NET ZERO AND THE UK AGRI-FOOD SYSTEM: PRIORITIES FOR RESEARCH AND POLICY - A CONSULTATION DOCUMENT

AFN Network+ (Agri-Food4NetZero)

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1. Introduction

Globally, the agri-food system accounts for a third of total greenhouse gas (GHG) emissions. In the UK, the proportion is lower at just under a quarter. Total emissions from the UK agri-food system are around 135MtCO_2e a year, around half of which comes from the production sector. The next largest sources are transport and retail accounting for 11-12 per cent each.[1] Agricultural emissions are principally from livestock, agricultural soils, fuels and heating. Methane makes up almost two-thirds of agricultural emissions, largely from livestock and their manure. Since 1990, emissions from UK agriculture have fallen by 12 per cent, but most of this fall was due to falling livestock numbers and fertiliser use to around 2010. Emissions from agriculture have flatlined over the past 15 years, and between 2020 and 2021 they were estimated to have increased by 3 per cent.

The Climate Change Committee's (CCC) Sixth Carbon Budget, published in 2020, suggests changes in the UK agri-food system to ensure sufficient reduction in net emissions to achieve a net zero UK by 2050.[2] The budget suggests net emissions from agriculture and land should fall from 67 MtCO_2e in 2018 to 40 MtCO_2e in 2035 and to 16 MtCO_2e by 2050. The CCC assumes that net self-sufficiency in food remains the same. The key changes for the agri-food and land use system are as follows:

Food: A 20 per cent drop in meat and dairy consumption by 2035 and a further 15 per cent drop in meat consumption by 2050; a 50 per cent reduction in food waste by 2030, and 60 per cent by 2050.

Farming: Agricultural emissions fall from 54.6 MtCO_2e in 2018 to 39 MtCO_2e in 2035, and to 35 MtCO_2e in 2050; uptake of low emission farming practices reduces emissions by 4 MtCO_2e by 2035; productivity improvements reduce emissions by 1 MtCO_2e by 2035; fossil fuel use in agriculture halves from 4.6 MtCO_2e of emissions in 2018 to 2 MtCO_2e in 2035.

Land: Some 440,000 ha of additional woodland to be planted by 2035 and 260,000 ha shifted to bioenergy production. Total woodland area should increase to 18 per cent of the UK's land area and additional energy crops to 720,000 ha by 2050. This will require 30,000 ha of trees a year planted by 2025, rising to 50,000 ha per year by 2035. To meet targets, the CCC anticipates around a third of agricultural land would need to be freed up from production by 2050; 25 per cent of UK land area is covered by forestry and energy crops (compared to 15 per cent today) and 80 per cent of peatland is restored by 2050.

This pattern of change remains the most authoritative statement by an independent statutory body focussed primarily on how the UK gets to net zero. However, a host of interesting

[1] https://edgar.jrc.ec.europa.eu/edgar_food#intro

[2] Climate Change Committee (2020b) *The Sixth Carbon Budget: The UK's Path to Net Zero*. London: Climate Change Committee. https://www.theccc.org.uk/publication/sixth-carbon-budget/

alternative pathways have been set out by others including the National Farmers' Union[3], the National Food Strategy[4], the Sustainable Food Trust[5] and the Green Alliance[6].

The AFN Network+ was established in 2022 to help inform the work of the UK research councils. It is funded by UKRI, the research councils' umbrella body, including the Engineering and Physical Sciences Research Council (EPSRC), the Biotechnology and Biosciences Research Council (BBSRC), the Natural Environment Research Council (NERC) and the Economic and Social Research Council (ESRC). The Network's membership has grown to over 1,300 in its first year and it organises activities to support networking, knowledge exchange and research agenda-setting among researchers, practitioners, stakeholder organisations and policy-making bodies. It also supports the professional development of early career researchers and funds some research of its own. This consultation document has been produced after the Network's first year of activities, and research priorities were explored at an expert workshop in November 2023.

During 2023, the AFN Network+ produced four scenarios for 2050 to help broaden thinking about what the world could be like.[7] In each scenario, the UK gets to net zero by 2050, but along different pathways and in very different socio-economic and geopolitical circumstances. The scenarios are not predictions of what will happen. They are just tools to help us expand our thinking beyond simple assumptions that the future is an extrapolation of recent trends. They are designed to help us think about a broader range of research questions for the 2020s and beyond. The scenarios are:

- Scenario A: 'Build back fast again' – an unstable and globalised world, where economic growth is key (essentially business-as-usual);
- Scenario B: 'Circular worlds' – geopolitically stable and globalised, underpinned by circular sustainable systems and values;
- Scenario C: 'Self-sufficiency' – an unstable, regionalised world, where a circular economy is driven by the need to save resources; and
- Scenario D: 'The right to food' – a geopolitically stable world, with a globalised economy built on 'green growth'.

The scenarios were used to help frame the discussions at our November workshop and to broaden thinking about plausible futures for the agri-food system, and the kinds of research priorities that emerge. In what follows, we set out the suggested priorities for research and policy under six themes. (These themes were generated from previous discussions among Network members and an event in Leeds in May 2023). We also propose policy options. The six themes are not strictly discrete and bounded and the proposed research and policy options

[3] National Farmers' Union (2019a) *Achieving Net Zero: Farming's 2040 Goal*. London: NFU. https://www.nfuonline.com/archive?treeid=138313

[4] National Food Strategy (2021) *National Food Strategy – Independent Review: The Plan*. London: National Food Strategy. https://www.nationalfoodstrategy.org/

[5] Sustainable Food Trust (2022) *Feeding Britain: From the Ground Up*. Bristol: Sustainable Food Trust https://sustainablefoodtrust.org/our-work/feeding-britain/

[6] Green Alliance (2023) *Shaping UK Land Use: Priorities for Food, Nature and Climate*. London: Green Alliance https://green-alliance.org.uk/publication/shaping-uk-land-use-priorities-for-food-nature-and-climate/

[7] Benton, T. *et al.* (2023) W*hat Could the UK Agri-Food System Look Like in 2050?* Bristol: University of West of England, AFN Network+ https://www.agrifood4netzero.net/news

often straddle them. We have added a final section considering system-wide and cross-cutting issues.

Healthy and sustainable diets: How to develop a resilient UK food system that contributes to net zero while promoting healthy diets? (This theme focuses on the need for dietary and food system change to contribute to a net zero UK, while promoting access to healthy and affordable diets. It covers the social, environmental, and economic dimensions of animal production, and of plant-based alternatives in the agri-food system, as well as the role of fruit, vegetables, and ultra-processed foods in diets).

Land productivity: What should we grow in the UK? (This theme focuses on the productive utilisation of our finite land resource. It covers questions of how crop and animal breeding and husbandry can help ensure sufficient food is produced from less land, and how space can be created for ambitious targets for planting trees to sequester carbon).

Food security and trade: Where should our food come from? (This theme focuses on the geographical scales at which our agri-food system operates and the balance between food produced and traded locally, nationally and across national borders. It covers questions of food security, reliance and sustainability of markets and supply changes at different spatial scales).

Land use change and land management: How should we change land use and land management in the UK? (This theme focuses on the mechanisms and incentive systems to drive required changes in land use and land management in the UK. It covers questions of agricultural support policies, new markets for carbon sequestration (trees and soils), land use frameworks and reconciling demands of net zero, biodiversity and other environmental services).

Circular food systems: How can we develop a more circular UK food system, including the agricultural economy and ecology, other components of the system, and the infrastructure that underpins it? (This theme focuses on the question of more sustainable agricultural production systems with a particular emphasis on the concepts of circularity. It covers questions of the need for smaller-scale, mixed farming systems and the relative merits of systems such as agroecology, agroforestry and regenerative agriculture, and the re-use of nutrients from along the supply chain).

Behaviour change: Individual and institutional behaviour change in the UK agri-food system. (This theme focuses on the role of institutions and policies to encourage behaviour change in the agri-food system. It covers questions of the politics, economics, psychology, and food nutrition science of effecting large-scale dietary change across the population and the individual and institutional dynamics of changes in food production practices).

System-wide and cross-cutting issues: How can we capture the system-wide features of the agri-food transition? (This theme focuses on the need for systems-thinking and analysis in research and policy and a holistic approach to science and policy measures).

Consultation Question 1: Is this characterisation of the net zero challenge for the UK agri-food system a reasonable one? Do you have any other comments?

2. Healthy and Sustainable Diets

Healthy and sustainable diets are at the heart of the question of agri-food system transformation. However, the relationship between consumer preferences, producers and the links in the supply chains in-between are continually changing and need to be better understood. The power and freedoms of some exist alongside the squeeze and constraints upon others. The UK's transition to net zero will require more than just the development and adoption of new technologies in the agri-food system, including a more robust understanding of the powerful ways in which market and consumer influences operate.

Research Priorities

2.1 How could the economic framework governing UK food production be developed to better incentivise domestic production of healthy foods (*e.g.* fruit, vegetable and salad crops) and address the market failures that are inhibiting growth and investment in these crop categories? What are the retailing and supply chain management systems that shape sustainable and unsustainable production practices? How do food waste cycles operate and how can their environmental efficiency be improved?

2.2 How can action research develop new models of inclusive local systems of food provision, including innovation in business models and social and physical infrastructure development? How can we ensure existing inequalities and poverty are not made worse but also addressed through a food system transition? What framework could be used to design a socially just food system?

2.3 What are the scientific assumptions incorporated in our National Inventory compiling and reporting system around GHG emissions sources from the agri-food system (e.g., methane from manure management v enteric sources)? How can weaknesses in the evidence base be improved?

2.4 What social, economic, infrastructural, and informational trends have shaped the agri-food system of today, its structure and functions? How can international comparative work help better understand the distinctive features, challenges and opportunities that characterise the UK's system?

2.5 How can a whole-systems approach to the relationship between soils and nutrition be developed (bringing together specialists in the soil and gut microbiomes, for example), including studies of long-term changes in soil management and their implications?

2.6 What are the relationships between ultra-processed foods (UPFs) and unprocessed foods in supply chains and retail systems? What are the implications of radically reducing UPFs for the provision of perishables and for food system business models?

2.7 What social and demographic trends influence dietary choices? How do information and knowledge systems and their associated power relations shape behaviour?

2.8 What machinery of government changes may help ensure stronger promotion and co-ordination on healthy and sustainable food across Government Departments, including, but not limited to, Department of Health, Department for Environment, Food and Rural Affairs, Department for Education, Ministry of Justice, and Department for Culture, Media and Sport?

Policy Priorities

2.9 What is the UK farming sector for? The Westminster and Devolved Governments need to decide and make explicit the extent to which agricultural land in the UK is to be used for producing food for UK consumption or to supply export markets. If optimising domestic self-sufficiency in food production is the goal (rather than optimising exports), then a target level of self-sufficiency in the major food commodities (meats, cereals, fruit, and vegetables) should be set for 2030 and for 5-yearly intervals to 2050.

2.10 The Westminster and Devolved Governments should collectively develop a clear strategy for the pathway to a sustainable agri-food system that actively enables the UK's net zero-by-2050 goal. The vision should be collaboratively produced with agri-food industry, environmental and consumer organisations in order to enjoy widespread stakeholder support. It should convey the seriousness and urgency of the net zero challenge, emphasising that action is required immediately and in line with agreed five-yearly milestones. It should take a whole-systems approach that includes sufficiently mitigating greenhouse gas emissions, enhancing public health, strengthening biodiversity, and supporting livelihoods.

2.11 The National Food Strategy (2021) provides a sound underpinning analysis of the priorities for change and should form the basis for strategies to support the transition.

2.12 The Westminster and Devolved Governments should each develop a contingency plan for a sudden drop in food availability in case of problems (e.g., with transportation or due to extreme weather). Local resilience forums and civil contingency arrangements should be reviewed from the perspective of food supply and distribution.

Consultation Question 2: Are these the most significant research priorities under the theme of 'healthy and sustainable diets'? Do you have other suggestions of priorities? Do you have any comments on these priorities?

Consultation Question 3: Are these the most significant policy priorities under the theme of 'healthy and sustainable diets'? Do you have other suggestions of priorities? Do you have any comments on these priorities?

3. Land Productivity

Discussions about issues affecting future UK land use often seem to assume we have much more land than we do. There is a general commitment to at least maintain levels of domestic self-sufficiency, but also a need for considerable additional land to be planted for trees and used to grow energy crops. Environmental targets require land for nature conservation and biodiversity, and land will be required to house a growing population. The net zero transition raises fundamental questions about how land is used optimally, and how UK consumers' demands for food can be met from less agricultural land while not increasing imports.

Research Priorities

3.1 Do current markets and policy frameworks sufficiently incentive improved productivity on farms? What is the optimal geography of crop and animal production in the UK (from the perspective of emissions and production)? How can the competition for land between human food and animal feed be managed for optimum public benefit? How can technological advances in animal breeding and data science be harnessed to improve productivity and reduce emissions, including through the use of individual animal data?

3.2 What are the best strategies for mixing trees and food production on farmland (in terms of food production and sequestration)? How can market failures be corrected through tax, subsidy, and regulation? How can tree-planting be most effectively strategically guided to ensure optimum co-benefits (sequestration, flood risk, biodiversity, recreation) and to manage the risk of future forest fires? How can the restoration of peatland for emission-reduction purposes be most effectively balanced with food production priorities?

3.3 How can we move from single-use food and energy to multi-purpose crops and animals, (including exploiting waste streams)? How can agricultural resources (land and buildings) be utilised to generate solar power while maintaining and enhancing food production? How can calculations around emissions and sequestration be used to inform enterprise stacking?

3.4 What policy measures, incentive systems and knowledge exchange arrangements are required to reduce pre-farm-gate food waste? How can models of circularity be developed to eliminate waste at source?

3.5 How can the potential tensions between sustainable intensification and agroecological approaches be reconciled, including at the landscape scale where some strategic co-ordination across groups of farm businesses may be required?

3.6 What lessons can be drawn about the efficacy of the research, innovation and knowledge exchange system for British agriculture including through learning from other countries' experience?

Policy Priorities

3.7 At the core of the dilemmas in the agri-food system transition is the use of land for food production and other purposes (including for production for export). The UK Net Zero Vision and Strategies for the Agri-Food System need to be underpinned by a land use strategy, for each part of the UK, that reflects the need for significant land use changes to maintain, and even enhance, UK levels of self-sufficiency in food while making sufficient land available for other uses. The land use strategy must be robust enough to help drive real change over the next three decades accompanied by effective regulation and financial incentives to landowners and managers, and not just be 'light-touch' pieces of analysis.

3.8 The Westminster and Devolved Governments should develop clear agri-food industrial strategies to support the improvement of productivity across key food product types, in the light of the likely changed requirements in land use types by 2050. These strategies should include provision for the strengthening of the R&D and innovation system to support change more directly among agri-food firms of all kinds.

Consultation Question 4: Are these the most significant research priorities under the theme of 'land productivity'? Do you have other suggestions of priorities? Do you have any comments on these priorities?

Consultation Question 5: Are these the most significant policy priorities under the theme of 'land productivity'? Do you have other suggestions of priorities? Do you have any comments on these priorities?

4. Food Security and Trade

Food production in the UK land is both for domestic consumption and for export. The balance between these two has important implications for how we think about optimising UK land use for food production and other purposes. Pressure on the land resource focuses attention on the land used to support livestock farming, including grazing land for farm animals, but also the arable cropland used to grow animal feeds. Recommendations to reduce livestock numbers are about the release of land for other purposes as much as about reducing direct emissions from the animals themselves.

Research Priorities

4.1 How can we build resilience into food supply chains which are able to adapt and withstand pressures from external political, environmental, or economic instabilities? Research might involve modelling different scenarios at systems level through to individual business resilience. A key question is what does a resilient and adaptive food supply and trade system look like? How can resilience be measured? What are the pathways, enablers, and support arrangements that could help advance the transition? What is the relationship between building domestic resilience and strengthening export prospects in future? How can fairness in commercial practices in food supply chains be strengthened?

4.2 What novel crops and production systems might contribute to optimising the UK's land resource under conditions of climate change? How might changes in rotations and cropping patterns help improve diets, reduce food security risks, and enhance the productivity of land in future? How might an understanding of key micronutrient needs inform measures to improve food security? What would be the implications of developing alternative proteins to replace processed meats for food security and land use?

4.3 What would be the impacts on UK production and exports from large-scale dietary shift in UK consumption (e.g., away from meat and dairy)? Would changed UK consumption patterns prompt changes in land use, or simply increase food exports? Is UK-produced meat competitive enough to be exported if domestic consumption fell dramatically? What are the likely implications for UK emissions from large-scale UK dietary change? How elastic are the relationships between changes in yields, land use, diets, and exports? How distinctive are recent patterns of UK dietary change compared to other European countries?

4.4 How can we ensure future trade deals can take account of the broader issues around food production such as GHG emissions, biodiversity, and animal welfare? To what extent has the Australia and New Zealand deal 'set the bar' in terms of future UK trade deals when it comes to food and agriculture?

4.5 How can data management and analytics be developed to better inform decisions around food trade and sustainability? How can sustainability and net zero measures be

incorporated into mandatory reporting to inform consumers and companies in supply chains? What are the co-dependencies between food trade and emissions from other sources (e.g., processing, transport etc)? How can system-wide data be supported by field measurements?

4.6 How can the UK become more self-sufficient in animal feedstuffs while not compromising the ability to produce food crops for human consumption? What is the greenhouse gas emission footprint of the UK's increasing consumption of chicken meat? What would be the business opportunities and emission-reduction benefits in the UK food system from a move away from such dependence upon chicken meat?

Policy Priorities

4.7 The Westminster and Devolved Governments should develop more explicit targets for the degree of provision of the main food commodities and products that should be produced within the UK. In particular, the degree of self-sufficiency in fruit and vegetables should be actively stimulated and supported.

4.8 The UK's international trade policy should not compromise the ability of UK agri-food businesses to compete by permitting imports with lower environmental and animal welfare standards than our own.

4.9 A National Task Force on Resilience of Agri-Food Supply Chains should be established to carry out horizon-scanning work to foresee and plan for threats and disruptions to key supply chains.

4.10 Both main political parties have suggested a 50 per cent target for the proportion of temperate food products procured through the public sector in England that should be British in origin. This target is not ambitious enough and should be set to rise incrementally to 60 and 70 percent by 2035 and 2040. It would also be helpful to include requirements that food procured by the public sector is sustainably produced.

Consultation Question 6: Are these the most significant research priorities under the theme of 'food security and trade'? Do you have other suggestions of priorities? Do you have any comments on these priorities?

Consultation Question 7: Are these the most significant policy priorities under the theme of 'food security and trade'? Do you have other suggestions of priorities? Do you have any comments on these priorities?

5. Land Use Change and Land Management

Soil and land management can help sequester carbon. There is therefore increasing interest in how land management practices might be encouraged to contribute to reducing net emissions while still farming the land. This is partly about planting trees and hedgerows, but carbon can also be sequestered through better management of soils. There are a questions about how such sequestration might be monitored, audited and financially rewarded. There is also increasing interest in the technologies and instrumentation for authenticating and governing sequestration through land and soil management, as well as concern about farmland being taken out of food production for trees in a non-strategic way.

Research Priorities

5.1 How can the post-CAP system of agricultural support in England, Scotland, Wales and Northern Ireland be developed to ensure net zero UK by 2050 goals are sufficiently met?

5.2 How can the R&D, knowledge exchange, and advisory system be developed to support the scale and systemic nature of change required of UK land use and land management practices for the net zero transition?

5.3 What is the relationship between patterns of land ownership, occupancy change and land management for the net zero transition? How does land ownership and land occupancy arrangements affect the prospects for tree-planting and sequestration?

5.4 How do we create consistent measures and demonstrations of appropriate farming and land management practices for the net zero transition? What are the most effective business models to ensure sufficient natural capital from the UK agri-food and land use system? In particular, what are the most effective means of measuring, managing and improving soil health? How can their adoption be most effectively supported in British land management? How can the opportunity costs of alternative land use options be best calculated, visualised and understood?

5.5 How does the regulatory baseline need to evolve over the coming decades to ensure net emissions are sufficiently reduced? What are the social and political obstacles to strengthening the regulatory baseline and how might they be overcome?

5.6 How can fruit and vegetable production and farmland trees and orchards be integrated back into commercial farming systems?

5.7 How has the institutional governance of land use and land management evolved over recent decades, and how well-suited are current structures for supporting desired change at field, farm, local, regional and national levels?

5.8 How can carbon pricing and carbon markets be most effectively developed to support the net zero transition and provide economic incentives for desirable land use and land management practices? How can GHG emissions reduction be handled alongside improving biodiversity, water resource management and water pollution risks? How might the tax system be developed to support net zero objectives around land use and land management?

5.9 How can farmers be encouraged or incentivised to proactively manage land holistically, for multiple benefits, rather than just for productivity? How can sustainable land management practices be more effectively 'locked in' to protect environmental benefits over the longer term?

5.10 What are the implications of multifunctional land use options for public use and enjoyment of the countryside? How can we ensure that land management meets public and private expectations?

5.11 What are the barriers to achieving the Climate Change Committee's suggested targets for upland and lowland peat restoration and how might they best be overcome?

Policy Priorities

5.12 The Westminster and Devolved Governments should ensure that post-CAP agricultural support schemes sufficiently incentivise greenhouse gas emissions reduction, especially in the key emitting areas such as ruminant livestock.

5.13 The Westminster and Devolved Governments should develop national plans for the encouragement of replanting of hedgerows to meet the Climate Change Committee's recommended targets by 2030 and 2050.

5.14 Whole-system transformation will require sufficient emphasis on, and resourcing of, training, skills and human capital development among land managers and within the main land-based education and training institutions.

Consultation Question 8: Are these the most significant research priorities under the theme of 'land use change and land management'? Do you have other suggestions of priorities? Do you have any comments on these priorities?

Consultation Question 9: Are these the most significant policy priorities under the theme of 'land use change and land management'? Do you have other suggestions of priorities? Do you have any comments on these priorities?

6. Circular Food Systems

There is growing interest in the potential merits of more mixed farming systems as a means of reducing reliance on manufactured inputs such as fertilisers, but also improving the holistic management of agricultural systems to reduce pressures on the soil and water environment. It is less clear what this might mean for overall levels of production and productivity.

Research Priorities

6.1 How can the true cost of food be embedded in the financial operation of the agri-food system, so that environmental and public health externalities are properly incorporated (and access and affordability is not compromised for vulnerable groups)?

6.2 In developing healthy soils, how can effective baselines be established, and how best can networks of farmers be established to demonstrate and share best practice? How can the UK's food production move away from a reliance on manufactured fertiliser?

6.3 Are we sufficiently equipped with the industrial base and skills needed to create the infrastructure for a more circular food system? Where would this capability come from otherwise? How vulnerable does this make us?

6.4 How can companies' focus be supportively shifted from Scope 1 to Scope 3 GHG emissions?

Policy Priorities

6.5 The Westminster and Devolved Governments should work with the agricultural industry to develop plans for the covering of slurry pits to reduce manure management emissions from all dairy farms, indoor pig units and intensive beef enterprises with slurry-based systems.

6.6 Defra and its Scottish, Welsh and Northern Irish equivalents should review the enforcement of water pollution laws that affect agriculture and better integrate greenhouse gas emissions reduction measures with those protecting water and clean air.

6.7 The Westminster and Devolved Governments should develop stretching targets and delivery plans for expansion of agroforestry (to reach 20% of all farmland by 2050). In Wales, there is a particular need to better integrate achieving tree-planting targets with support for the social and economic sustainability of the farming industry in the most agriculturally dependent regions.

6.8 The Climate Change Committee's suggested targets on food waste reduction will require concerted emphasis on promoting waste-reduction systems and behaviours

along the food chain (from on-farms, though processing, distribution and retailing, and to end use in catering and in households).

Consultation Question 10: Are these the most significant research priorities under the theme of 'circular food systems'? Do you have other suggestions of priorities? Do you have any comments on these priorities?

Consultation Question 11: Are these the most significant policy priorities under the theme of 'circular food systems'? Do you have other suggestions of priorities? Do you have any comments on these priorities?

7. Behaviour Change

Science and technology have a vital role to play in supporting the transformation of the UK agri-food system. However, an over-reliance on technological solutions risks diverting attention from important questions about the day-to-day practices of individuals and institutions. The last Climate Change Committee Chair, Lord Deben, pointed to institutions as the biggest challenge in reforming the agri-food and land use system. The model for transforming the energy sector cannot be transplanted into the agri-food system, where changing mindsets and everyday practice will prove more challenging for individuals and institutions alike.

Research Priorities

7.1 How might fiscal measures be developed to disincentivise bad practices and incentivise good practices (for farmers and food companies), including measures modelled on the success of the Soft Drinks Industry Levy in stimulating beneficial substitutionism by manufacturers?

7.2 What can be learned from the experience of social movements and activist movements in promoting and supporting individual behaviour change?

7.3 How could the insights from the Behavioural Insights Team report published (and then quickly unpublished) in October 2021 on behaviour change for net zero best be operationalised for the agri-food system?

7.4 How are farming culture, identity and values evolving over recent decades and how are net zero concerns influencing how farmers are valued by others? How do we identify and address the non-financial barriers which are preventing the required changes in farming and land management practices? How will the removal of the Basic Payments Scheme affect the viability of farming businesses and the social structure of the farming community in marginal areas, and with what implications for land management for net zero?

7.5 Where does the concept of the 'nanny state' come from? What are its social and political underpinnings? What explains the international geography of its salience? What lessons can be learned from the experience of the Soft Drinks Industry Levy in the UK and applied to other aspects of food and drink consumption?

7.6 What are the material and financial flows and interdependencies between key production systems and markets (e.g., between beef and dairy systems and markets)? What are the social and family dynamics influencing the age structure and skills profile of the livestock sector and what social, economic and technological trends will determine the sector's ability to adapt?

Policy Priorities

7.7 Agriculture and food policy should be better aligned with public health objectives. The Westminster and Devolved Governments should develop proposals, based on the successful experience with the Soft Drinks Industry Levy, to discourage the use of unhealthy and more highly emitting ingredients in processed foods so that manufacturers and processors reduce net greenhouse gas emissions.

7.8 The Westminster and Devolved Governments with UKRI should develop a sustained, long-term programme of research into the drivers of behaviour change among landowners and land managers, which draws on economics, socio-cultural and psychological perspectives from across the social sciences, to underpin measures to ensure net emissions reduction and a socially just transition.

7.9 The Westminster and Devolved Governments should develop a system of measurable targets for reduction in food waste at key points along the food chain and for the reduction in consumption of the unhealthiest and most highly emitting foodstuffs and develop educational and public awareness programmes to support desirable change.

7.10 Building on the work of the Food Data Transparency Partnership, Scope 3 food greenhouse gas emissions reporting and any food packet labelling should be required to use the GHG Protocol. Standardised guidance should be provided for UK-specific emissions factors.

7.11 There should be a plan for mandatory GHG reporting at the point of sale for all food products.

Consultation Question 12: Are these the most significant research priorities under the theme of 'behaviour change'? Do you have other suggestions of priorities? Do you have any comments on these priorities?

Consultation Question 13: Are these the most significant policy priorities under the theme of 'behaviour change'? Do you have other suggestions of priorities? Do you have any comments on these priorities?

8. System-wide and Cross-Cutting Issues

The economic pressures of the past 15 years have focussed attention on the affordability of, and access to, healthy food among different social groups. Managed structural change in the UK agri-food system is also an opportunity to address the serious problems of health inequalities which are increasingly influenced by poor diet. At the same time, there is the question of the 'winners' and 'losers' from what might be significant changes in land use and livelihoods in the agri-food system. Dietary-related poor health is a major driver of financial pressure on the NHS, but is also affecting the overall function of the UK economy through illness and absence from work. A just transition ought to ensure the social issues around food, diet and health are addressed for both social and economic benefit, and that measures are put in place to support any structural change that might significantly affect particular occupational communities.

Research Priorities

8.1 How does the research and innovation system incorporate lived and living experience into processes of research agenda-setting, prioritisation, programming and project funding?

8.2 Technological changes, including genetic engineering and gene editing, are a potentially disruptive force in the agri-food system. How might public and private interests most effectively work together to develop technological solutions in the agri-food system?

8.3 How best do we build an engineering and bioscience skills base for the 'Green Food Bioeconomy'?

8.4 How effective and reliable are the protocols for GHG emissions reduction and life-cycle analysis for food products being used by British food companies (such as ISO14067)? How can initiatives such as the Food Data Transparency Partnership be strengthened to improve the transparency, ownership, and public trust in emission-reduction measures?

8.5 What are the institutional barriers to a systems approach to agri-food sector transformation and how might they be overcome?

Policy Priorities

8.6 The net zero dimensions to the work of Defra and its devolved counterparts relating to the UK agri-food system should be considered holistically by an independent National Agri-Food for Net Zero Advisory Committee reporting jointly to the Cabinet Office, Defra and the Devolved Administrations. The Committee should work closely with the Climate Change Committee, monitor progress on emissions reduction, make recommendations for setting targets, and include within its remit questions of institutional change and the machinery of government and the interactions between

net zero, other environmental goals, and those around trade, and access and affordability of healthy food.

8.7 Strategic research and innovation funding questions relating to the UK agri-food system span the remits of BBSRC, NERC, EPSRC and ESRC. Within UKRI, these Councils should establish a cross-Council prioritisation body and consider the proportion of funding that goes to research focused specifically on the UK agri-food system as compared to research based in other parts of the world.

8.8 The Westminster Government should produce a breakdown of 5-yearly emission-reduction targets by sub-sector, by devolved nation and English region starting in 2025.

8.9 A plan for the development of bioenergy for carbon capture and storage needs to be developed hand-in-hand with a land use framework which considers food production, biodiversity and other requirements from land use.

8.10 Governing and opposition parties should develop plans to promote transitional support for workers and businesses in sectors affected by structural adjustment to a net zero UK. (For example, this could include support for livestock businesses under a scheme akin to Labour's £2.5 billion British Jobs Bonus aimed at the oil and gas sector).

8.11 Governing and opposition parties should take steps to ensure young people (aged under 35) and disadvantaged groups are able to inform policy-making for the agri-food system's net zero transition. (This could include measures such as the Climate and Economic Justice Screening Tool used in the US to understand the distributional consequences of support for the net zero transition.

Consultation Question 14: Are these the most significant research priorities under the theme of 'system-wide and cross-cutting issues'? Do you have other suggestions of priorities? Do you have any comments on these priorities?

Consultation Question 15: Are these the most significant policy priorities under the theme of 'system-wide and cross-cutting issues'? Do you have other suggestions of priorities? Do you have any comments on these priorities?