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.

## 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.***

### B. The path to the 2050 target

**Question 5:** How big a role can consumer, individual or household behaviour play in delivering emissions reductions? How can this be credibly assessed and incentivised?

ANSWER:
We believe that consumer behaviour will play a fundamental role in delivering emissions. For example, we are currently developing Future Energy Scenarios across our electricity network that is informed by consumer research on how willing they are to switch to different technologies. This willingness considers both the cost and convenience of different technology types and reflects different building types and current installation levels. Currently it is focussed on heating, transport, flexibility and storage technologies as these will have the biggest impact on our network.

Whilst we have seen uptake levels of EVs within our distribution area increase (we now connect c.80,000 plug in EVs), the electrification of heat is happening at a rate that is much slower than required to meet the net zero target (we only have c.11,000 RHI related installations across our network). We therefore do not believe consumers will switch to low carbon heating without stronger policy action. The Government's Future Homes Standard is a positive step towards this. As a next step Government should look at how to provide suitable incentives for those using the most carbon intensive heating technologies alongside initiatives to further upgrade the energy efficiency of the UK's building stock.

**Question 6:** What are the most important uncertainties that policy needs to take into account in thinking about achieving Net Zero? How can government develop a strategy that helps to retain robustness to those uncertainties, for example low-regrets options and approaches that maintain optionality?

ANSWER:
As highlighted by the CCC we now have a clearer pathway on decarbonising power and significant progress is being made on transport. We believe significant uncertainty remains in terms of how will decarbonise the UK's heating sector. Whilst transitioning from gas to hydrogen remains a potential scenario for reaching net zero by 2050, there are major challenges (technical and commercial) that need to be overcome for hydrogen to have an impact at scale. Ahead of the end of the sixth carbon budget in 2037 we see an opportunity for government to focus attention on upgrading energy efficiency and incentivising heat electrification where it demonstrates cost efficiency e.g. new builds and off-gas grid.

**Question 7:** The fourth and fifth carbon budgets (covering the periods of 2023-27 and 2028-32 respectively) have been set on the basis of the previous long-term target (at least 80% reduction in GHGs by 2050, relative to 1990 levels). Should the CCC revisit the level of these budgets in light of the net-zero target?

ANSWER:

**Question 8:** What evidence do you have of the co-benefits of acting on climate change compatible with achieving Net Zero by 2050? What do these co-benefits mean for which emissions abatement should be prioritised and why?

ANSWER:
A key co-benefit is the reduction of energy bills and fuel poverty that can be realised through improving energy efficiency, which is typically one of the most cost efficient carbon abatement options. Whilst there is more uncertainty around take up of low technologies e.g. for heating, we believe that energy efficiency provides a least regrets option. From an electricity systems perspective energy efficiency can:

- Reduce peak demand and therefore capex spend on network reinforcement;
- Reduce the need for carbon intensive generation to come on to meet peak demand;
- Reduce system losses;
- Reduce energy bills ; and
- In a scenario with hydrogen reduces the volume that needs to be produced.

UKERC has found that energy efficiency has already played a major role in delivering carbon emission reductions as well as increasing productivity in the UK[1].

## D. Sector-specific questions

**Question 18 (Surface transport):** As laid out in Chapter 5 of the Net Zero Technical Report (see page 149), the CCC's Further Ambition scenario for transport assumed 10% of car miles could be shifted to walking, cycling and public transport by 2050 (corresponding to over 30% of trips in total):

a) What percentage of trips nationwide could be avoided (e.g. through car sharing, working from home etc.) or shifted to walking, cycling (including e-bikes) and public transport by 2030/35 and by 2050? What proportion of total UK car mileage does this correspond to?

b) What policies, measures or investment could incentivise this transition?

ANSWER:

[1] http://www.ukerc.ac.uk/news/energy-efficiency-contributed-25-of-uk-economic-growth-since-1971.html

**Question 19 (Surface transport):** What could the potential impact of autonomous vehicles be on transport demand?

ANSWER:

Our initial thinking is that growth of autonomous vehicles will only have an impact on electricity usage if it reduces the total miles travelled. Given the uncertain dynamic between the number of autonomous vehicles and their actual usage this is an area that warrants further investigation.

**Question 20 (Surface transport):** The CCC recommended in our Net Zero advice that the phase out of conventional car sales should occur by 2035 at the latest. What are the barriers to phasing out sales of conventional vehicles by 2030? How could these be addressed? Are the supply chains well placed to scale up? What might be the adverse consequences of a phase-out of conventional vehicles by 2030 and how could these be mitigated?

ANSWER:
Given our role in facilitating new connections e.g. for EV charge-points and ensuring that the electricity distribution network runs safely and reliably, we are preparing for several different uptake scenarios. One of these scenarios includes meeting a policy target in which the government bans the sale of petrol and diesel vehicles from 2030. With sufficient notice and alignment with Ofgem's regulatory framework, we are confident that we can facilitate the expected rise of EVs if this new target was introduced.

**Question 21 (Surface transport):** In our Net Zero advice, the CCC identified three potential options to switch to zero emission HGVs – hydrogen, electrification with very fast chargers and electrification with overhead wires on motorways. What evidence and steps would be required to enable an operator to switch their fleets to one of these options? How could this transition be facilitated?

ANSWER:

**Question 22 (Industry):** What policy mechanisms should be implemented to support decarbonisation of the sectors below? Please provide evidence to support this over alternative mechanisms.

a) Manufacturing sectors at risk of carbon leakage
b) Manufacturing sectors not at risk of carbon leakage
c) Fossil fuel production sectors
d) Off-road mobile machinery

ANSWER:

**Question 23 (Industry):** What would you highlight as international examples of good policy/practice on decarbonisation of manufacturing and fossil fuel supply emissions? Is there evidence to suggest that these policies or practices created economic opportunities (e.g. increased market shares, job creation) for the manufacturing and fossil fuel supply sectors?

ANSWER:

**Question 24 (Industry):** How can the UK achieve a just transition in the fossil fuel supply sectors?

ANSWER:

**Question 25 (Industry):** In our Net Zero advice, the CCC identified a range of resource efficiency measures that can reduce emissions (see Chapter 4 of the Net Zero Technical Report, page 115), but found little evidence relating to the costs/savings of these measures. What evidence is there on the costs/savings of these and other resource efficiency measures (ideally on a £/tCO2e basis)?

ANSWER:

**Question 26 (Buildings):** For the majority of the housing stock in the CCC's Net Zero Further Ambition scenario, 2050 is assumed to be a realistic timeframe for full roll-out of energy efficiency and low-carbon heating.

a) What evidence can you point to about the potential for decarbonising heat in buildings more quickly?

b) What evidence do you have about the role behaviour change could play in driving forward more extensive decarbonisation of the building stock more quickly? What are the costs/levels of abatement that might be associated with a behaviour-led transition?

ANSWER:

a) There is evidence that with strong policy action changes can be implemented much more quickly than anticipated. For example, the transition from town gas to natural gas happened in around ten years and involved visits into homes. More recently the uptake of Solar PV has shown that with a strong price signal around a million households can be reached in a few years and supply chain efficiencies can be realised.

b) Please see our response to question 5 on what role behaviour change can play.

**Question 27 (Buildings):** Do we currently have the right skills in place to enable widespread retrofit and build of low-carbon buildings? If not, where are skills lacking and what are the gaps in the current training framework? To what extent are existing skill sets readily transferable to low-carbon skills requirements?

ANSWER:

**Question 28 (Buildings):** How can local/regional and national decision making be coordinated effectively to achieve the best outcomes for the UK as a whole? Can you point to any case studies which illustrate successful local or regional governance models for decision making in heat decarbonisation?

ANSWER:

**Question 29 (Power):** Think of a possible future power system without Government backed Contracts-for-Difference. What business models and/or policy instruments could be used to continue to decarbonise UK power emissions to close to zero by 2050, whilst minimising costs?

ANSWER:

**Question 30 (Power):** In Chapter 2 of the Net Zero Technical Report we presented an illustrative power scenario for 2050 (see pages 40-41 in particular):

a) Which low-carbon technologies could play a greater/lesser role in the 2050 generation mix? What about in a generation mix in 2030/35?

b) Power from weather-dependent renewables is highly variable on both daily and seasonal scales. Modelling by Imperial College which informed the illustrative 2050 scenario suggested an important role for interconnection, battery storage and flexible demand in a future low-carbon power system:

   i. What other technologies could play a role here?

   ii. What evidence do you have for how much demand side flexibility might be realised?

ANSWER:
As highlighted in our response to question 8 we believe that energy efficiency can play a major going forward and there is a strong case for suitable energy efficiency measures to be deployed alongside heat pumps to avoid network upgrades. In addition to this we see significant scope to unlock flexibility from Demand Side Response (DSR), which will help to reward customers and avoid unnecessary capex in network reinforcement and new generation capacity. In order to achieve this the customer proposition will be key and will depend on energy as a service business models. UKPN has been extensively working with stakeholders to test and overcome the barriers around this. For example, our Flexibility Roadmap[2] and

[2] https://innovation.ukpowernetworks.co.uk/wp-content/uploads/2019/07/futuresmart-flexibility-roadmap.pdf

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Innovation website[3] provide detail on how we are being a neutral market facilitator and the various trials we have run/are running to support the energy transition. For example, our Project Shift[4] is demonstrating the potential benefits of DSR by testing which commercial and regulatory arrangements stimulate an optimal response from customers – both for their needs and the wider systems.

**Question 31 (Hydrogen):** The Committee has recommended the Government support the delivery of at least one large-scale low-carbon hydrogen production facility in the 2020s. Beyond this initial facility, what mechanisms can be used to efficiently incentivise the production and use of low-carbon hydrogen? What are the most likely early applications for hydrogen?

ANSWER:

**Question 32 (Aviation and Shipping):** In September 2019 the Committee published advice to Government on international aviation and shipping and Net Zero. The Committee recognises that the primary policy approach for reducing emissions in these sectors should be set at the international level (e.g. through the International Civil Aviation Organisation and International Maritime Organisation). However, there is still a role for supplementary domestic policies to complement the international approach, provided these do not lead to concerns about competitiveness or carbon leakage. What are the domestic measures the UK could take to reduce aviation and shipping emissions over the period to 2030/35 and longer-term to 2050, which would not create significant competitiveness or carbon leakage risks? How much could these reduce emissions?

ANSWER:

[3] https://innovation.ukpowernetworks.co.uk/

[4] https://innovation.ukpowernetworks.co.uk/projects/shift/

**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:
  - Crop yields rising from the current average of 8 tonnes/hectare for wheat (and equivalent rates for other crops) to 10 tonnes/hectare
  - Livestock stocking density increasing from just over 1 livestock unit (LU)/hectare to 1.5 LU/hectare

Can this increase in productivity be delivered in a sustainable manner?

Do you agree that these are the right measures and with the broad level of ambition indicated? Are there additional measures you would suggest?

ANSWER:

**Question 34 (Agriculture and Land use):** Land spared through the measures set out in question 33 is used in our Further Ambition scenario for: afforestation (30,000 hectares/year), bioenergy crops (23,000 hectares/year), agro-forestry and hedgerows (~10% of agricultural land) and peatland restoration (50% of upland peat, 25% lowland peat). We also assume the take-up of low-carbon farming practices for soils and livestock. Do you agree that these are the key measures and with the broad level of ambition of each? Are there additional measures you would suggest?

ANSWER:

**Question 35 (Greenhouse gas removals):** What relevant evidence exists regarding constraints on the rate at which the deployment of engineered GHG removals in the UK (such as bioenergy with carbon capture and storage or direct air capture) could scale-up by 2035?

ANSWER:

**Question 37 (Infrastructure):** What will be the key factors that will determine whether decarbonisation of heat in a particular area will require investment in the electricity distribution network, the gas distribution network or a heat network?

ANSWER:
To support this we recommend breaking the challenge down into (1) new builds, (2) off-Gas Grid and (3) existing buildings. On the former, we are encouraged by the Government's Future Home Standard proposals and we believe tighter Building Regulations can make a significant impact in this area. From a DNO perspective

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we are confident in a our ability to facilitate new connections that accommodate heat pumps and we already have processes in place. Similarly, with off-gas grid connections due to the clustering of properties, we see a viable pathway to manage any switch to electrical heating e.g. via planned network upgrades. In contrast, there remains to be a significant challenge associated with decarbonising the existing building stock; this should therefore be a key area that policy-makers focus their attention on to ensure that a net zero trajectory is deliverable. For example, we see an important role for both regional decision making e.g. by metro mayors, as well as national decision making on infrastructure build out.

Based on our initial analysis in London we see a potential role for electrified heat networks due to the high penetration of properties, but this will require policy action. In any high electrification scenario consideration must be given to the huge scale of change required in data and systems. Whilst real-time decisions are made on the dispatch of dozens of generators at transmission level, with over 130,000 sub stations across our distribution area alone, we face a major challenge of coordinating millions of interconnected loads and generators in real-time.