

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?

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?

The current method for calculating the UK carbon budget does not account for the carbon embedded in goods imported by and consumed in the UK. If countries exporting goods and services into the UK do not reduce their emissions, the UK's true carbon footprint can never reduce to net-zero. The UK should seek to lead by example, but also prevent further offshoring of domestic production in a counter-productive attempt to reduce apparent national emissions. The UK must account for the carbon that it imports.

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?

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?

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?

Steel is generally sold business-to-business, but with the increasing public consciousness of climate change there is strong evidence of businesses with a direct interface with the public driving climate action up their supply chains. The degree of pressure being exerted on foundation industries by customers has thus intensified in recent years, although this has not obviously translated into businesses being prepared to pay a premium to be supplied by low carbon material suppliers. As steel producers have to compete on price with globally traded steel, this means that there is no means of recovering expenditure on low carbon technology from the market.

One way to further incentivise consumers to take account of emissions in their consumption patterns would be to introduce a robust, harmonised and easy to understand carbon labelling scheme for goods (and services). In order to be meaningful, this would have to be underpinned by a life-cycle approach, taking account of the full life cycle of goods, including end of life. The EU's Product Environmental Footprint (PEF) tool offers a possible route to such a system.

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?

Policy needs to take into account the uncertainty that exists with regards technical feasibility and deployment cost for industrial (and more general, societal) decarbonisation. In the case of the steel industry, which has already come very close to optimising its carbon intensity using known technology, there will need to be a global transition involving a substantial switch to currently unproven technology. For the power sector, there now seems to be greater clarity with regards the pathway towards net zero emissions and solutions for decarbonising personal transportation are also becoming much clearer. Not only are the technological solutions for some sectors clearer than for others, but the ability of certain sectors to finance a transition, for example, by passing costs on to consumers, varies from sector to sector. A subsidy or policy model that may have worked to incentivise decarbonisation in one sector may not be effective in another.

Another uncertainty, or complication, is the interdependency of different industrial sectors and other parts of the economy. For example, the decarbonisation of personal transportation is likely to be achieved through electrification, but the automotive sector and members of the public cannot have certainty that sufficient green electricity and charging infrastructure will be in place to make their investments successful. In the same way, the foundation industries are very dependent upon the power sector's rate of grid decarbonisation, access to bulk hydrogen and carbon storage infrastructure at low prices. Policy assurance is needed that power prices will be competitive with our those of our European partners and short-term support can be provided that does not conflict with state aid rules, so we may make the necessary transition.

There also exist substantial uncertainties around global carbon policy (and carbon pricing) and trade policy. It is imperative to ensure an equal playing field in international, competitive markets. There are currently no signs that harmonised, universal carbon prices will emerge, and an alternative must be considered, such as product standards or carbon

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border mechanisms to protect domestic producers from import penetration from producers in less carbon constrained economies. Such measures would be low-regret and would facilitate the creation of markets for responsible manufacturers while sending strong price signals to overseas producers. As other countries start decarbonising their steel production, it will be easy to allow their products into the low-emission markets.

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?

A revision of the budgets is likely to be needed to meet net-zero by 2050 and the quicker the UK moves towards decarbonisation, the easier it will be to meet the net-zero target.

The existing carbon budgets could be revised if additional ambitious and supportive policies were to be introduced, i.e. a combination of governmental support for capex and policies to facilitate the OPEX costs (see the answer to question 22). It is difficult to see how the steel industry could decarbonise any faster with the current policies.

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?

There are currently very few, obvious co-benefits from decarbonising steel. Decarbonisation will require significant capital investment and increase ongoing operational costs. So long as there is no tangible market premium for responsible producers - and no direct benefits from decarbonising under present market conditions, apart from complying with regulatory requirements – this will remain the case.

If Government could provide financial support towards a technology transition, or a market created for responsible products, or legislation enacted that mandated the use of responsible products (for example, legislation along the lines of the EU Ecodesign Directive), then there could be a co-benefit for the UK economy in terms of developing and showcasing green technology capability in the UK that could then be exported to the rest of the world. The UK steel industry is structurally well-placed to be serve as a test bed for the development of decarbonisation technology:

- The UK not only has a heritage of steel industry innovation, but also has a huge wealth of talent in its world-leading universities, many of which already have close collaborations with the steel sector in relation to decarbonisation and resource efficiency.
- The UK remains a strong centre for design and engineering (for example, Primetals, has a strong UK base and is already providing engineering / technological decarbonisation solutions for steel companies across the globe).
- The UK steel sector benefits from its proximity to long-term geological CO₂ storage

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- Steelmaking, particularly integrated steelmaking, can act as a hub for wider industrial symbiosis and resource efficiency. The South Wales Industrial Cluster is an example of this. As such, any actions taken to decarbonise the steel sector are likely to have consequential benefits for wider industrial decarbonisation.

As such, the vision for the UK to become a hub for steel sector decarbonisation technology development appears to be realistic, within our grasp and capable of benefiting the whole economy. But this vision can only be achieved if decarbonisation is made affordable.

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?

For the steel industry, it is vital that policy be implemented as soon as possible rather than delayed. Although there generally is a wish for certainty, there is currently a lack of needed policies to allow steelmaking in the UK to decarbonise. For the period 2030-35, the steel sector needs a clear direction of travel and policies that will enable this transition – ideally, this should be announced many years in advance, so the sector can prepare (like the recent announcement of a phase out of conventional car sales by 2035). The sector needs a commitment to future policy on creating markets for responsible steel or on Carbon Border Adjustments (or similar policies – see Q22) now to set course for the transition, otherwise, steel producers cannot see a route to decarbonisation that is married to profitability.

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?

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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?

Maintaining competitiveness with global producers remains profoundly important when considering policy options for driving decarbonisation of the UK steel sector. So far, the main policies regarding industrial decarbonisation (EU ETS) have not sufficiently dealt with competitiveness, apart from trying to prevent carbon leakage through a process of (inadequate) free allocation of allowances. Indeed, UK industries pay a disproportionately higher energy price compared to European competitors. The EU ETS in effect merely serves as a cap on production.

No policies have yet been introduced to ensure increased competitiveness under Net Zero targets. If the UK steel industry and other foundation industries are to decarbonise fully

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while retaining production in the UK, a new paradigm in policy development must be introduced, so that decarbonisation will lead to increased competitiveness. As discussed in response to earlier questions, this could take the form of measures designed to create a market for responsible steel:

- It is possible to define criteria within the framework of public procurement policy that require or encourage 'clean steel' to be used in projects. The uptake by many entities engaged in public procurement of the UK Steel Charter, which includes a commitment to purchase only steel products meeting sustainability standard BES6001, is an example.
- There is currently a toolkit of EU product environmental policy that could be adapted (for example, by the UK Government after the UK's expected withdrawal from the EU) to mandate the use of 'clean steel' by OEMs. For example, the Ecodesign Directive requires that products in defined product groupings must achieve minimum, defined levels of sustainable design before they can be placed on the EU market. Another example is the suite of producer responsibility directives (e.g. Packaging and Packaging Waste Directive, End of Life Vehicle Directive etc.) which stipulate product design and end of life recycling requirements.

Another mechanism that the UK Government should consider is the use of consumption based reporting of domestic emissions, and a linkage between this means of accounting for national carbon emissions and legal carbon emissions targets.

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?

It is evident that the UK steel sector is not thriving under the current economic climate and legislative framework. Policies such as the high industrial electricity prices actively disadvantage the sector and increase its vulnerability. UK policies must recognise the commercial reality of the international steel market and be designed in a way that will ensure the sector can once again prosper, as it will never otherwise be able to decarbonise. Many of the policies the sector points to do not need to have a negative impact on vulnerable workers and consumers but can be designed in a way that will avoid negative consequences for these groups.

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?

A key consideration in relation to the devolved administrations is that the contribution of industry to national emissions varies between them. The national emissions inventory of

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Wales is more dominated by hard to abate industrial emissions than the inventories of England and Scotland.

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?

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?

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

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?

It will not be possible to reduce emissions from steel plants in Wales without policies on CCUS, hydrogen, electricity prices, and carbon border mechanisms, which are all currently designed on a UK basis. It is thus imperative that decision making is coordinated.

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?

Current planning processes and existing PPI contracts mean that road replacement and new builds are not aligned with the future carbon targets. New road infrastructure, near the Tata Steel site in Port Talbot for example, did not include cycle ways or footpaths and can be seen as a missed opportunity. This is a nationwide issue, and policy needs to move quickly to ensure that new roads and transport planning, should take consideration of an increase in cycling and walking. Grants to install cycle ways would be welcomed.

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

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?

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?

A transition to low-carbon transport could also benefit industry by incentivising the expansion of renewable power and hydrogen production and transportation.

Up to 2050, the Port Talbot site could also be a bulk provider of hydrogen, given sufficient incentives to kick-start the local hydrogen economy. The availability of CCS, using the Port Talbot plant as a necessary anchor project, would allow low-carbon hydrogen (SMR) to benefit from this CCS infrastructure. A holistic and localised approach to the net-zero challenge is needed, not looking at each sector or solution in isolation.

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

The UK steel industry is a sector at risk of carbon leakage, as it is significantly trade-exposed as shown by numerous studies by the EU in implementing climate change policies ([SOURCE](#)). There are many different policy measures that could be used to drive decarbonisation without de-industrialisation in manufacturing sectors at risk of carbon leakage, such as steel:

- Carbon border mechanisms: Although somewhat technically difficult to implement, it is also the most suitable policy mechanism. As the steel industry competes in an international market on price, it is impossible to decarbonise, if it has to compete with imported high-emission, lower-priced steel. A CBM allows there to be an additional carbon cost on imported high-emission steel to create a level playing field for domestic producers.
- Product standards: In many ways, product standards are similar to CBM, although a blunter tool of not allowing steel to be sold in the UK, if it is produced through high-emission methods.
- Green public procurements: In many sectors, public procurement makes up a substantial proportion of the market and can, therefore, help drive change across supply chains. For steel, public procurement makes up between 7-10% of the steel annual consumption, and there is, therefore, less scope for public procurement being able to drive significant change.
- Carbon Taxation: Carbon taxation works very well in certain sectors, such as the power sector, which is not exposed to international trade and are able to pass on the costs to their customers. This is not the case for the steel sector, as their competitors do not face similar policies. In effect, carbon taxes instead merely

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reduce the capital available for investment and make decarbonisation harder for the sector.

- **Internalising costs:** Another option is internalising all additional costs faced as a result of decarbonisation policies, i.e. the Government will fund the ongoing higher operational costs of low-carbon technologies, so companies can still compete on price. This is a route currently being considered for UK CCUS policies. Although this mechanism does address one of the main concerns (i.e. higher OPEX) of the steel sector, we would be concerned about the level of support needed and the long-term willingness to fund this via general taxation or energy bills, considering the scale of support needed.
- **Electricity prices:** While electricity price policies are not policy mechanisms that will directly support the decarbonisation of the steel sector, the policies are a major barrier. Options for decarbonising the steelmaking process include fuel switching (e.g. hydrogen), CCUS, and electrification. All these options, but in particular electrification and hydrogen steelmaking, leads to increased electricity consumption. A systemically higher electricity price is a substantial barrier to any investment in decarbonisation options, as this would further worsen the industry's ability to compete with European and global steelmakers. Lower industrial energy prices is thus a basic necessity for the industry to be able to start decarbonising its production and therefore play an integral part in helping the UK Government meet its 2050 target.

Ideally, a combination of the above policies would be implemented, as no one policy is sufficient to support the decarbonisation of the steel sector.

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?

There are good examples of where Governments have assisted the steel sector in taking steps towards decarbonisation, such as the German and French Governments implementation of low industrial electricity prices. This has allowed their steel sectors to be in a much stronger financial position to invest in decarbonisation. Other examples include the Swedish HYBRIT, which is a joint R&D project between the Swedish Government and three steel companies in developing hydrogen steel production.

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

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)?

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?

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?

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?

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?

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?

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?

From Tata Steel's recent work with The National Grid, it is clear that there is large potential for fuel switching to hydrogen in the South Wales industrial region, and it is likely that this is mirrored across the UK's industrial base. A target of one facility within this decade is insufficient to meet a net-zero target, unless rapid expansion occurs at high-cost in 2030s, with industries suffering from a lack of cost effective low-carbon options. Hydrogen infrastructure must be rolled out across all industrial regions starting this decade, if we are to meet more ambitious targets. A very good example of early application, would be for Tata Steel to utilise its works arising gases more efficiently, to become a large net exporter of hydrogen, kick-starting the local hydrogen economy. This could only be achieved if the demand and incentives were quickly put in place to address a shortfall in energy needs with cost effective electricity or NG and to carry out a demonstration of this technology, to reduce potential risks. Grants to support new infrastructure need to be made available (which should be excluded from state aid rules, if it is needed to address the climate emergency) along with a reduction in the network charge for hydrogen uses. Injection of hydrogen into the grid seems to be a good early application of hydrogen to reduce domestic heating emissions, as does hydrogen public transport, which has a dual benefit of improving air quality.

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?

Offsetting emission from aviation and shipping is needed using GHG removal technologies and a switch to biofuels. Some serious consideration should be given to the UK's bioenergy policy. Unless it is linked to aviation, shipping or CCS, given the limited UK bioenergy supply, all biofuel sources will be needed to offset the difficult to decarbonise sectors, such as aviation or shipping.

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?

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?

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?

Given global activity and demonstrations, CCS should rightly be regarded as a viable and cost effective technology. There are few constraints to its uptake if the risks and financial models can be addressed. The location of current and planned biomass use is a potential constraint, if there is no access to CCS infrastructure. Steel plants can be a significant contributor to GHG removal if biomass is used in combination with CCS, however there is no incentive in place, nor national CCS infrastructure. The use of unabated biomass, within integrated steelworks can provide a short-term decarbonisation solution.

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?

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?

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?

Given global activity and demonstrations, CCS should be regarded as a viable and cost effective technology. There are a range of geological storage options available to the South Wales region, albeit that some shipping would be required, limiting risk of access to suitable storage. It's clear that the quicker the UK moves to introduce CCS infrastructure, the easier and more cost effective it will be as 2050 approaches. There is a case for CCS infrastructure to be developed rapidly up to 2030. At scale means the ability to sequester >3million ton of CO₂ per annum, to provide economies-of-scale to bring costs to an appropriate level. CCS is already cost effective today, with costs estimated to be no more than £65 per ton of CO₂ sequestered for the steel sector. This would only represent a very small price increase to end customers, but unaffordable to those engaged in business to business supply. To meet the CCC's current CCS targets, CCS infrastructure needs to be in place at all 5 UK industrial clusters, however the current ambition will only provide funding for 1 net-zero industrial cluster in the 2030s, leaving the other 4 regions without the means to decarbonise quickly and cost effectively.