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.

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.

NFU Cymru welcomes the opportunity to respond to the UK Climate Change Committee Call for Evidence on the Sixth Carbon Budget and Welsh emission targets.

NFU Cymru champions Welsh farming and represents farmers throughout Wales and across all sectors. Our vision is for a productive, profitable and progressive Welsh agricultural industry that delivers jobs, growth and investment for Wales.

The importance of the farming industry in rural Wales cannot be over-stated. Welsh farming businesses are the backbone of the Welsh rural economy, the axis around which rural communities turn. The raw ingredients that we produce are the cornerstone of the £6.8 billion Welsh food and drink supply chain, 217,000 are employed across the whole food and drink supply chain with 78,000 employed in the Food and Farming Priority Sector.

We are proud that the Welsh public associate Welsh farmers, first and foremost, with providing safe, high quality and traceable food and at NFU Cymru we want to ensure that consumers in Wales, the UK and further afield can continue to enjoy and choose the top quality food that we produce here in Wales. Welsh farmers look after over 80% of the land area of Wales, maintaining and enhancing our natural environment – Wales' key asset. Farming activity supports a diverse range of species, habitats and ecosystems, provides a range of ecosystem services including flood alleviation, carbon sequestration, climate change mitigation; and delivers the significant backdrop for Wales' tourism and recreation sector worth an estimated £2.5bn annually. Welsh farmers are key promoters and protectors of our culture, heritage and the Welsh Language. Overall Welsh farming makes an unparalleled contribution to the social, economic, environmental and cultural well-being of Wales. The Welsh Agricultural Industry has the highest proportion of Welsh Speakers, more than any other sector.

Overall Welsh farming makes an unparalleled contribution to the economic, environmental, social and cultural well-being of Wales in line with the Well-Being of Future Generations Act summarised in our Welsh Farming: Bringing Wales Together booklet and video.

With 80 per cent of national land area in the agricultural sector, NFU Cymru members have a significant interest in land-based renewable energy production, where they can benefit directly as energy producers themselves or as hosts for energy plant developed by others. NFU research, as well as that of other organisations, suggests that nearly two-fifths of farmers and growers have already invested in some form of renewable energy production for self-supply or export to other users. We estimate that farmers own or host about 70 per cent of Britain's solar power capacity, over half of AD capacity and the majority of wind power, while playing a significant role in the supply or fuelling of renewable heat.

Last year, the NFU and NFU Cymru set out its vision for agriculture to achieve a net zero contribution to climate change across the whole of agricultural production in England and Wales by 2040, focussed on three key areas:

- Improving the productive efficiency of farming across all sectors
- Increasing on-farm carbon storage in vegetation and soils
- Boosting production of land-based renewable energy, including bioenergy for processes coupled to CCUS, to generate credits for GHG emissions avoided and GHG removal.

General comments

Farmers and growers in the UK are already starting to see the impact of climate change upon our sector, and extreme weather events over the past two years have served to remind us how vulnerable farming is to a changing climate.

The NFU has engaged with staff and members of the Committee on Climate Change (CCC) since 2008, on the evidence base for reducing agricultural and land-based emissions (mostly through increased productivity and improved management), on how farmers and growers can contribute to the decarbonisation of other parts of the economy, on the CCC's 2011 and 2018 bioenergy reviews, and on land use and potential greenhouse gas removals.

In line with our response to the CCC's previous Call for Evidence on building a zero-carbon economy, we recognise the need to go further and faster in national decarbonisation across all sectors, as well as the political imperative for the CCC to propose the Sixth Carbon Budget in advance of COP26. By 2033-37, we will be three-quarters of the way through the planned delivery of our 'net zero' agriculture plan, having enabled the "easy wins", initiated the mid-term measures and started preparatory work on the long-term goals.

We also acknowledge the need for a "just transition" that takes into account factors such as competitiveness, energy security, food security, and the UK's comparative economic advantage as a low-carbon food producer across a range of food types. A "just transition" for farmers and land managers will require upskilling of the agricultural workforce, whether through formal training or learning on-the-job, as agriculture embraces new and more productive technologies (e.g. applications of artificial intelligence).

NFU Cymru welcomes new practical and profitable diversification opportunities for farmers in enhancing carbon stores on farm, producing bio-based substitute materials for buildings and industry, and coupling bio-energy to carbon capture and storage. However, future farming policy must enable farmers to meet the food production needs of the nation alongside our wider environmental goals, so boosting the productivity and competitiveness of both crop and livestock output is of paramount importance.

Our aspiration is for Welsh farmers to produce the most climate-friendly food in the world. Noting that the latest evidence suggests the carbon footprint of UK beef is about half the world average, we can go further, whether that is through improving our productivity, using our own land, hedgerows and trees to take up and store carbon, or boosting our renewable energy output. We know that there is no single answer to the climate change challenge facing us all. NFU Cymru urges Government and other stakeholders across the food chain to work with the agricultural industry to help deliver our net zero aspiration by 2040, alongside producing high quality, affordable food for the nation.

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: n/a

Question 2: How relevant are estimates of the remaining global cumulative CO_2 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: n/a

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: n/a

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:

NFU Cymru shares concern with other stakeholders that UK leadership in tackling climate change (as well as the confidence of the business community) requires more than just a net zero goal for 2050: interim goals consistent with this increased level of ambition are also required, so a revised and strengthened UK NDC is desirable. However, net zero will not happen on its own. Delivery of goals and ultimate net zero will require appropriate policy measures and support for the sector from government if they are to become a reality.

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: n/a

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: n/a

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:

The NFU agrees with other stakeholders that at a minimum the fifth carbon budget may need to revised to match the trajectory towards net zero by 2050 (see Q4 above).

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: n/a

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: n/a

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: n/a

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: n/a

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: n/a

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: n/a

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: n/a

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:

NFU Cymru notes UKCCC is calling for evidence to provide advice on the third carbon budget (2026-2030), updated advice on the second carbon budget (2021-2025) as well as interim targets for 2030-2040.

UK CCC has previously recognised that decarbonisation in Wales may be more challenging than elsewhere. This needs to be reflected in the UK Wide sixth carbon budget.

NFU Cymru believes that the Well-Being of Future Generations Act provides a strong framework for assessing the impacts of targets, placing a duty on public bodies to consider equally economic, environmental, social and cultural well-being. We identify that decarbonisation policy proposals are likely to impact disproportionately on rural and farming communities. Proposed policies are also likely to impact on food security/food production capacity in Wales when many challenges to our global food production system are now predicted.

The Foresight Future of Food and Farming Report (2011), for example, identified many pressures on the global food system between now and 2050. This includes:

- Increases to the global population size to an estimated 9 billion (from approximately 7 billion today) by 2050;

- Changes in the size and nature of per capita demand;
- Future governance of the food system at both national and international levels including the extent to which governments act collectively or individually to face future challenges;
- Climate change – which will interact with the global food system in two ways. Firstly growing demand must be met against a back-drop of rising global temperatures and changing patterns of precipitation and secondly policies for climate change mitigation have the potential to significantly affect the food system;
- Competition for key resources including land for food production, global energy demand and global water demand.

We highlight the Future Trends Report lacks a food security/agricultural productive capacity indicator and this is a key gap.

Widespread land use change to meet decarbonisation objectives is likely to lead to significant negative impacts for the farming and rural communities with loss of employment and rural vitality and associated irreparable damage to Welsh culture, language and rural well-being. Welsh Government proposals for medium to large scale afforestation of 66,000 ha, for example, will result in the loss of 1400 farms (average farm size 48ha) in Wales. This does not represent a just transition in that the burden is unfairly borne in rural Wales.

Annex 1 highlights the importance of agriculture to Wales across the Well-Being of Future Generations goals.

Farmers do, however, recognise that they have a key role to play in contributing to decarbonisation in Wales, they are very much part of the solution in line with the net zero agriculture 2040 ambition. Farmers are focussed on improving production efficiency and also enhancing carbon stores on Welsh farms and are responsive to measures that deliver increased hedgerows, woodland parcels alongside renewable energy generation. Such an approach allows Welsh farms to continue to deliver the broadest possible range of positive benefits to society.

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

ANSWER: n/a

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: n/a

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: n/a

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

ANSWER: n/a

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: n/a

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: n/a

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:

(d) In a previous (2018-19) working group on electric agricultural/non-road vehicles co-chaired by the NFU under the government's Industrial Strategy, it was concluded that reinforcement of electricity infrastructure, including buffer battery storage systems, would be essential for charging relatively large electric vehicles (EVs) for agricultural use – an

option which is likely to be widely commercially available by 2033-37. The group considered it critically important that Government (through Ofgem) incentivises the Distribution System Operators to support electricity grid upgrades and new technology. In addition, improved digital infrastructure and connectivity would enable the deployment of advanced Connected and Autonomous Vehicles in agriculture, addressing the Government's 'Grand Challenge' of future mobility in the rural economy. The group also concluded that the large EV batteries likely to be used in this sector would be well-suited to providing vehicle-to-grid (V2G) services, reinforcing weak rural electricity networks, lowering the cost of non-road EV ownership, reducing emissions from agricultural production and supporting integration of renewable electricity generation on farms and rural enterprises.

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: n/a

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

ANSWER: n/a

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: n/a

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: n/a

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: n/a

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: n/a

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: n/a

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: n/a

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: n/a

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:

By 2030/35 (and out to 2050) we anticipate that the use of liquid transport biofuels may be confined mostly to long-distance aviation and shipping, cutting emissions by 70% or more compared to fossil fuels, in line with the emission saved by sustainable biofuels today. It is important for the UK to plan for continued future demand for domestic bioenergy feedstocks to supply this need.

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:

The CCC's productivity goals for crops and livestock are broadly in line with the NFU's own net zero strategy. Enhancing productivity is also one of the three cornerstones of NFU Cymru's proposals for a future domestic agricultural policy. Over the next 15-20 years, we expect to achieve increased productivity through better livestock diets (including feed additives), improved livestock health and breeding, low GHG fertilisers, precision agriculture, improved slurry management, skills and training and resolving barriers in investment that may arise from tenancy. Welsh Government' future agricultural policy and a broader range of enabling government measures will be essential to support this change and to facilitate investment in new technology (e.g planning policy, grants) and to provide farmers with the required infrastructure whether digital, energy or physical.

We are pleased to see the central role for farming within the Net Zero Technical Report as well as the recent Land Use: Policies report, with the CCC recognising that UK red meat livestock production is amongst the most climate-friendly in the world. We think it is helpful that policies to reduce food waste and to manage shifts in consumer dietary preference are considered together. The NFU believes the UK should be aiming for 50% reduction in waste throughout the whole food supply chain, which would also relieve pressure on people to make dietary changes.

NFU Cymru rejects an explicit goal to reduce the area or numbers of grazed livestock, which would have a disproportionately impact on already disadvantaged regions of Wales and significant economic, environmental, social and cultural consequences. The emissions profile of a range of agricultural production systems in Wales already compare favourably to other parts of the world. Such a policy could result in displacement of production from Wales to elsewhere.

However, we are not yet convinced that indoor horticultural production can replace more than a small fraction of field crops, Vertical farming remains marginal, and is presently confined to specialist food service products (e.g. fresh herbs, spinach, wheatgrass).

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:

The NFU agrees with the broad level of ambition for bioenergy crops and the relevant policy recommendations made in the CCC's recent Land Use: Policies report. In addition to perennial energy crops (up to 700,000 hectares by 2050, as suggested by the CCC), we believe there will be opportunities in the 2020s to further expand production of annually harvested non-food crops within more diverse arable rotations, such as hybrid rye, maize and herb-rich grass leys, thereby supporting an expanded fleet of AD biomethane installations to help decarbonise domestic gas supply.

Uptake of afforestation and woodland planting on farmland will be highly dependent upon effective policy instruments, such as access to a robust carbon price for planting at scale. Enhanced and extended hedgerows, together with smaller patches of woodland and other agroforestry measures, may be more likely to be incentivised in the short term (e.g. 2021-25).

NFU Cymru does not support widespread land use change from agriculture to forestry at the scale proposed by Welsh Government. We highlight 66,000ha of medium to large scale afforestation would result in the loss of 1400 farms in Wales (average farm size 48ha) with associated economic, environmental, social and cultural impacts. We are clear that the burden of decarbonisation should not fall unequally on our rural and farming communities. This would not align with the duty on public bodies under the Well-Being of Future Generations Act to enhance economic, environmental, social and cultural well-being. It is also not globally responsible' or sustainable to export food production to other parts of the world where environmental standards may be lower.

We look forward to presenting evidence to the CCC on additional GHG removal measures which a robust carbon price reward might make widely accessible to farmers and growers in the future (e.g. late 2020s onwards), such as soil amendment with biochar or basaltic minerals. Such unconventional soil amendments are presently the subject of experimental field trials in the UK and overseas.

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:

A key NFU Cymru policy ask to enable "Pillar 3" of our net zero strategy is to support domestic, alongside renewables, bioenergy and bioeconomy supply chains now, in order to build capacity for GHG removals in the future. We were pleased to see policy recommendations to this effect in the recent CCC Land Use: Policies report. NFU Cymru believes a future competitive market needs to emerge between different negative emissions pathways, i.e. a wide range of different technologies and systems at a variety of scales. Support for a robust long-term carbon price may be the best way to bring this forward. We believe it is likely that some agricultural business opportunities for atmospheric CO2 removal may be deliverable for a fraction of the cost of industrial CCUS. Looking beyond land-based removals, this might take the form of diverting otherwise vented biogenic CO2 (e.g. from anaerobic digestion or ethanolic fermentation) into the production of synthetic fuels or longer-lived bioplastics, carbon fibre and composite materials.

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 CO_2?

ANSWER: n/a

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: n/a

Question 38 (Infrastructure): What scale of carbon capture and storage development is needed and what does that mean for development of CO_2 transport and storage infrastructure over the period to 2030?

ANSWER:

NFU and NFU Cymru have a stakeholder interest in the development of infrastructure for CO_2 transport by pipeline. We have extensive experience with regard to other operations that require access to cross or use agricultural land, including coal and potash deep mining, opencast coal, oil and gas pipelines, water, sewage, and new railways such as HS2. It is essential that farm businesses are properly consulted and compensated for any new associated infrastructure crossing their land, which may carry significant negative implications for agricultural production if poorly executed.

Annex 1 - The Contribution of Agriculture to the Well-Being of Wales

The Welsh Government Well-Being of Future Generations (Wales) Act 2015 is designed to improve the social, economic, environmental and cultural well-being of Wales. The Act establishes seven goals that all public bodies, including Welsh Ministers, must work to achieve. The contribution that farming makes to achievement of all seven goals is unparalleled by any other industry, as highlighted in the following below:

Well Being of Future Generations Act: **Well-being Goals**	**NFU Cymru: Agriculture is the Answer**
A prosperous Wales	• 60,000 employed full or part time in farming in Wales • £1.5bn Gross Output • Farming underpins a food supply chain worth over £6bn • Over 220, 000 people in Wales are employed in the agri-food sectors – that's 17% of the workforce and Wales's biggest employer • The Welsh countryside managed by farmers provides the backdrop for the tourism industry worth over £2.5bn • **The Welsh agricultural industry is a key generator of wealth and employment for the people of Wales**
A resilient Wales	• Farmers care for 81% of total land area of Wales – that's over 1.84m hectares • 600,000 ha of environmentally designated areas • Almost 560,000 ha managed under Glastir Entry Sustainable Land Management Scheme designed to combat climate change, improve water management and maintain and enhance biodiversity • Farming supports a diverse range of species, habitats and ecosystems • Farmers provide a range of ecosystem services including carbon sequestration and management, water quality and water quantity management for flood alleviation • Low carbon, local energy installations have the potential to meet 57% of Wales's electricity consumption and the evidence shows a large proportion of projects are located within Wales's rural local authorities

	• GHG emissions from agriculture have declined by 20% since 1990 and further decreases are being achieved through production efficiency measures • **Welsh farmers play a key role maintaining and enhancing our natural environment and supporting the provision of a full range of ecosystem services**
A healthier Wales	• Welsh agriculture is a key provider of safe, nutritious, high quality Welsh food which plays a fundamental contribution in supporting the physical and mental well-being of the people of Wales • Welsh farmers are known to operate to some of the highest standards of welfare and production in the whole world • Welsh farming also delivers a significant proportion of Wales's access provision which includes 16000 miles of footpaths, 3000 miles bridleways, 1200 miles of cycle network, and 460,000 ha of open access land • **Welsh farming makes a key contribution to the physical and mental well-being of the people of Wales**
A more equal Wales	• Rural Wales is home to 33% of the Welsh population. • The vitality and potential of rural areas is closely linked to the presence of a competitive and dynamic farming sector. The NFU Cymru 'Why farming Matters to the Welsh Economy' shows that each family farm is typically economically linked to some 40-80 other businesses in the region • **Through direct and indirect employment in rural communities, Welsh farming underpins the rural economy and contributes to a more equal Wales**
A Wales of cohesive communities	• Local communities in rural Wales are heavily dependent on agriculture for financial and social prosperity. • Leadership and voluntary roles in rural communities • **Welsh farmers make a key contribution towards the provision of attractive, viable, safe communities in rural areas**
A Wales of vibrant culture and thriving Welsh language	• Agriculture has the highest proportion of Welsh speakers of any sector. • Farming is the bedrock of rural communities across Wales which have been shaped by farming activity spanning hundreds of years. Farmers continue to maintain these traditions, preserving rural culture and sense of place • **Welsh farmers are key promoters and protectors of our culture, heritage and the Welsh language**
A globally responsible Wales	• Current levels of self-sufficiency at a UK level are at 62% • Future challenges to our global food production system include climate change, a growing UK and global population, water scarcity. Given its climate and rainfall, Wales is predicted to be an area of favoured production in the future • **Welsh farmers have a key role to play feeding the people of Wales and in contributing to global food security now and in the future.**