions as soon as possible, recognizing that peaking will take longer for developing country Parties, . . on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty.'

On the basis of the Agreement, therefore, it will not be globally equitable to simply aim for an global average of per capita emissions in the medium term, as in 2008; irrespective of the UK target date established. Currently, the UK's carbon footprint is almost 50 per cent above the global average. This disparity is iniquitous and only likely to continue for many years. It can only be justified if the UK adopts a particularly ambitious timeframe to achieve a Zero Carbon target.

COP20, at Lima, established that Parties should be required to justify their responses on the basis of fairness and ambition. Thus, the UK given its historical role in disproportionately exacerbating climate change, should be taking on a leadership role to help mitigate for its historical legacy. The Zero Carbon target, therefore, should be suitably ambitious.

C. UK to aim to remain a world leader on CC given its historical responsibility to date

Given its legacy and its (self?) proclaimed lead in emission reductions, the CCC recommendation should be for the UK to aspire to a world leadership role by way example and to facilitate diffusion of low-carbon tactical technologies and practices. A leadership role will only be credible with a duly ambitious timeframe for a Zero Carbon target. There would be, of course, opportunities for the UK economy to benefit from sharing and exporting low-carbon practices through climate diplomatic outreach. Through dissemination of innovative low-carbon approaches to developing

countries, the UK could actually help global mitigation efforts but only where the UK was itself a leading country in terms of carbon reduction.

D. The IPCC Remaining Global Carbon Budget and UK's Equitable Share

In recent years there has been some dispute and uncertainty about the modelling undertaken to evaluate the actual carbon budget consistent with attaining the Paris goals, the publication of the IPCC 1.5°C Special Report now provides the suitable reference basis for understanding what that budget should be taken to be, for the purpose of this CCC review.

Given discussion of Carbon Capture and Storage (CCS) below and the need for a precautionary approach, as argued below, the reference budget should be taken from the P1 pathway within the IPCC 1.5°C Special Report.

The indicative global budget is 525 GtCO2eq from 2019 (IPCC) Given the international obligation of the UK to at least address its differentiated responsibility, and working from a position of at least global equity, the UK share of that budget is as per 0.88 per cent of the global population. This means **the UK share is 4.625 GtCO2eq**.

Given that the UK's [provisional] 2017 declared GHG emissions are 0.456 GtCO2eq, this suggests that an appropriate Zero Carbon target is approximately X years hence, where:

X = 2 x (4.625 / 0.456) = 20.3 years

Accordingly, an appropriate target from 2019 to attain Zero Carbon would be by 2040.

Coincidentally, this is in close agreement to that set by and adopted by Greater Manchester Combined Authority, which has been advised by the Tyndall centre for Climate Change.

E. Assessment of suitable UK target must acknowledge key uncertainties: need for a precautionary approach

The 'large elephant in the room' is the ascribed percentage confidence of achieving constrained global warming, whether to 2° (66%) or 1.5°C (50%). The only response to this uncertainty, in the context of exceedance of planetary (biosphere) boundaries (ie. the state we are in), is to exercise scientific rigor and a genuine precautionary approach in order to address what is actually at stake.

But simply to cite a few examples here:

At COP24, Valerie Masson-Delmotte, Co-Chair of WG1, explained that a key knowledge gap is still the safe level of global warming that would avoid irreversible sustained loss of sectors of the Greenland & Antarctic ice sheets. The latest paleoclimate research and ice sheet models suggest that even with warming limited to 1.5 to 2° we cannot ensure we may avoid long term destabilisation (SBSTA-IPCC Special Event, 4 Dec, 2018, COP24: webcast @ 1:42:30). The relevant IPCC report that ***may*** clarify these sort of risks further, *Special Report on the Ocean and Cryosphere in a Changing Climate,* will not be finalised until September 2019.

Another source of uncertainty, with overshoot from 1.5°C, referenced in the IPCC 1.5C Special Report, is the thawing of Arctic permafrost, which could trigger a tipping point with release something the order of 100GtC02eq. The IPCC report with *high confidence*, 'constraining warming to 1.5°C would prevent the melting of an estimated permafrost area of 2 million km2 over centuries compared to 2°C (Chadburn et al., 2017)'.

There are also uncertainties around the potential for any industrial scale contribution of carbon capture and storage to serve any significant mitigation before 2030 (See below).

F. Precautionary assessment of potential CO2 Reduction (CDR) before 2040 essential

This will be divided into carbon capture & storage and natural climate solutions:

a) Carbon Capture & Storage (CCS)

CCS generation is not commonly proven on a large scale, even despite a series of UK Government and EU initiatives aimed at incentivising its development. It is argued CCS

technology is too expensive to be commercially viable for private developers without government support in the shape of a carbon strike price. The **CCC** need to carry out a realistic assessment on these points and not simply defer to the CCS lobby. The most important barriers and uncertainties to deployment of industrial scale CCS are:

Need for stronger incentive mechanisms; insufficient CO2 price; economic & financial viability; lack of a robust-transparent legal framework and renewable energy competition.

It is only realistic to point out that CCS will play only a minor role, even at best, prior to 2050 and that scenario should inform the stress on CDR tactical portfolio.

b) Natural Climate Solutions (NCS)

By IPCC's own admission, Integrated assessment modelling has not yet adequately explored land conservation, restoration and management options to remove carbon dioxide from the atmosphere in sufficient depth, despite land management having a potentially considerable impact on the terrestrial carbon stock (Erb et al., 2018). Moreover, natural CDR measures have low technological needs; have strong synergy with biodiversity, and come with other potential environmental & social co-benefits (Griscom, et al., 2017). The research by Griscom, et al, outlines the very significant potential of NCS—when constrained by food security, fiber security, and biodiversity conservation—could be 23.8 Gt of CO2 eq per yr. This is more than 30 per cent above previous estimates. This was not factored into the IPCC's modelling for its P1 pathway.

G. Need to set Two 'Zero Emissions' – For National and Local Government

Aviation and maritime emissions need to be addressed by the UK at the international level. But it will be important to enable the UK's national assemblies and city regions to describe a target

a) An aspirational 'zero carbon' target should be set, taking account of aviation and maritime emissions, given the UK's role in aviation and its links with the London based IMO. The CCC should posit the UK government having a global leadership role to help promote international measures to dramatically reduce maritime and aviation emissions. All departments of Central Government and regulatory bodies should adhere to this target.

b) A 'zero carbon' target, that excludes maritime and aviation emissions, for national assemblies and city regions. This will be enable a proprtionate target aspiration for particular national and local governments to be set.

H. Zero Carbon Innovation & Dissemination Oversight Commission

Built Infrastructure; Town Planning: Public Services; Public Utilities

Given the unprecedented rapidity of transition required, the effective accelerated dissemination of innovation will be essential in order to escalate change. An oversight body should be considered that serves to draw together sectorial outputs, systematically facilitates and synthesises feedback on reports of innovation across the four main sectors that benefit the most from public sector investment. Its purpose will be to catalyse diffusion of innovative technology, planning and implementation practices that work towards reduction of GHG emissions and help deliver on sustainable development goals.

I. Reality Check on UK Progress towards suitable GHG Emissions

Growth in consumption-based GHG emissions grew by 20% between 1990 and 2008, albeit followed by a 9% reduction in 2008 – 2009. (Barrett, 2013). Between 1990 and 2014, UK domestic CO2 production emissions fell by 27 per cent (Carbon Brief, 2017). However, more than half of that reduction is offset by imported emissions from other countries, with consumption emissions only declining by 11% over the same period. The issue of imported GHG emissions for UK consumption must be addressed as part of understanding the trajectory of change needed to achieve the Zero Carbon target and the scale of change to be effected. Thus, as part of a review of the Zero Carbon target the suitability of the GHG emissions at a specific point in time within the

revised time frame towards that target needs to be considered. That must include review of the appropriateness of the 5th Carbon Budget.

The Secretary of State is exceeding her powers in attempting to constrain the scope of the CCC review, and irrespective the CCC needs to perform its advisory role, in accordance of the 2008 Climate Change Act.

J. A more immediate Zero Carbon Target MUST require the implications of 5th Carbon budget to be reviewed for its suitability to the overall carbon descent trajectory

The most outstanding feature that systematically distinguishes the 1.5°C from the 2°C Integrated Assessment Model (IAM) scenarios, as examined in Rogelj et al. (2018), is that there is not a single pathway with a more than 50% probability of achieving the target without overshooting it until 2100. That is, under the best scenario, there is a likelihood that the average global temperature increase will, at some point, exceed 1.5°C, before returning to this level at the end of the century. The output pathways from the IPCC Special Report (2018), except for pathway P1, effectively say the same. This implies that much of the CO2 emitted in the first half of the century will need to be removed from the atmosphere again. This, therefore, reinforces the significance of striving to minimize emissions ***before*** 2050 and, hence, to set an ambitious timeframe for attaining Zero Carbon.

Given that consideration, and some of the shortfall (Noted in several reports from CCC) in HM Government actions to date - and previously assumed for the purpose of setting the 5th Carbon budget – there should be a at the very least comment on the continuing appropriateness of the 2032 emissions target as part of the revised time frame for the Zero Carbon target.

L. REFERENCES [All web links access 6th December, 2018]

Barrett, et al. (2013) Consumption-based GHG emission accounting: a UK case study https://www.tandfonline.com/doi/abs/10.1080/14693062.2013.788858

Carbon Brief (2018) New scenarios show how the world could limit warming to 1.5C in 2100, 5 March, 2018 @ 16:55 https://www.carbonbrief.org/new-scenarios-world-limit-warming-one-point-five-celsius-2100

Department for Business, Energy & Industrial Strategy (2018) 2017 Provisional UK Greenhouse Gas Emissions statistical summary. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/695929/2017_Provisional_emissions_statistics_one_page_summary__1_.pdf

Carbon Brief (2017) Mapped: The world's largest CO2 importers and exporters. 5 July, 2017 @ 11.52 https://www.carbonbrief.org/mapped-worlds-largest-co2-importers-exporters

Chadburn, S.E. et al., (2017) An observation-based constraint on permafrost loss as a function of global warming. *Nature Climate Change*, 1-6, doi:10.1038/nclimate3262.

IPCC (2018) Special Report: Global Warming of 1.5°C Special Report. https://www.ipcc.ch/sr15/

Matthews, H D et al (2014) National contributions to observed global warming *Environ. Res. Lett.*

Rogelj, J. et al. (2018) Scenarios towards limiting global mean temperature increase below 1.5C, Nature Climate Change, doi:10.1038/s41558-018-0091-3

UNFCCC (2016) The Paris Agreement. http://unfccc.int/paris_agreement/items/9485.php

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: REFER TO SECTION L

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: REFER TO SECTIONS: A, B, C, D, E, F, J, K

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: REFER TO SECTIONS: A, B, F, H

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: REFER TO SECTIONS: G, H

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?

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ANSWER: REFER TO SECTION: F

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: REFER TO SECTION: H

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: REFER TO SECTIONS: G, H

Part 4: Costs, risks and opportunities

Part 5: Devolved Administrations

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: REFER TO SECTIONS: A, B, C, D, E, F, G, H, I, J, K