

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.

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. Climate science and international circumstances

Question 1: The climate science considered in the CCC's 2019 Net Zero report, based on the IPCC Special Report on Global Warming of 1.5°C, will form the basis of this advice. What additional evidence on climate science, aside from the most recent IPCC Special Reports on Land and the Oceans and Cryosphere, should the CCC consider in setting the level of the sixth carbon budget?

ANSWER:

Question 2: How relevant are estimates of the remaining global cumulative CO₂ budgets (consistent with the Paris Agreement long-term temperature goal) for constraining UK cumulative emissions on the pathway to reaching net-zero GHGs by 2050?

ANSWER:

Question 3: How should emerging updated international commitments to reduce emissions by 2030 impact on the level of the sixth carbon budget for the UK? 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:

Question 4: What is the international signalling value of a revised and strengthened UK NDC (for the period around 2030) as part of a package of action which includes setting the level of the sixth carbon budget?

ANSWER:

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:

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:

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:

C. Delivering carbon budgets

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:

Outside of the delivery priorities for a 2050 net-zero target given in CCC's Net Zero advice, there are a few key policy actions required for the period out to 2030/2035. According to the 2019 Net Zero report, the main focus for industry related goals is on CCS development. In reality, the UK's 5.7 billion barrels of oil and gas in already-operating fields will exceed the UK's share in relation to the Paris climate goals - and industry and government ambition is currently to extract 20 billion barrels in the coming decades [1]. The government must therefore cancel any future oil and gas licensing rounds, and stop issuing permits for new fossil fuel exploration and development immediately. They must also revoke undeveloped licenses and review whether existing facilities should be phased out early [2].

Relatedly, subsidies for oil and gas extraction are on track to add twice as much carbon to the atmosphere as the phase out of coal power saves. The UK government must remove all subsidies from oil and gas extraction - including tax breaks - and Decommissioning Relief Deeds should be cancelled. Currently, the UK has some of the lowest oil tax rates in the world, and the taxpayer is set up to pay almost half of the cost of decommissioning offshore oil installations at the end of their life [3].

In the Net Zero advice, it is suggested that the government should assess more broadly how a transition is perceived as fair and that vulnerable workers should be protected. It notes the need for analysis at a regional level and for specific industrial sectors. Understanding that government policy enabled the rapid expansion of the oil and gas industry, and its sustained extraction long after it would have otherwise declined, we advocate that the government

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must intervene similarly to enable renewables development. Workforce modelling in the 2019 *Sea Change* report suggests that there will be approximately 40,000 existing oil workers that may need a different job by 2030 [4].

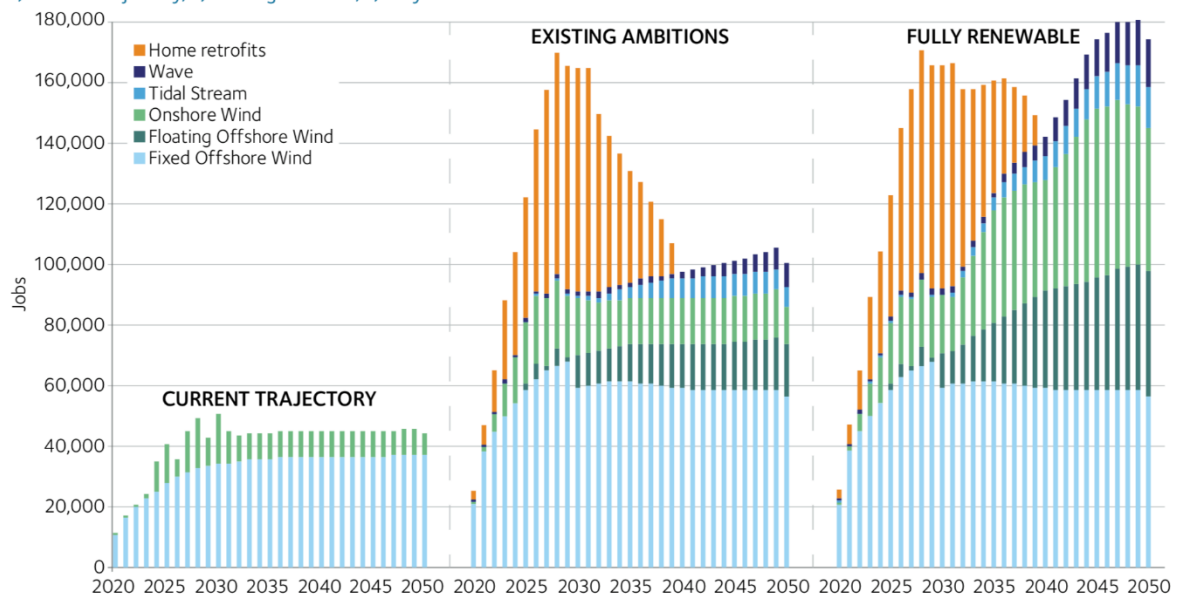
As seen in the attached table [5] from *Sea Change*, with the current trajectory of minimal government support for renewable energy, the growth of jobs in wind energy alone exceeds the number of oil workers affected by the transition, but will not result in enough power to meet UK demand nor in enough jobs to credibly support large scale re-employment of oil industry workers. Within a scenario implementing proposed ambitious targets from industry and policymakers, at least three times as many new jobs will be created in wind power, marine renewables and energy efficiency retrofits. In a Fully Renewable scenario, with a full transition to renewables by 2050, there are over four times as many jobs created [6]. The government must invest in clean energy and public sector participation in the clean economy, this includes national investment banks, ownership of renewable infrastructure, and support for local supply chains. The government should also support major scaling-up of education, retraining and re-skilling to help workers succeed in these new industries.

Citations

[1] OGA, UK Oil and Gas Reserves and Resources as at end 2017, November 2018, p.3, https://www.ogauthority.co.uk/media/5126/oga_reserves__resources_report_2018.pdf
 OGA, Projections 2018, p.5; and 2019, p.7.

- [2] “Sea Change” Friends of the Earth Scotland, Oil Change International, Platform (2019).
- [3] “Sea Change” Friends of the Earth Scotland, Oil Change International, Platform (2019).
- [4] “Sea Change” Friends of the Earth Scotland, Oil Change International, Platform (2019).
- [5]

Figure ES-6. Estimates of cumulative potential new jobs in case study industries – a) Current Trajectory, b) Existing Ambition, c) Fully Renewable.



Sources: Modelling by Platform and Transition Economics. See Appendix 3

[6] “Sea Change” Friends of the Earth Scotland, Oil Change International, Platform (2019).

Question 10: How should the Committee take into account targets/ambitions of UK local areas, cities, etc. in its advice on the sixth carbon budget?

ANSWER:

Question 11: Can impacts on competitiveness, the fiscal balance, fuel poverty and security of supply be managed regardless of the level of a budget, depending on how policy is designed and funded? What are the critical elements of policy design (including funding and delivery) which can help to manage these impacts?

ANSWER:

Questions of competitiveness, fiscal balance and security of supply are bound up in government intention and political ambition. Ceasing to develop new oil and gas fields in the UK would lead to a 70% reduction in UK oil extraction by 2030 and an 80% reduction in gas extraction, compared to 2018 levels. Ultimately, replacing this domestic extraction without simply switching to imports requires concerted effort. While the government [1] and Oil and Gas UK claim continued extraction is needed to meet energy demand: there is a growing body of literature showing otherwise [2,3,4,5]. What we can conclude from these studies is that there is no technical or economic barrier to rapidly reducing oil and gas dependence, the barriers are political.

While oil companies claim that any energy transition would take decades, the Benjamin Sovacool of Aarhus University has examined ten historical energy transitions at the national level, in both end-use and supply technologies, that took place within 10-20 years [6]. What is required is a concerted and coordinated effort by the government. In contrast to the objective of mass extraction, and strategy including optimising, exploration, development, stewardship and technology outlined in the Petroleum Act 1998 [7], the government is “non-committal, if not antagonistic” in its approach to renewables support [8].

Policy design is competitive and fiscally sound when it is investing in growing industries and doing so sustainably. There are a variety of ways to achieve this, but all of them involve the end of oil and gas subsidies and MER. Pathways include investing in the development of new clean energy technologies such as tidal stream and floating offshore wind turbine installations [9], upgrading ports to allow for commercial commitment [10], and re-tooling supply chains to take on contracts for off-shore renewables [11]. In short, the UK and Scottish government must initiate a concerted policy and fiscal effort to rapidly build the clean energy industry to at least the extent they have with the oil and gas industry.

Citations

[1] Alex Chisholm (Permanent Secretary, BEIS), Oral evidence to Public Accounts Committee inquiry into Public cost of decommissioning oil and gas infrastructure, HC 1742, 11 February 2019, Q53, <http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/public-accounts-committee/public-cost-of-decommissioning-oil-and-gas-infrastructure/oral/96503.pdf>

[2] Paul Allen et al., Zero Carbon Britain: Rethinking the future, Centre for Alternative Technology, 2013, <https://www.cat.org.uk/info-resources/zerocarbon-britain/research-reports/zero-carbonrethinking-the-future/>

Question 11: Can impacts on competitiveness, the fiscal balance, fuel poverty and security of supply be managed regardless of the level of a budget, depending on how policy is designed and funded? What are the critical elements of policy design (including funding and delivery) which can help to manage these impacts?

[3] Christopher Clack et al., “Evaluation of a proposal for reliable low-cost grid power with 100% wind, water, and solar”, PNAS, June 2017, 114, 26, pp. 6722-6727, <https://doi.org/10.1073/pnas.1610381114>

John Bistline and Geoffrey Blanford, “More than one arrow in the quiver: Why ‘100% renewables’ misses the mark”, PNAS, 12 July 2016, 113, 28, E3988, <https://doi.org/10.1073/pnas.1603072113>

Mark Jacobson et al., “Matching demand with supply at low cost in 139 countries among 20 world regions with 100% intermittent wind, water, and sunlight (WWS) for all purposes”, Renewable Energy 123, 3 February 2018, pp.236-248, <https://doi.org/10.1016/j.renene.2018.02.009>

Mark Jacobson et al., “100% Clean and Renewable Wind, Water, and Sunlight All-Sector Energy Roadmaps for 139 Countries of the World”, Joule 1, pp.108–121, 6 September 2017, <https://web.stanford.edu/group/efmh/jacobson/Articles/I/CountriesWWS.pdf>

[4] Vivid Economics, Keeping It Cool: How the UK can end its contribution to climate change, Report prepared for WWF, November 2018, <https://www.wwf.org.uk/sites/default/files/2018-11/NetZeroReportART.pdf>

[5] Vivid Economics, A Climate of Possibility: Harnessing Scotland’s natural resources to end our contribution to climate change, Report prepared for WWF Scotland, January 2019, https://www.wwf.org.uk/sites/default/files/2019-01/WWF_Report_VIVID_Jan_2019.pdf

[6] Benjamin Sovacool, “How long will it take? Conceptualizing the temporal dynamics of energy transitions,” Energy Research & Social Science, 13, 2016, pp.202–215, <https://doi.org/10.1016/j.erss.2015.12.020>.

[7] Petroleum Act 1998, Section 9A.

[8] Andrew Whitaker, “Report warns Westminster’s attitude to renewables is putting UK energy security at risk”, The National, 11 May 2016, <https://www.thenational.scot/politics/14892599.report-warns-westminsters-attitude-to-renewables-is-putting-uk-energy-security-at-risk/>

[9] Kyle Smith, “The Danish wind industry 1980–2010: Lessons for the British marine energy industry”, International Journal of the Society for Underwater Technology, 30, No.1, 2011, pp. 27–33, <https://www.ingentaconnect.com/contentone/sut/unwt/2011/00000030/00000001/art00004?crawler=true>

[10] BVG Associates, UK Offshore Wind Supply Chain: Capabilities and opportunities, 2014, pp.52-53, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/277798/bis-14-578-offshore-wind-supply-chain-capabilities-and-opportunities.pdf

[11] See for instance: Call Mac Scaffolding <https://www.callmacscaffolding.co.uk/offshorescaffolding/>; PM Access <https://pmaccess.net/offshore>

Question 12: How can a just transition to Net Zero be delivered that fairly shares the costs and benefits between different income groups, industries and parts of the UK, and protects vulnerable workers and consumers?

ANSWER:

D. Scotland, Wales and Northern Ireland

Question 13: What specific circumstances need to be considered when recommending an emissions pathway or emissions reduction targets for Scotland, Wales and/or Northern Ireland, and how could these be reflected in our advice on the UK-wide sixth carbon budget?

ANSWER:

Question 14: The Environment (Wales) Act 2016 includes a requirement that its targets and carbon budgets are set with regard to:

- The most recent report under section 8 on the State of Natural Resources in relation to Wales;
- The most recent Future Trends report under section 11 of the Well-Being of Future Generations (Wales) Act 2015;
- The most recent report (if any) under section 23 of that Act (Future Generations report).
 - a) What evidence should the Committee draw on in assessing impacts on sustainable management of natural resources, as assessed in the state of natural resources report?
 - b) What evidence do you have of the impact of acting on climate change on well-being? What are the opportunities to improve people's well-being, or potential risks, associated with activities to reduce emissions in Wales?
 - c) What evidence regarding future trends as identified and analysed in the future trends report should the Committee draw on in assessing the impacts of the targets?
 - d) Question 12 asks how a just transition to Net Zero can be achieved across the UK. Do you have any evidence on how delivery mechanisms to help meet the UK and Welsh targets may affect workers and consumers in Wales, and how to ensure the costs and benefits of this transition are fairly distributed?

ANSWER:

Question 15: Do you have any further evidence on the appropriate level of Wales' third carbon budget (2026-30) and interim targets for 2030 and 2040, on the path to a reduction of at least 95% by 2050?

ANSWER:

Question 16: Do you have any evidence on the appropriate level of Scotland's interim emissions reduction targets in 2030 and 2040?

ANSWER:

Question 17: In what particular respects do devolved and UK decision making need to be coordinated? How can devolved and UK decision making be coordinated effectively to achieve the best outcomes for the UK as a whole?

ANSWER:

E. 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:

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

ANSWER:

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:

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:

Achieving a just transition in the fossil fuel supply sectors will require accountability, regionally specific policy development, and maximum transferability of skills with equivalent conditions.

In terms of accountability, the climate transition must not be used as a means for employers to undermine organised labour. A just transition strategy will need to be developed with input and leadership from workers and affected communities and guided by climate limits. Taking a queue from the TUC's resolution on a just transition, this includes: consultation between trade union representatives, government and voluntary organisations; investment in green technologies and infrastructures; democratic decision-making and worker participation; and strong social protection systems [1].

Trade unions should be actively involved in any employment transition, new industries' governance structures should be more accountable to workers through things like codetermination (trade unions and workers on companies' boards) and any transition plan should be accountable to the local communities most affected. This means regional plans and programmes must be designed with leadership from local governments and a range of local stakeholders [2].

In terms of equivalent conditions, energy workers must be offered jobs on at least equivalent terms and conditions and permanent contracts; worker support should include paid time off for education, fully paid-for relocation and retraining, wages protected for five or more years, and protecting pensions [3]. This means the public sector will need to take an active role in developing clean sectors, which should lead to an industry-wide agreement with employers regarding redeployment, job matching and upskilling.

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

Furthermore, a just transition must include oil-dependent regions, not simply its workers. This means community development investment programmes, which could include re-tooling the supply chain, building regional innovation hubs [4], improving logistics and connectedness including rail and internet [5] and reinvesting locally while supporting businesses to do the same.

Citations

[1] “Sea Change” Friends of the Earth Scotland, Oil Change International, Platform (2019).

[2] “Sea Change” Friends of the Earth Scotland, Oil Change International, Platform (2019).

[3] “Sea Change” Friends of the Earth Scotland, Oil Change International, Platform (2019).

[4] University of Aberdeen, “£40m hub to drive health innovation and life sciences company growth in Aberdeen”, 21 November 2018, <https://www.abdn.ac.uk/news/12455/>

[5] Tom Fogden, “Why Chattanooga Has the Fastest Internet in the US”, Tech.Co, 21 August 2018, <https://tech.co/news/chattanooga-fastestinternet-usa-2018-08>

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:

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:

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:

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 36 (Greenhouse gas removals): Is there evidence regarding near-term expected learning curves for the cost of engineered GHG removal through technologies such as bioenergy with carbon capture and storage or direct air capture of CO₂?

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:

Question 38 (Infrastructure): What scale of carbon capture and storage development is needed and what does that mean for development of CO₂ transport and storage infrastructure over the period to 2030?

ANSWER: