Committee on Climate Change

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

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?

ANSWER: Vattenfall believes that IPCC's special report (SR15) constitutes one of the most important basis for fact-based decision making on climate policy in line with the Paris Agreement's goals. The European Commission has already presented a strategy for a climate neutral EU economy by 2050, which is informed by the IPCC's conclusions to a large extent. In the UK it will be crucial that there is some urgent consideration given to GHG trajectories which the IPCC deems necessary and that there is a corresponding degree of in-depth analysis as we have seen in the EU. Besides, since the world's leading climate scientists in the IPCC concentrate on what needs to be done on a global scale, the UK must also consider what would constitute a fair contribution to reducing global GHG emissions under the Paris Agreement, reflecting its "common but differentiated responsibilities and respective capabilities" as an industrialised and developed country. Clearly, an average will not be enough.

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: Approximately 8 % of the EU's greenhouse gases (GHG) are non-CO2. A climate neutral economy requires that all GHG emission are eliminated or at least compensated for. The relative importance of the gases should be assessed based on their respective global warming potential (GWP). Some non-CO2 gases will be relatively difficult to remove, e.g. in the agriculture sector. It may be natural that these GHG emission abatements are achieved a bit later than CO2 emission reductions from the power sector, for example. Nonetheless, all types of GHG emissions should be captured by the overall climate target and subject to a strong climate policy effort.

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: Vattenfall is content for others to supply an answer to this question

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: Vattenfall believes that cooperative approaches are essential to address climate change effectively on a global scale. Developing countries need support both in putting in place the necessary national procedures (capacity building) and in mobilising finance for undertaking measures which reduce CO2 emissions in their country. This is already done by e.g. the Green Climate Fund (GCF) to some extent, but new mechanisms will be needed to massively scale-up the actions to the required levels. Article 6 of the Paris Agreement has a unique potential to steer private capital to cost-effective projects which both reduce GHG emissions and contribute to a sustainable development in poor countries. In addition, using market-based approaches is also likely to make parties more inclined to adopt more ambitious climate targets (current pledges are clearly insufficient for keeping global warming below 2 °C). The UK should embrace cooperative approaches, inside and outside Europe, and help to ensure that the Paris Agreement's market mechanisms become operational and exploited to their full potential.

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: It is important that climate action is supported though a global carbon market which expands its geographical coverage. The demand for verified emissions reduction credits can be created by both private companies and governments. The use of international credits should however not replace or weaken the incentive for decarbonising the economy domestically. Therefore, a balance should be achieved by placing a limit on how many credits can be imported.

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: The European power association (Eurelectric) has produced a recent study which demonstrates that the EU electricity supply can be made CO2 neutral before 2050, at even while demand for CO2 free electricity grows significantly to replace fossil fuels in other sectors such as heating and cooling, transport and industry. Electricity is increasingly becoming cleaner, and since electricity is affordable, reliable, secure and more efficient in end use than any other fuels, electrification will be a key enabler for decarbonising the economy. Vattenfall is already involved in a number of strategic

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partnerships with industry partners, e.g. in the steel industry, cement industry and refining industry. Our HYBRIT project for example is a collaboration of a mining company, a steel manufacturer and Vattenfall with the objective of having a completely fossil free process for steel manufacture by 2035. We also expect more applications of hydrogen as an energy carrier in the transport sector, e.g. the development of small airplanes powered by hydrogen gas. Smaller ships and ferries are likewise in their pilot phase. Nevertheless, the step up to operating larger aircrafts and deep-sea vessels requires the development of synthesised liquid fuels to provide sufficient energy density.

We should not be complacent about heat in buildings more generally, not just the hard to treat ones. In the heating sector reduction of heating demand and sustainable supply of the remaining demand is necessary. In the urban building stock, climate-neutral district concepts (rather than single-building approaches) would provide a substantial contribution to decarbonization and sustainability targets. There are no strong drivers to encourage existing buildings to connect to heat networks or use other forms of low carbon heat. Implementing synergies between electricity and heat through high efficient district heating, CHP plants combined with heat storage, "electricity to district heating" concepts or heat pumps should gain stronger support. In less densely populated areas in particular the gas grid can be supplemented by hydrogen to decrease emissions but the main barrier here, as in all these scenarios, is cost. Thus, the use of zero-emission technologies must be made more attractive by incentivising promising projects with funding to lower what remains a very high investment requirement.

There are pathways for decarbonising heat but there remain significant political and behavioural social risks associate achieving these. It will be critical in any scenario to find ways to ensure that, for example, appropriate heat offtake from thermal processes is always made use of and that, again, there are strong incentives to drive change. The recent Climate Change Committee Report on Hydrogen in a Low Carbon Economy rightly suggested that hydrogen could have a role in heat but that electrification and heat networks are the key technologies.

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: We will limit our comments to saying that again it is a question of cost. . Abating the last tonnes will be significantly more expensive. Therefore, it makes sense to also explore technologies for *negative* CO2 emissions which can compensate for a certain amount of remaining CO2 emissions in the system.

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: It is Vattenfall's view that in this regard innovation funding is important - as demonstrated by our flagship European Offshore Wind Development Centre (EOWDC)- but that this will not be sufficient on its own without a simultaneous commercialisation programme in support of key technologies. The wind sector has shown that a subsidy regime supports the development of a supply chain and experience, which drives down costs. The EV charging sector is at the start of that journey. All subsidy mechanisms come with upsides and downsides, but it would be hard to argue that the RO and CFD did not work extremely well. Vattenfall is therefore seeking consistency in policy and regulatory regimes which encourage rather than dampen innovation.

In terms of the specifics of the question, tighter long-term emissions need to be targeted at heavy industry and transport to incentivise electrification and decarbonisation in these sectors. A combination of emissions limits, levies and carbon pricing will serve to deliver better, quicker development of un-cost competitive technologies thus bringing their costs down and making them more widely available and applicable.

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: Vattenfall has experience in the Netherlands, in the context of EVs, of how quickly behaviours can change with the right supportive policies. The effect on behaviour of even small-scale policy changes can be demonstrated by the positive outcome achieved by introducing a 5p charge on plastic bags and echoed in the ongoing debate on the use of plastics.

In the case of heat in many cases changes to heating systems will require changes within people's homes and buildings, which can be disruptive and invasive. Addressing this will require strong buy in from consumers about the need to decarbonise to accept change and regulations, incentives and innovation to ensure that customers receive the best possible service at reasonable cost.

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: Vattenfall believes that the EU ETS should be the principal instrument to achieve the EU's climate targets. It is one of the most long-term, cost-effective, environmentally predictable and internal market compatible policies at hand to significantly reduce GHG emissions. It has potential to be a very powerful and efficient tool to achieve the EU's climate objectives in the captured sectors, which are jointly responsible for around half of the EU's overall GHG emissions. It is a technology-neutral instrument, meaning that it allows all CO2 abatement options to compete on equal footing and it gives companies as well as consumers a uniform CO2 price incentive to undertake all sorts of measures from the supply to the end-use side. It is our view that is in the common interest of the UK and the EU to maintain a deep cooperation on climate policy. A solution should be found so that UK and EU operators remain in the same carbon market and can meet their

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obligations cost-effectively. The overall ambition level in terms of reduced GHG emissions in Europe should not be lower even if the UK develops its own ETS, and its own mid-century climate strategy and to maintain its commitment under the Paris Agreement.

In the non-ETS sector, particularly in the heating sector, individual heating related CO2 emissions from fossil fuels need to be priced via a CO2 taxation to safeguard a level-playing field and to phase out fossil fuels from individual heat supply. Compensatory measures in the tax systems should be explored for final consumers to avoid inappropriate burdens and supporting acceptance.

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: The decarbonisation of heat is an example of an area where tighter targets could make a difference. The amount of urgency and effort in respect of heat is not commensurate with the scale of the challenge under the current targets. If tighter targets lead to more decisive action, then there could be a real opportunity to accelerate. Heat is a real growth opportunity for the UK. Increased deployment could and should bring significant economic opportunities.

On risks, there are specific risks associated with offshore wind also. The industry hopes to have developed a capacity of 30gw by 2030. However tough environmental constraints and ongoing issues around military radar threatens the next generation of offshore wind (maybe as much as 10GW).

For onshore wind there is also a heightened risk that if routes to market are blocked then it rules out a low-cost path to emissions reductions and places even more emphasis on offshore wind and therefore heightened delivery risk on carbon budgets. In terms of opportunities onshore wind has significant capacity to provide energy at the lowest cost to the consumer if political barriers are removed.

In addition, proposed Ofgem reforms to network charges appear to bear down most heavily on low carbon generators. We would urge the Climate Change Committee to bring some scrutiny to Ofgem's grid charges and what this means for climate targets.

More generally it is Vattenfall's view that tighter targets need to be accompanied by short life incentives (the carrot and stick approach) to bring down the cost of required technology in the short term, as demonstrated by the combination of subsidies plus competition in offshore wind rapidly bringing down the LCOE. But subsidies are not the only mechanism available. The government could also look at the use of levies and taxes as a driver, which is a double win in terms of providing revenue to government at the same time as creating incentives for the more rapid development of new technologies. This is especially true where the available technology is not yet sufficiently developed because the demand or commercial viability has held back its deployment.

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: Vattenfall is content for others to supply an answer to this question

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: Devolved Administrations have made good progress towards their own climate change targets and it is Vattenfall's hope that they can continue to develop distinct agendas, using the powers at their disposal (planning, environment, local business finance) to lead the way in what can be achieved through a more radical approach to policy making. We recognise that different geographies have different demands and can therefore a 'one size fits all' approach is not sufficient to address climate change issues. Devolved and local government should be given the ability (through funding and relevant powers) to better support growth in specific areas – eg heat and the electrification of transport – to meet local needs (albeit within a national framework). In other areas, such as the electrification and decarbonisation of industrial processes, policy and support mechanisms (RTFO, carbon pricing, emissions standards) should be driven centrally and be part of UK wide approach.

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: Our 'ask' in this respect is for the Committee to give urgent attention, in its work plan, to: • creating more urgency in the debate around heat decarbonisation, and • bringing better scrutiny to the support and opportunities for the speedier development of EV charging networks • continuing to make the case loudly for more onshore wind in the energy mix