Building a zero-carbon economy – Call for Evidence

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: The committee should consider estimates of what is involved in meeting the UK obligations.

Question 2 (CO_2 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: If there was to be a differentiation we would need to know about it as soon as possible in order to advise our members.

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:

We believe carbon offsets would be an effective policy tool to help the UK cut emissions elsewhere in the world. Offsets are viewed internationally as an important policy tool to maintain stable economies and to improve sustainability.[1] In 2017, Gold Standard projects reduced over 14 million tonnes of greenhouse gas (GHG) emissions from the atmosphere, for a cumulative sum of 78 million tonnes since 2008 – enough to account for the annual emissions of nearly 8.5 million homes in the US.[2][3] The policy also delivers important co-benefits in terms of meeting sustainable development goals.

We believe that the UK can help facilitate a cleaner energy transition globally by supporting local projects through carbon offsetting. For example Bio LPG has a role in developing countries to help them move away from traditional biomass, given the carbon savings it offers as well as reductions in NOx.[4] In many developing nations there is an over reliance on wood for cooking, for example in Kiribati and Tuvalu this has forced people to use Kerosene.[5] Using kerosene and wood for cooking is particularly harmful as it requires unsustainable deforestation and emits carbon and harmful by-products, such as NOx.

By using carbon offsets or other internationally collaborative efforts we could not only help countries transition to green energy but also make big gains in reducing global greenhouse gas emissions. It is important that we recognise that reducing emissions is a global endeavour and that the UK will not solve this problem just by looking at its own emissions. In fact it may be preferable to conduct greater activity in developing nations as the potential savings are greater for the capital spend.

Another way to support efforts to cut emissions elsewhere in the world is by the UK promoting and aiming to export UK technology to other countries. With the right government support we see hydrogen as a promising new technology in which we could pioneer and export to the rest of the world. In order for this to become a reality, in our estimation, we will need to establish hydrogen as a viable alternative to natural gas in heat for homes, which will require investment and change in infrastructure.

[1] https://www.emisoft.com/how-carbon-offsets-and-data-management-improve-sustainability/

[2] https://www.goldstandard.org/sites/default/files/documents/gs_annualreport_2017.pdf

[3] https://www.goldstandard.org/sites/default/files/documents/gs_annualreport_2017.pdf

[4] https://www.calor.co.uk/home-energy/biolpg

[5] https://www.goldstandard.org/sites/default/files/documents/gs_annualreport_2017.pdf

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:

There needs to be a rational debate on this subject. There will be sectors of the UK economy that are too expensive to decarbonise completely in ratio to the cost.

For example it will be very hard to decarbonise the off grid sector in line with the Paris agreement without moving to electric heating. This however will not only be complicated due to the nature of the housing stock. It will also force homeowners of off grid, rural homes to pay high upfront costs for their new heating, which may also lead to higher energy bills. As this sector only contributes a marginal amount to the overall emissions it would be more prudent to allow bio fuels to reduce emissions and then require the outstanding carbon to be purchased either through credits or through offsetting.

This should be replicated in other areas. Agriculture, aviation and shipping will remain complex and expensive areas to totally decarbonise. The UK could spend a lot of money attempting to decarbonise these areas to the level required, or it could accept that there will be exceptions that remain technologically impractical to decarbonise and instead invest in reducing carbon in other countries where the marginal gains are greater.

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:

To reduce emissions close to zero, most hard to treat buildings should be connected to the gas grid, if they are not already, and fitted with a hydrogen ready boiler. This would mean that when, hydrogen is injected into the grid, the boiler would generate close to zero emissions, depending on the percentage of the blend. Further, improving the EPC of the house with a gas boiler and other measures would allow the UK to stay ahead of targets.

A move to electric heating without a change in consumer behaviour would lead to an increase in emissions. For example, people are used to turning the thermostat up when they feel cold for short periods of time. Whereas, the same behaviour with a heat pump will use significantly more energy, because of its design. Calculations show that a boiler running on natural gas will be cheaper to run than an air source heat pump, and also will probably have lower carbon emissions.[6]

[6] http://www.narecde.co.uk/air-source-heat-pumps-vs-gas-boilers/#.W-wTiNX7TIU

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Heat pumps are supposed to be running at a low temperature all day and this is not how people are used to heating their homes. There is nothing to suggest that people's behaviour will change if they switch to electric heating, therefore there is a genuine concern that electric heating could lead to an increase in energy use, compared to a gas boiler.

With regards to consumer behaviour, overall, 2% of people said they made changes to their home directly because of the guidance included in the EPC. 1% said they made large changes and 1% said they made small changes.[7] The results of this survey indicate that the general public and especially the private rented tenants (who are most likely to be in fuel poverty) have a very low awareness of energy saving actions and therefore we think they would be unlikely to change their behaviour around heating, even after government information campaigns.

Hydrogen and other bio fuels such as Bio LPG and Bio oil for heating would allow decarbonisation without having to rely and consumer behavioural change. This should be the route pursued, not one that places requirements on consumers to alter existing habits.

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:

Bio energy with carbon capture (BECCS) has the potential to produce negative emissions, because bio fuels are carbon neutral as they only emit what carbon the plant based fuel source has absorbed over its lifetime. Capturing the carbon from biofuels therefore removes more carbon, resulting in negative emissions; this could be used to offset any emissions from other hard to treat areas.

It is also possible to reduce emissions via gasification when bio fuel is used. This process converts organic fuel based materials into CO2, hydrogen and carbon monoxide without combustion, with a controlled amount of oxygen and or steam, resulting in a gas mixture called syngas.[8] The power derived from this process and the combustion of syngas is renewable and offers carbon savings.[9]

The sustainable technical potential for net negative emissions with BECCS has been estimated to 10 Gt of CO_2 equivalent annually, with an economic potential of up to 3.5 Gt of CO_2 equivalent annually at a cost of less than 50 €/tonne, and up to 3.9 Gt of

[7] https://www.gov.uk/government/statistics/beis-public-attitudes-tracker-wave-27

[8] http://wiki.gekgasifier.com/f/Review+of+Biomass+Gasification+Technologies.NNFCC.Jun09.pdf

[9] http://wiki.gekgasifier.com/f/Review+of+Biomass+Gasification+Technologies.NNFCC.Jun09.pdf

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CO_2 equivalent annually at a cost of less than 100 €/tonne.[10] The real world consequences of this are that the Government would be able to keep bio energy in the picture, having previously been unsure about its carbon saving potentials.

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:

Tighter long term emissions targets for the UK could be an effective method to achieve accelerated emissions reductions, if they are met with targeted government support for new and innovative technologies. For example, acceleration in the support for Hydrogen could lead to Hydrogen blends of up to 20% initially and 100% after a government drive to replace or upgrade boilers. This could meet the near zero emissions targets for homes much sooner than the current targets if the Government initiated a similar drive to the conversion from town gas to natural gas, only this time from natural gas to hydrogen.

This would enable the UK to claim status as a pioneer in a new technology and it would allow British business to lead in expertise and possibly gain a higher market share, compared to overseas rivals. Globally, the world used 3,670 billion tonnes of natural gas, in 2017.[11] This figure demonstrates that usage of gas remains high. In order to bring this figure down, the UK should be the first country to change its gas supply to hydrogen, so that other countries have a case study of a country that has successfully achieved the conversion. This level of usage also illustrates the potential market for decarbonised gas and hydrogen. Demonstrating that conversion at scale can be achieved would allow the UK export expertise and be a global leader in this technology, creating jobs and further inward investment.

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:

Gas makes up 84% of household energy consumption, and studies show consumers are generally highly satisfied with the way it works as it is easy to use, relatively cheap and efficient.[12] Following from this we expect that if the Government mandated a change to

[10] https://www.eenews.net/assets/2011/08/04/document_cw_01.pdf

[11] https://www.statista.com/statistics/282717/global-natural-gas-consumption/?fbclid=IwARoPOaGNhIfkOmaDrbosD-KQbIxH5YvTkk_gTqU-sLTIczonK77hll3GLmo#0

[12] http://geography.exeter.ac.uk/staff_profile_images/Hoggett2011_Heat_in_Homes.pdf

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electric heating, this would go against public opinion and force people to use a heating method they are not used to and do not understand.

The Government's top recommendations on home energy efficiency improvements, range from cheap measures, for example buying a hot water cylinder jacket for £25, to more substantial investments, such as installing a boiler from around £1,500.[13] We think that because having a boiler installed is relatively simple and the individual does not have to do much to facilitate it, this is the best way to improve an EPC, rather than insulation which people consider a hassle.

The Government's study into heating behaviour says that, although many people are concerned about the environment this does not always translate into taking practical steps to reduce domestic energy consumption. Although many energy efficiency measures have been proven to be highly cost-effective, many people are yet to introduce them. One of the barriers to making energy efficiency improvements relates to the fact that the benefits are accrued over a long period of time, whereas the costs associated with them are immediate and sometimes large. Generally it seems people may prefer a smaller reward today over a larger reward in the future.[14]

According to the Government, "one important lesson from behavioural economics is that individuals tend to go with the flow of pre-set options, or defaults, often regardless of whether the pre-set options maximise our individual or collective wellbeing".[15] Given that there is no way for the Government to dictate the temperature on consumer's thermostats, it is unclear that people will ever decide to change their behaviour and turn their heating down. Therefore guidance should not assume this will happen

Moreover, we think that given the complexities involved in trying to change people's behaviour, it makes more sense to convert homes to a hydrogen ready boiler, so that even if they do not change their behaviour, they will by default decarbonise their heating. Consumer behaviour patterns point to the most sensible plan being one that minimises need for change.

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:

EUA believes the best way to meet a net zero target in home is the conversion to and introduction of Hydrogen. At the point of use, no harmful emissions are produced when

[13]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/60536/behaviour-change-and-energy-use.pdf

[14]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/60536/behaviour-change-and-energy-use.pdf

[15]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/60536/behaviour-change-and-energy-use.pdf

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Hydrogen is burned – only water vapour. This gives hydrogen a fundamental advantage over conventional fossil fuels.[16]

Hydrogen produced via SMR + CCS would deliver carbon savings at a quarter of the price of air source heat pumps and ground source heat pumps, whilst hydrogen produced from electrolysis would deliver carbon savings at approximately half the price.[17] . Analysis illustrates that if natural gas was completely replaced by hydrogen, the emissions would drop by 71% if the hydrogen was produced by SMR with CCS or 91% if produced by wind power electrolysis.[18]

The Government needs to ensure that energy efficiency in homes is also improved, with rigorous legislation that forces private and social landlords to reach at least a band D in the short term and C in the medium term. Current policy has too many loopholes for that outcome to be certain by 2030. Improving privately owned homes is much more complicated and to date the policy levers and subsidies have made limited progress. We continue to work with Government and other stakeholders to try and resolve this issue.

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:

Due to high level of variation depending on the designated pathways, it is not possible at this stage to be confident on what the costs would be. Industry will be looking to the CCC guidance on likely areas of needed change in order to inform where the additional costs may be.

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

[16] https://policyexchange.org.uk/are-we-really-on-the-cusp-of-a-hydrogen-economy/

[17] https://policyexchange.org.uk/wp-content/uploads/2018/09/Fuelling-the-Future.pdf

[18] https://policyexchange.org.uk/wp-content/uploads/2018/09/Fuelling-the-Future.pdf

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:

Differences in the housing stock between England, Wales, Scotland and Northern Ireland can lead to different policy priorities for each region. This is because some homes may be harder to heat than others, for example old houses with no cavity walls, which could make them unsuitable for electric heating. The result of these differences can lead to differing targets for each region, for example some regions may be harder to decarbonise than others if there are lots of homes off the gas grid, reliant on oil.

There are 419,435 (31.4%) properties in Wales that are not on the gas grid. Around 369,000 occupied dwellings (15%) in Scotland are beyond the reach of the gas grid network.[19] A large proportion of these will be solid wall properties and so less suitable for some heating methods than higher EPC homes. This will mean that there will be a high number of properties using some sort of oil and therefore careful consideration will need to be given in order to help them decarbonise without unfairly penalising them.

In Northern Ireland 80 per cent of households are off-grid and around 80 per cent of these use heating oil. However, a higher proportion of the off grid population in Northern Ireland has the option to connect to mains gas; this reflects the relatively recent roll-out of mains gas networks.[20] Advice given to Northern Ireland could factor in the potential carbon savings from connecting these homes to the gas grid.

Given the fact Northern Ireland has the option to connect many of these properties to the gas grid, we would recommend the Government considers this for those households, because as previously mentioned, a gas boiler is one of the most effective ways to improve the EPC of a home.

Finally, The Committee on Climate Change (CCC) suggests that decarbonisation of Welsh industry via conversion to hydrogen route might be more cost effective than alternatives, and therefore models a scenario based on CO2 transport by ship to an existing storage network.[21]

Part 6: CCC Work Plan

[19] https://www.gov.scot/binaries/content/documents/govscot/publications/report/2016/10/action-plan-deliver-affordable-warmth-rural-scotland-proposed-scottish-rural/documents/00508122-pdf/00508122-pdf/govscot%3Adocument?inline-true

[20] https://webarchive.nationalarchives.gov.uk/20140402222541/http:/www.oft.gov.uk/shared_oft/market-studies/off-grid/OFT1380.pdf

[21] https://hynet.co.uk/app/uploads/2018/05/14368_CADENT_PROJECT_REPORT_AMENDED_v22105.pdf

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: