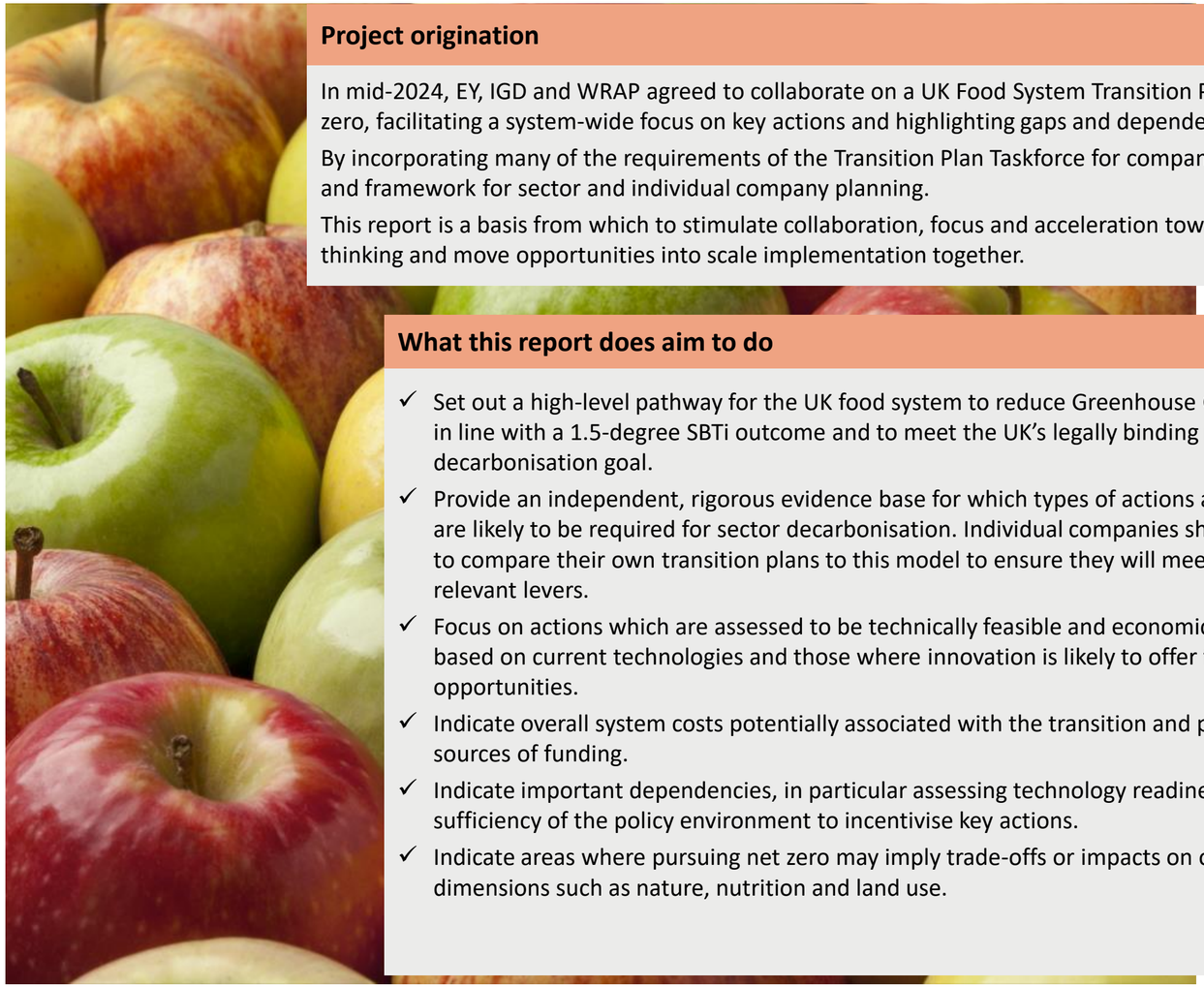
SUMMARY REPORT:

A Net Zero Transition Plan for the UK Food System

November 2024

Scope of the report



Project origination

In mid-2024, EY, IGD and WRAP agreed to collaborate on a UK Food System Transition Plan report. The aim was to create a robust evidence base to show what it would take for the sector to reach net zero, facilitating a system-wide focus on key actions and highlighting gaps and dependencies that need to be collectively addressed.

By incorporating many of the requirements of the Transition Plan Taskforce for companies to disclose their detailed decarbonisation plans, it is hoped this report will also function as a useful reference and framework for sector and individual company planning.

This report is a basis from which to stimulate collaboration, focus and acceleration towards net zero, leveraging the deep expertise and capability across the system to build upon and enrich this initial thinking and move opportunities into scale implementation together.

What this report does aim to do

- ✓ Set out a high-level pathway for the UK food system to reduce Greenhouse Gas emissions in line with a 1.5-degree SBTi outcome and to meet the UK's legally binding national decarbonisation goal.
- ✓ Provide an independent, rigorous evidence base for which types of actions at what scale are likely to be required for sector decarbonisation. Individual companies should be able to compare their own transition plans to this model to ensure they will meet or exceed all relevant levers.
- ✓ Focus on actions which are assessed to be technically feasible and economically viable, based on current technologies and those where innovation is likely to offer further opportunities.
- ✓ Indicate overall system costs potentially associated with the transition and point towards sources of funding.
- ✓ Indicate important dependencies, in particular assessing technology readiness and the sufficiency of the policy environment to incentivise key actions.
- ✓ Indicate areas where pursuing net zero may imply trade-offs or impacts on other dimensions such as nature, nutrition and land use.

What this report has not tried to do

- × Incorporate abatement options which are not yet scientifically proven. As science evolves (e.g., relating to soil carbon), it may be that there are further opportunities for improved supply-side outcomes, which can be incorporated in updated plans.
- × Incorporate abatement from carbon removals related to land-use change, as rules regarding their inclusion in company inventories are to be finalised next year, following which their implications should be reviewed.
- × Present a picture of the best imaginable case wherein every company moves as fast on every dimension as the best in class. It is recognised that many individual companies are more ambitious on some dimensions than the pathway set out here.
- × Offer a complete analysis of dependencies and impacts of decarbonisation actions on related dimensions such as nature, nutrition and land use; further work is proposed here.
- × Offer a complete analysis of the financial implications for separate parts of the supply chain over time, for example where significant upfront capital may be required to unlock cost efficiencies over a number of years. For any individual company, the cost outlook may be very different to the macro aggregate presented here.
- × Propose a target or roadmap for delivering the emissions reduction potential of consumers shifting towards lower-GHG dietary choices.

Foreword from Sarah Bradbury, Chief Executive, IGD

This is the start of a journey, together.

In recent years we have seen first-hand the vulnerabilities in the food system and the increasing risks to its resilience, as here in the UK we have seen temperatures reach record highs of 40^{o}C and some of the wettest months on record last year and this year.

It highlights that climate adaptation planning will need to be central to ensuring food security in the future.

Food production is responsible for around a third of global GHG emissions, so we must play our part in the transition to net zero, the targets we have committed to for 2030 and 2050 are stretching so collective action is what's needed. Decarbonisation is a challenge for any sector and this is compounded for the food system by its enormous complexity and the competitive nature of the industry

Commitments to WRAP's 2030 Courtauld Agreement have helped deliver a significant reduction in food retailers' scope 1 and 2 emissions. The development of a measure by WWF brought together leading food retailers with a commitment to halving the environmental impact of the shopping basket by 2030. Recognising that achieving net zero can't happen in isolation – there is also a nature emergency, so we must prevent further biodiversity loss

This plan shows the challenge that several 2030 targets are at risk of not being met, but that doesn't mean without co-ordination we can't still achieve net zero by 2050. We need a different approach, one that involves the whole end-to-end supply chain, a more aligned dialogue across Industry and with government. A more widely shared view of where we are now, how extensively we can reduce emissions and what will be needed in terms of capabilities, financing and policy support to do this.

That is why we commissioned this Food System Net Zero Transition Plan as an independent, evidence-based review built from the broadest, most robust and proven data available, to align the conversations and progress. The analysis has been conducted by an expert consultancy team at EY with the support of specialists at the Scottish Rural Agricultural College and the support of our partner, global environmental NGO, WRAP.

Our thanks to those who have been involved in delivery of this report and for the engagement we have had through its development – from industry stakeholders including trade associations, from farming sector bodies, and from officials in central government and the devolved administrations.

The report sets out what it will take from now to achieve net zero, facilitating a system-wide focus on the levers and actions, highlighting gaps and dependencies. It makes clear that we need to go further, faster, together. It also makes clear that investing in abatement opportunities now is more affordable than paying for offsetting costs later.

It is important to recognise some of the limitations of this work. By virtue of it taking a whole system approach it does not take into account the diversity of progress across subsectors. Nor does it reflect that some businesses are moving faster by investing sooner or with the benefit of shorter, simpler supply chains. We know that the conclusions drawn from this work will not be universally agreed upon. Indeed, reaching consensus on every element is not practical or realistic.

Our aim is for it to be the basis for collaboration and accelerated progress, providing an aligned framework and measurement, with the same methodology as used by government and the Climate Change Committee to develop carbon budgets . From this we can use our collective expertise and capabilities to align around opportunities to implement solutions at scale.

My ask of you reading this is to ensure we don't use all our energy debating the elements on which we might disagree.

I invite you to join us, to enrich this analysis, and to use it is a catalyst for us to work in partnership – because we will go further, faster, together.

Foreword from Catherine David, Executive Director of Behaviour Change and Business Programmes, WRAP

This report is a clear call to action to achieve our shared goal of a net zero food system by 2050.

We have worked together with stakeholders from across the value chain to synthesize several complex data sets regarding the UK food system, creating and quantifying a strategic plan for the sector to meet its net zero obligations.

We are up against the clock now, which is why this plan lays out both the supply and the demand side actions needed if we are to cross the net zero line in time.

We can only achieve our net zero, and nature, goals by investing in our farmers. We recognise the many pressures bearing down on farmers, and we share a dependence on a resilient UK food and farming sector, providing affordable nutritious food for all, whilst protecting and restoring nature. Without fairness, security, and sufficient financial rewards for net zero changes reaching our farmers, there can be no meaningful climate action in the food sector.

This report lays out the key actions that need to take place on farms, and at scale. To achieve the pace of change needed, we must see significant increases in investments as well as a step change in the nature of collaboration with farmers, and across the value chain.

On the supply side, the pathway to net zero depends on the rapid decarbonization of electricity, heat, and transport infrastructure, whilst on the demand side, we must ensure that the food we do produce is not wasted and provides people with a healthy, environmentally sustainable diet.

We have made great progress on food loss and waste through WRAP's Courtauld Commitment[1].

This report highlights how eliminating food waste can help achieve net zero goals and presents unambiguous evidence that this should be a core pillar of net zero planning in the food sector. With the average family throwing away approximately £1000 worth of edible food each year, there is a huge opportunity for change, and the need for a national collective mission to accelerate action on household food waste prevention.

At WRAP, we do not shy away from challenging issues and for the food sector, no issue is more charged than diet change. WRAP has published a 2030 pathway[2] for delivering a 50% reduction in the GHG footprint of UK food and drink that includes significant mitigation from shifting diets towards the Eatwell Guide.

This report restates that need for urgent action on diets, whilst modelling a 2050 scenario that is more conservative than the current recommendation of the Committee for Climate Change. We believe urgent action is needed by industry and government to establish a pathway for diets, with clear targets for 2030 that are rooted in the best current evidence and a range of expert perspectives, including from a nutrition and nature viewpoint.

We call on the sector to come together, work through such differences, and focus UK Food's incredible strengths and talents on solving the greatest challenges of our generation.

As an organisation committed to evidence-based action to drive system change, WRAP stands ready to work with the sector, with flexibility, humility, and determination,

to drive that change and ensure that UK Food leads the way and delivers on its commitments to a net zero future.

1 Courtauld Commitment – WRAP
2 UK Food System GHG Emissions – WRAP, 2021

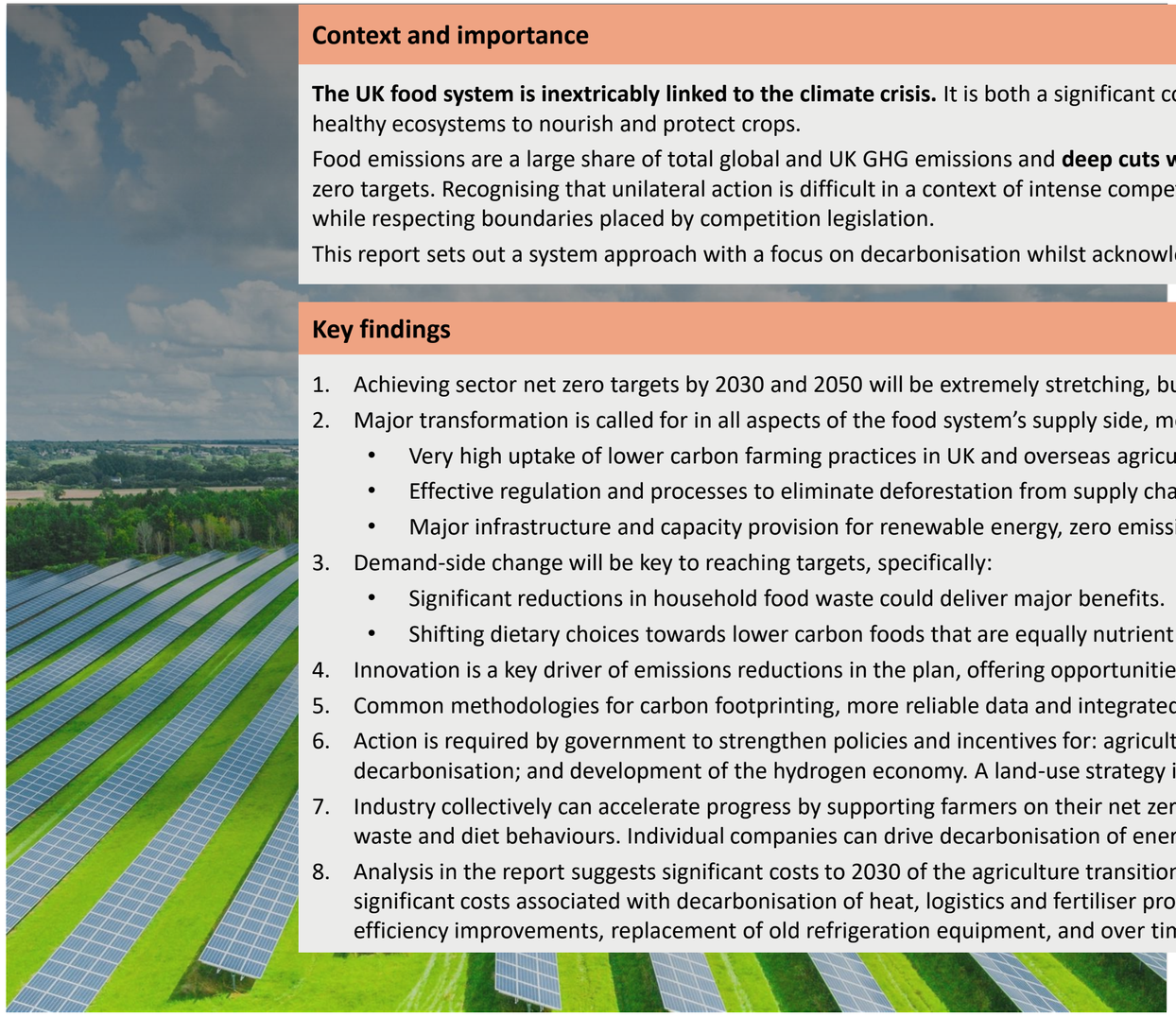
Approach and methodology

The approach of the report

1. This report starts with the **UK food system carbon footprint** and the WRAP estimate of the food system carbon footprint in 2021, which includes net imports. Emissions related to citizens transporting and using products were removed, some estimates are updated to use alternative sources, and some are recategorized to align with intervention levers.
2. Next, **levers to reduce emissions are assessed** for each part of the footprint, based on bottom-up analysis of feasibility and cost-effectiveness. These levers relate both to the supply-side (production) and demand-side (consumption). The evidence base includes government and Climate Change Committee (CCC) analysis; industry intelligence from interviews with and materials provided by farming representatives, protein processors, manufacturers, retailers, plus logistics, chemicals, science and commodities companies.
3. The **agriculture analysis** uses a Marginal Abatement Cost Curve (MACC) model developed by Scotland's Rural College (SRUC). This is used by the CCC, including for its forthcoming advice on the Seventh Carbon Budget. **Therefore, it is consistent with what will be required from agriculture to meet carbon budgets and the net zero target,** and is used by both government and the private sector. The MACC has been tested through review by independent experts. Abatement potential relative to a baseline is drawn from a longlist of over 300 mitigation measures and an evidence base that has been developed over the last fifteen years by SRUC, from primary and secondary sources. Based on this assessment, a MACC is constructed, showing those options which are applicable to UK conditions, where there is a degree of confidence, they are feasible and do not have negative impacts for other environmental objectives. For measures that meet these criteria, the MACC maps their abatement potential and related cost, the latter including a full assessment of costs (e.g. capital, operating, income foregone). Pathways for agriculture emissions reductions are developed, accounting for barriers to uptake. The focus is on a High Ambition scenario, with very high rates of uptake for key measures by 2035, given the need for ambitious action to meet climate commitments and targets.
4. The **potential opportunities to meet SBTi commitments** are identified for 2030 and 2050 through a mix of supply-side and demand-side interventions from bottom-up analysis, and the conditions that would have to be in place to make these options commercially viable. System emissions pathways are developed with different levels of ambition and delivery-confidence and compared with commitments that the industry has made for 2030 and 2050.
5. The **annual costs** associated with emissions reductions are estimated as being the difference between costs associated with low-carbon technologies and a business-as-usual scenario.
6. Significant **uncertainties and dependencies** are identified with recommendations on how these should be managed.

The approach is consistent with guidance from the Transition Plan Taskforce (TPT). In particular, it sets out quantified ambition, identifies key drivers and actions to deliver emissions reductions including action owners, associated costs, dependencies, and some aspects of just transition (inclusiveness, affordability impacts). Further work will be needed as the plan is developed and implemented, e.g. on nature and the just transition, and by sector. Other aspects of transition planning guidance should be covered in company plans (e.g. financing plans, company governance and incentives).

Importance of a net zero food system and key findings



Context and importance

The UK food system is inextricably linked to the climate crisis. It is both a significant contributor to greenhouse gas (GHG) emissions and other environmental impacts, and completely dependent upon healthy ecosystems to nourish and protect crops.

Food emissions are a large share of total global and UK GHG emissions and **deep cuts will be required to meet climate objectives**. The industry has faced this challenge through wide adoption of net zero targets. Recognising that unilateral action is difficult in a context of intense competition and interdependent supply-chains, the industry has agreed that a **system approach to net zero is required**, while respecting boundaries placed by competition legislation.

This report sets out a system approach with a focus on decarbonisation whilst acknowledging the need to avoid negative consequences for related imperatives like nature, nutrition and livelihoods.

Key findings

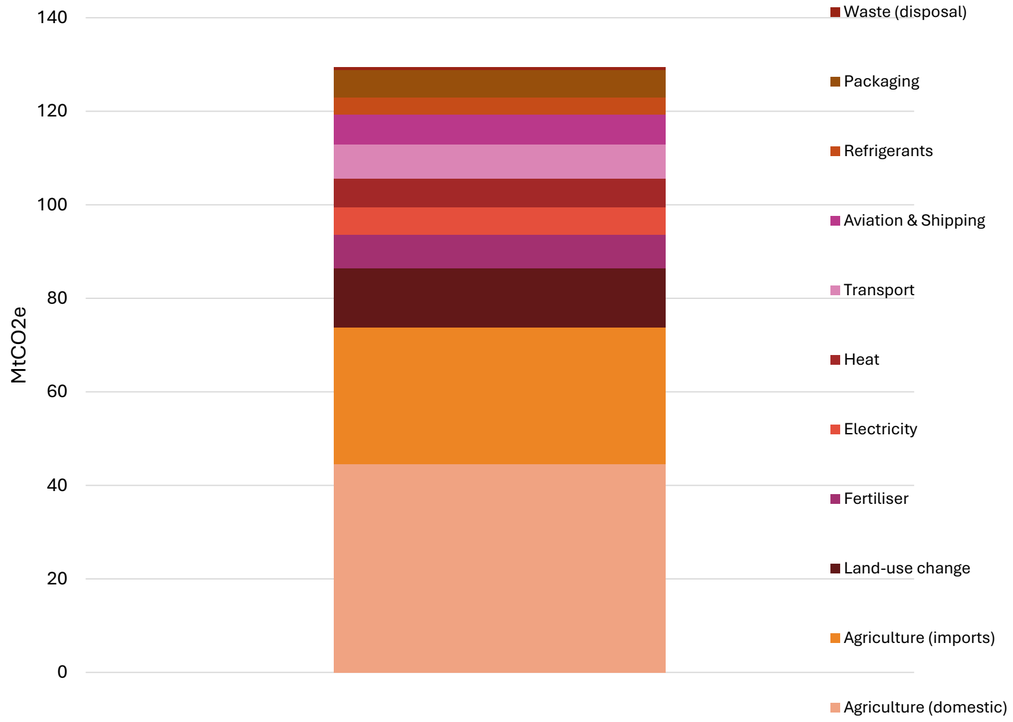
1. Achieving sector net zero targets by 2030 and 2050 will be extremely stretching, but is possible with urgent focus and partnership throughout the system.
2. Major transformation is called for in all aspects of the food system's supply side, most notably:
    - Very high uptake of lower carbon farming practices in UK and overseas agriculture.
    - Effective regulation and processes to eliminate deforestation from supply chains.
    - Major infrastructure and capacity provision for renewable energy, zero emission logistics and low carbon heating and cooling.
3. Demand-side change will be key to reaching targets, specifically:
    - Significant reductions in household food waste could deliver major benefits.
    - Shifting dietary choices towards lower carbon foods that are equally nutrient rich and/or the Eatwell Guide represents a significant GHG abatement opportunity.
4. Innovation is a key driver of emissions reductions in the plan, offering opportunities in agriculture, low-carbon heat and logistics, and production of green fertiliser.
5. Common methodologies for carbon footprinting, more reliable data and integrated systems are required to support emissions reductions and improve accuracy of reporting.
6. Action is required by government to strengthen policies and incentives for: agriculture in England and the devolved administrations (DAs); investment in low-carbon heat and logistics; power sector decarbonisation; and development of the hydrogen economy. A land-use strategy is urgently needed, with a request that a draft for consultation be published in the first quarter of 2025.
7. Industry collectively can accelerate progress by supporting farmers on their net zero journey, developing approaches for overseas sourcing, and supporting consumers with changes to their food waste and diet behaviours. Individual companies can drive decarbonisation of energy, transport and refrigerants.
8. Analysis in the report suggests significant costs to 2030 of the agriculture transition, together with reducing land-use change emissions and making packaging more sustainable. There will be further significant costs associated with decarbonisation of heat, logistics and fertiliser production in the period 2030 – 2050. Throughout, there will be significant financing requirements for energy efficiency improvements, replacement of old refrigeration equipment, and over time, for investment in relatively capital-intense low-carbon technologies.

Executive summary

There are huge opportunities to reduce the carbon footprint of the UK food system.

The UK's food system carbon footprint is 129.5 MtCO2e, equivalent to around 30% of territorial emissions. As at the global level, the UK system footprint is dominated by agriculture and land-use change, with fertiliser production, energy and transport being significant components.

Breakdown of emissions baseline (2021)*



Supply-side abatement opportunities

- **Agriculture:** change farming practice, end land-use change for imported commodities, green fertiliser
- **Energy:** grid decarbonisation, energy efficiency improvements, low-carbon heat
- **Refrigerants:** fridges and freezers with minimal F-gas emissions
- **Transport:** fuel efficiency improvements, logistics efficiency improvements, low-carbon vehicles
- **Packaging:** increase recycling, alternative materials, reuse

Demand-side abatement opportunities

- **Food reduction:** opportunities throughout supply chain, but particularly at household level
- **Diet change:** eating less of the most carbon intense foods and replacing these with low-carbon alternatives, while maintaining nutrition, accessibility and affordability

*The scope of this footprint excludes emissions associated with household energy and consumer transportation. As a result, it is different to that presented by WRAP in its report 'Tracking UK Food System Greenhouse Gas Emissions: 2015-2021'. Aside from this, the footprints are consistent subject to small adjustments relating to agriculture emissions based on new SRUC analysis and recategorising some data (e.g. fertiliser use for imported goods).

Executive summary

Deep cuts in emissions are required to meet SBTi targets and carbon budgets.

Industry has made ambitious commitments under SBTi, comprising targets for Forest Land and Agriculture (FLAG) and non-FLAG emission sources. Deep cuts in food system emissions will be needed to meet legislated carbon budgets.

SBTi non-FLAG targets (energy, transport, heat, food waste, packaging, refrigerants)
- **2030:** deep cuts required
- **2050:** net zero (100% reduction)

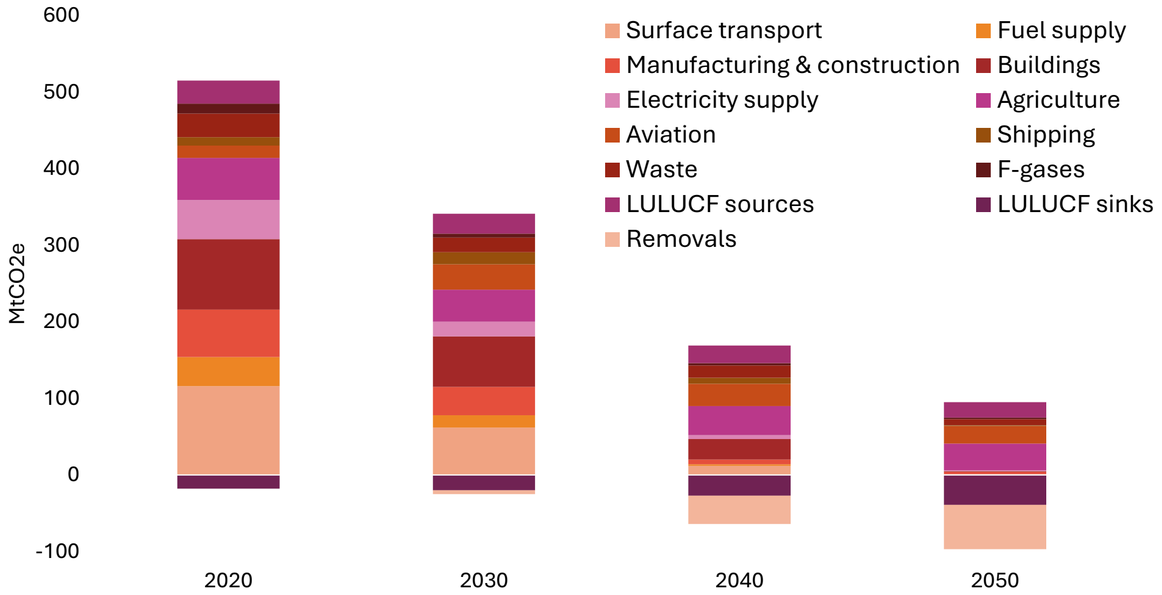
SBTi FLAG targets (agriculture practices, LUC associated with imported commodities, fertiliser production)
- **2030:** 30%+ reduction
- **2050:** 70% reduction

Population growth
- The Office for National Statistics (ONS) projects population growth from 67m in 2021 to 77m in 2046 (extrapolated in the modelling to 78m in 2050)
- Food demand is assumed to increase with population growth
- This implies the need for further emissions reductions in order to meet absolute reduction targets

Carbon budgets

Carbon budgets are designed based on sector pathways for emissions reductions. The food system should at least keep pace with these pathways. Over time, emissions from electricity, heat and transport fall to zero in pathways underpinning budgets. The agriculture pathway assumes widespread adoption of low-carbon practices, together with food waste reduction and diet change – though with flexibility of the balance of effort across levers, which are considered in this report.

UK economy emissions by source towards net zero[1]



1 The Sixth Carbon Budget – Climate Change Committee, 2020

Executive summary

There are significant supply-side opportunities to cut emissions close to zero for non-FLAG and to make deep cuts for FLAG.

Agriculture: 40 – 55% cut against 2021 baseline by 2050

- 40% reduction requires:
  - Widespread adoption of low-carbon farm practices
  - Land-use change emissions reduced to zero through sustainable growing
  - Fertiliser emissions reduced to zero through use of hydrogen

- 55% reduction requires the deployment of the above, alongside less mature and more challenging approaches:
  - Feed additives for grazing animals
  - Biostimulants
  - Low-carbon feed
  - Inter-cropping

Electricity: close to zero emissions by 2035 or earlier

- Grid decarbonisation through investment in renewables and nuclear
  - Government to clarify ambition and drive the decarbonisation
- Grid expansion, including to support electrification of heat and transport

Heat: close to zero emissions by 2050

- To 2030, focus on energy efficiency and trialling of renewable heat
- From 2030, electrification through electric technologies, predominantly heat pumps and electric ovens

Transport: close to zero emissions by 2050

- To 2030, focus on fuel efficiency of HGVs and electric delivery vehicles for retail
- From 2030, deployment of low-carbon HGVs, most likely to be battery HGVs

Packaging: emissions cut by at least 50% by 2050

- Reductions through the period to 2050, based on increased recycling, alternative materials and reuse

Refrigerants: emissions cut by at least 83% by 2050

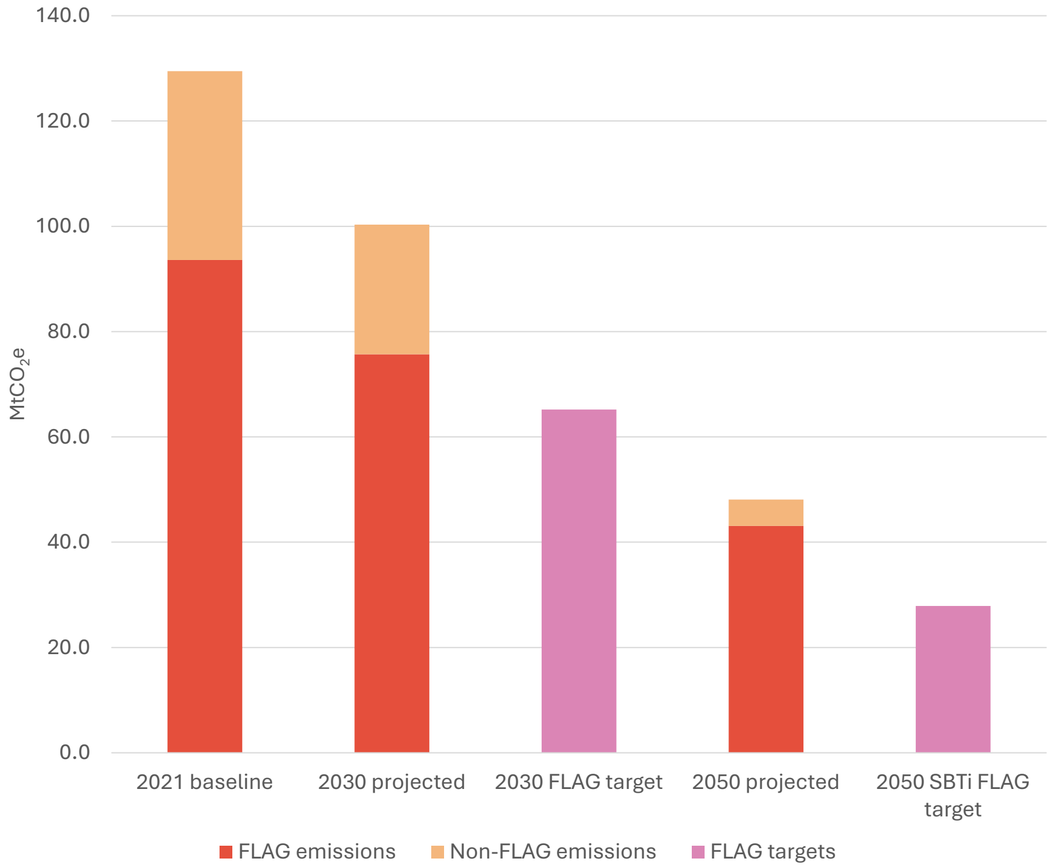
- Replacement of old, polluting refrigerators and freezers with modern technologies that have lower F-gas emissions

1 The Sixth Carbon Budget – Climate Change Committee, 2020

Executive summary

Supply-side opportunities are sufficient to meet non-FLAG commitments and to make important contributions to meeting FLAG targets and carbon budgets – but demand side action will also be needed.

FLAG and non-FLAG emissions projections against FLAG targets



Demand-side action

The chart shows maximum potential from supply-side action, which makes significant contributions to SBTi FLAG targets – but demand side action will be required to meet these and to contribute to carbon budgets. There are important demand-side opportunities relating to food waste reduction and diet change.

Food waste reduction

- Currently around 25% of food is wasted[1], with the biggest single contributor being household food waste.
- The Courtauld Commitment aims to reduce food waste by 50% in 2030 against a 2015 baseline.
- The industry should aim to deliver the Courtauld Commitment and go beyond it, reducing food waste to very low levels by 2050.
- The lever for this is collective industry action working in partnership with government.
- Food waste reduction would make an important contribution to meeting SBTi FLAG, but would still leave a gap.

Diet change

- The Climate Change Committee has developed scenarios for diet change to help meet carbon budgets. Without diet change, the food system would not be able to make its contribution here, and would not meet SBTi FLAG targets.
- Given the assessment of supply-side opportunities and scope for food waste reduction, moderate diet change away from the most carbon intense foods – red meat and dairy - could be sufficient, e.g. equivalent to a 20% reduction across these categories, but with no set balance of effort.
- Diet change also has important health considerations, which are beyond the scope of this report.
- The food industry should work urgently to develop an approach to diet that balances net zero and health objectives; the absence of a position stands in the way of progress and leaves the industry vulnerable to having policies imposed upon it.

1 UK Food Waste & Food Surplus – UK Key Facts – WRAP, 2023

Executive summary

Costs of decarbonisation: Funding of at least £500 mn annually will be required to support low-carbon agriculture measures – without this, key measures will not be adopted by farmers.

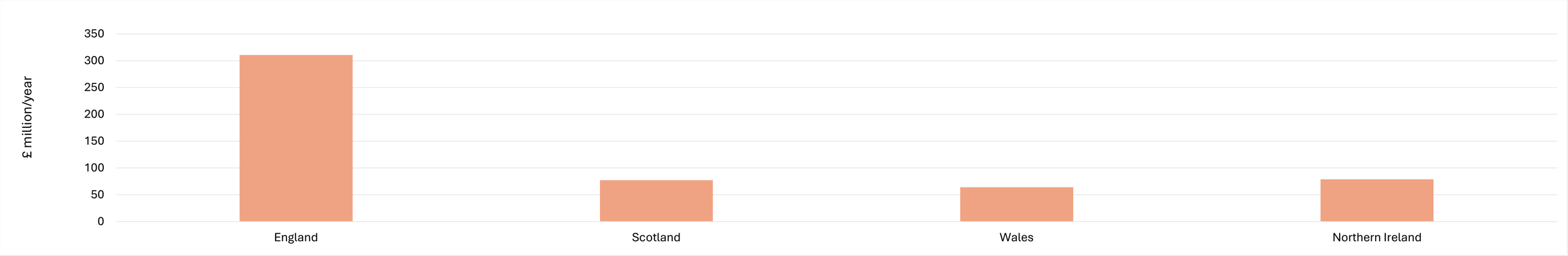
There are two categories of measures for agriculture abatement: those that save money and those that cost money on a net basis.

Even for the former, farmers will need to be supported in their net zero transition. For example, it is recommended that funding should be made available for farm-level carbon audits, benchmarking and planning; in Northern Ireland, these are funded in effect through direct payments, for which they are a qualifying condition. There are some measures where there is lag between investments and payoffs. Again, these will have to be funded.

Measures which cost money will have to be funded or they are highly unlikely to be adopted. While a net cost, these pass a value-for-money (VfM [return on public investment]) test: abatement costs are well within the UK Government's carbon values, and there are significant nature co-benefits. Annual costs are estimated of the order £500 mn, which are distributed across England and the DAs as shown in the chart below. These are funded in England under ELM, and it is recommended that these should similarly be funded in the DAs. Funding would typically be in the form of ongoing payments, given the vast majority of costs are operating. For the fewer measures where there are significant capital outlays, these should be funded through grants; for example, grants are available for slurry investment in England and Scotland. Over time, grants for low-carbon mobile machinery are likely to be needed.

There are much higher costs associated with supporting the broader farming transition and meeting national environmental objectives, which requires a more extensive scope of changed farming practice together with taking land out of production (e.g., for forestry, peatland restoration and nature recovery). For example, a recent NFU report estimated this cost to be over £4 bn annually[1].

Positive abatement cost per DA in 2050 (Section 3.4)



1 An agricultural budget that delivers for the environment – NFU asks of government – NFUonline, 2024

Executive summary

Costs of decarbonisation: There are significant costs of decarbonisation currently facing the food system. These relate to imported agriculture, sustainable feed and commodities procurement, and sustainable packaging.

Net cost and capital cost are differentiated: the former reflects any operating cost savings associated with the latter. Costs of low-carbon options are compared with business-as-usual alternatives. Costs are assessed on an annual basis to allow comparison with system revenues and consequently infer potential price impacts, as is the convention in effective transition planning.

To 2030:

Net costs:

In addition to domestic agriculture, there are three significant areas of cost related to decarbonisation facing the food system:

- **Imported agriculture:** Where the recommendation is that farming costs in the UK should be funded by government, there is not an equivalent mechanism for imported products. It is recommended that an industry programme should be considered to reduce emissions from imported products. While this would be costed as part of scoping work, based on UK costs and a comparison of farming products in the UK and foreign supply chains, funding of several hundred million pounds annually could be required.
- **Commodities caught by deforestation regulations:** There will be a premium associated with sustainable soy and commodities. This is currently uncertain, with a wide range of estimates in the market related to cost premia for EUDR. However, across the range of commodities, this could be in the hundreds of millions of pounds at the system level. It should only be temporary, because costs associated with establishing new supply chains and traceability systems are non-recurring.
- **Sustainable packaging:** There are a range of policies to drive sustainable packaging (e.g., EPR, plastics tax, PRNs), which together would add around £2.5 billion annually according to industry estimates.

Capital cost:

There are significant capital costs in the near term related to energy efficiency improvement. While related investments should have short payback periods, they still need to be funded (e.g., for waste heat recovery). Replacing ageing cold storage also requires large investments. These have typically been costed at the company level and included in financing plans. For purposes of illustration, the CCC estimates an annual investment requirement of £300 million across all industry for energy efficiency improvement. Costs associated with Anaerobic Digestion (AD) and renewable heat will need to be funded if they are to happen.

Executive summary

Costs of decarbonisation: Beyond 2030, there will be further costs equivalent to 1-2% of system revenues, related to heat, transport and fertiliser decarbonisation. There will be significant capital requirements throughout the period for low-carbon investments.

To 2050:

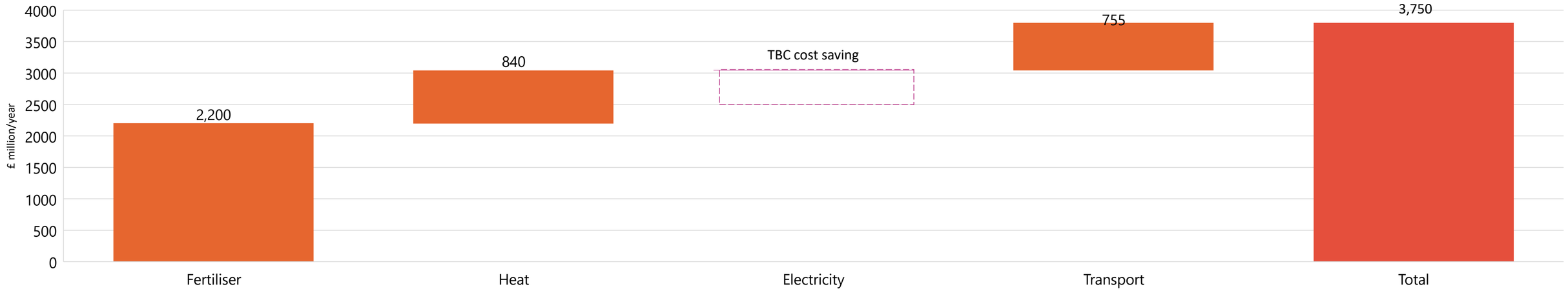
Net costs (additional to 2030):

Net costs will be added to the system through renewable heat, low carbon-HGVs and green fertiliser. For full abatement approaching 2050 across these three categories, the associated costs are estimated to be around £3.5 bn annually, which is equivalent to around £1.5 bn in present value terms, i.e. 1-2% of annual food expenditure of £140 bn. New policies will be required, with these costs to be funded by government (e.g., grants) and/or consumers (e.g., carbon pricing impacting food prices).

Capital cost:

There will also be significant capital outlays required for these technologies. For example, heat pump capital costs are around 4-8 times those of gas boilers, and battery HGVs are currently 3.5 times the capital costs of conventional alternatives, with further investment required for charging infrastructure. This raises a question about how investments can be financed within capital constraints. Opportunities to be considered further here are the roles for sustainable finance from banks (i.e. finance dedicated to support sustainability) and for government finance, to complement commercial finance.

Annual cost of decarbonisation 2050



Executive summary

Strengthening of government policy and support will be required to deliver emissions reductions across the food system.

Agriculture area	Specific ask
Farming budget	Confirm farming budget to support net zero and wider sustainable farming practices; and publish a land-use framework, including ambition and funding.
Farm-level carbon planning	Strengthen incentives for farm-level agri-environment practices through funded carbon audits, benchmarking and plans for farmers, to buttress their engagement with sustainable farming and related schemes.
Sustainable Farming Incentive uptake	Assess impact on uptake from uplifting payment rates in the Sustainable Farming Incentive scheme and consider the case for a further increase to improve uptake across farming types.
Feed additives	Extend farming support schemes to include full or partial payment for use of feed additives to support rollout.
Anaerobic digestion (AD)	To commit a new round of funding to support farm AD for farm waste (not crops).
Stacking of benefits / framework for accessing private finance	Develop a framework for farmers to access private finance, namely through generating revenue from carbon and nature markets and selling of ecosystem services, over and above what they are paid for through ELM, in order to monetise benefits of sustainable farming. This should take into account any new industry schemes.
Farm regulation	Undertake a regulatory review with respect to three objectives for farming: food production, net zero, nature.
Deforestation legislation	Introduce a regulation that prevents land use change from imports of soy and tropical commodities consistent with the EUDR, while managing risks related to land conversion.
Farm data	Standardise carbon calculations, data and reporting through agreeing common methodologies and standards. These should differentiate between different types of farming practice and, as a matter of urgency, reflect improvements due to SFI participation. With more confidence in data, reporting should be mandated, to support consumer decision making.
Trade policy	Ensure a level playing field between domestic produce and imports through common environmental standards, border tariffs for carbon-intense products, and trade preferences in Free Trade Agreements related to environmental standards and animal health/welfare; export promotion and trade facilitation for British products.
Agriculture – Welsh Government	Ensure that net zero measures are funded under the new Welsh framework, by testing them against the key net zero measures identified in this report to ensure that there are no gaps.
Agriculture – Northern Ireland Government	Provide financial incentives for the key measures identified in this report to drive down emissions from dairy and beef farming, which dominate Northern Ireland's farming carbon footprint.
Agriculture – Scottish Government	Provide financial incentives for the key measures identified in this report to drive down emissions from dairy and beef farming, which dominate the carbon footprint of farming in Scotland.

Executive summary

Strengthening of government policy and support will be required to deliver emissions reductions across the food system (cont.).

Supply-chain area	Specific ask
Grid decarbonisation	Clarify target date for grid decarbonisation (2030 vs 2035) and disclose credible plans to achieve this. Change regulatory guidance to support running of freezers at 15 degrees, to unlock energy efficiency savings.
Heat	Incentivise decarbonisation of heat processes in the food system by extending the Industrial Energy Transformation Fund (IETF) to support interim investment in low-carbon heat technologies. Rebalance gas and electricity prices, adding carbon costs to the gas price and removing policy cost uplifts from the electricity price.
Grid connection	Food companies and logistics companies should be prioritised for grid connection from the 2030s, which is when electrification becomes an important part of food system decarbonisation.
Transport decarbonisation and hydrogen economy	Building on participation of food companies in current programmes for transport decarbonisation (vehicles and infrastructure) and development of the hydrogen economy, ensure continued uptake as efforts are scaled up.
Packaging	There is an ongoing policy dialogue between the industry and government with the objective of a joined-up and streamlined approach across England and the DAs. This is detailed and technical in nature and therefore out of scope of the report.
Demand-side area	**Specific ask**
Food waste reduction	To be developed by industry group, but will include mandatory food waste reporting and addressing date labelling and pre-packaging of fresh produce.
Diet change	To be developed by industry group, but will include information provision, education, and revision of the Eatwell Guide including updating for latest evidence on consumption patterns.

Executive summary

Implementing the System Plan: Areas for Action

Asks of government

What: In this strategic plan there are 19 asks of government (see previous pages), which are key to supporting a level playing field and providing incentives for action to net zero.

Action: Industry to engage with government on policy asks at the earliest opportunity.

How: Structured discussions between industry and government convened by IGD.

Collective industry action

What: The areas for collective action are many, but prioritisation is needed in those which will generate faster progress to net zero and model ways of driving system change, taking account of the nature emergency and human health. There are a set of proposed areas, which have been under discussion with representative sector organisations from across industry since April this year.

Action:

Supply

1. Supporting farmers to join schemes through facilitation and incentives, in order to boost adoption of low-carbon practices (reduced fertiliser use, feed additives, etc.).
2. Convening on soil carbon, to understand the evolving evidence base and draw out implications for transition planning in the sector, including potential opportunities for farmers.
3. Aligning and further driving detailed design of regulation for deforestation-free soy and its implementation, to minimise costs while achieving policy objectives.
4. Consultation on establishing an import standard platform and programme for adoption of low-carbon practices in foreign supply chains.

Demand

5. Recommitting to reducing household food waste with greater adoption of all proven tactics across businesses.
6. Aligning industry to a position on diet change that balances net zero and health objectives, including an action plan.

How: IGD in partnership with WRAP to convene working groups to identify approaches for developing strategies and action plans in each of the above areas. These should be done on the basis of clear mapping of existing forums/initiatives/working groups to avoid duplication and ensure efficiency.

Sector and company transition plans

What: Sector and company transition plans should be aligned with – or go beyond – the strategic plan.

Action: Review sector and company plans against the strategic plan and update as appropriate, and be open to sharing learnings.

How: IGD to support this process and to facilitate greater sharing of learnings through lifting outputs into progress reporting (see below).

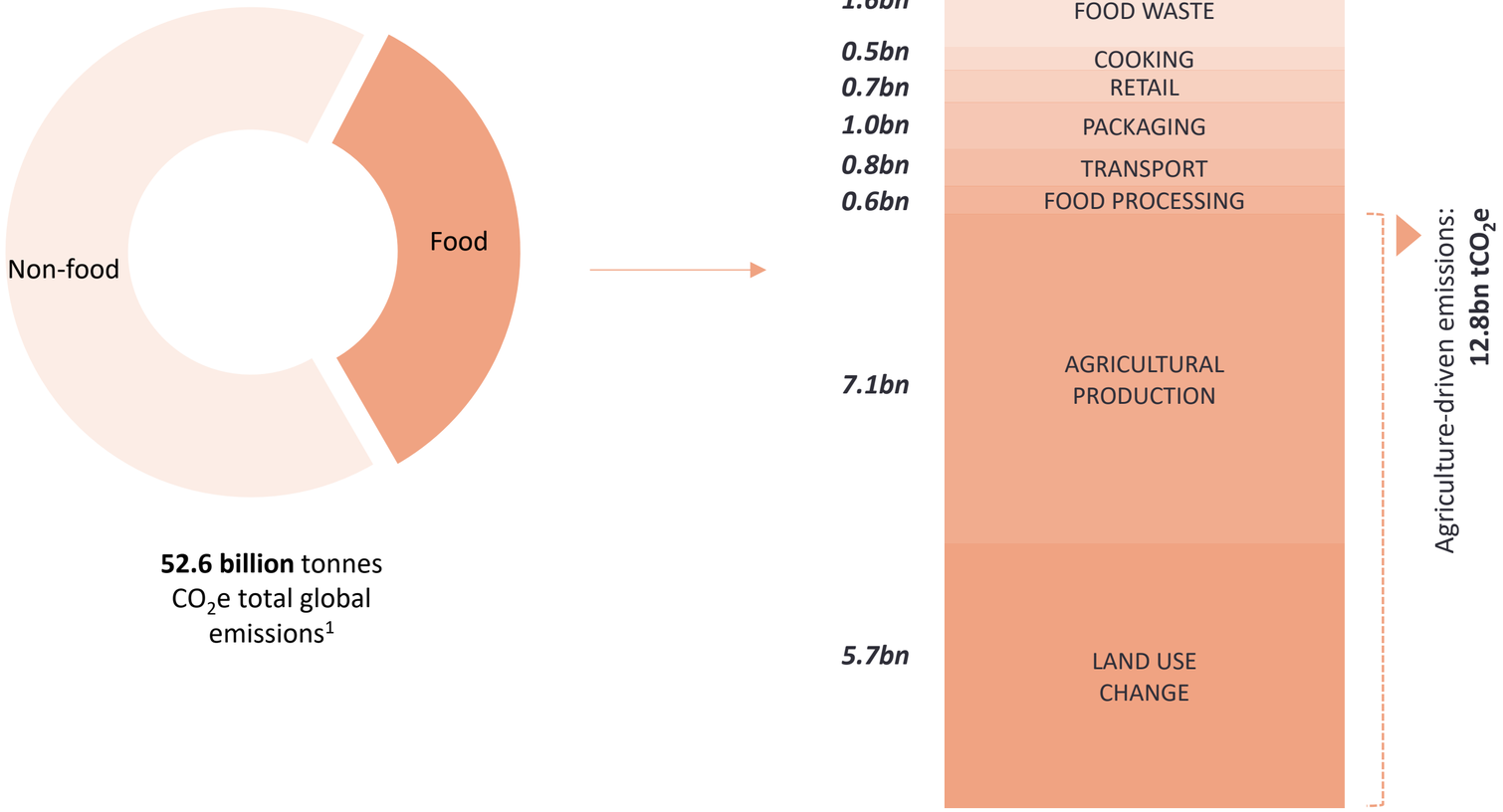
Review of progress

A first overall review of progress from the plan and the areas for action above will be publicly shared via a Webinar and Food System Net Zero Transition Plan Progress Report in June 2025, then bi-annually with a focus on the progress of actions.

01 Overview: emissions reductions opportunities and levers

Globally, the food industry is responsible for around a third of GHG emissions – it is increasingly the focus of international efforts to tackle climate change, and deep cuts will be required to meet global climate objectives.

Food system emissions make up 17.9 billion tonnes (34%) of global GHG emissions[1]



1. The global food system carbon footprint is dominated by agriculture and land-use change emissions, with downstream emissions in energy, transport and food waste.

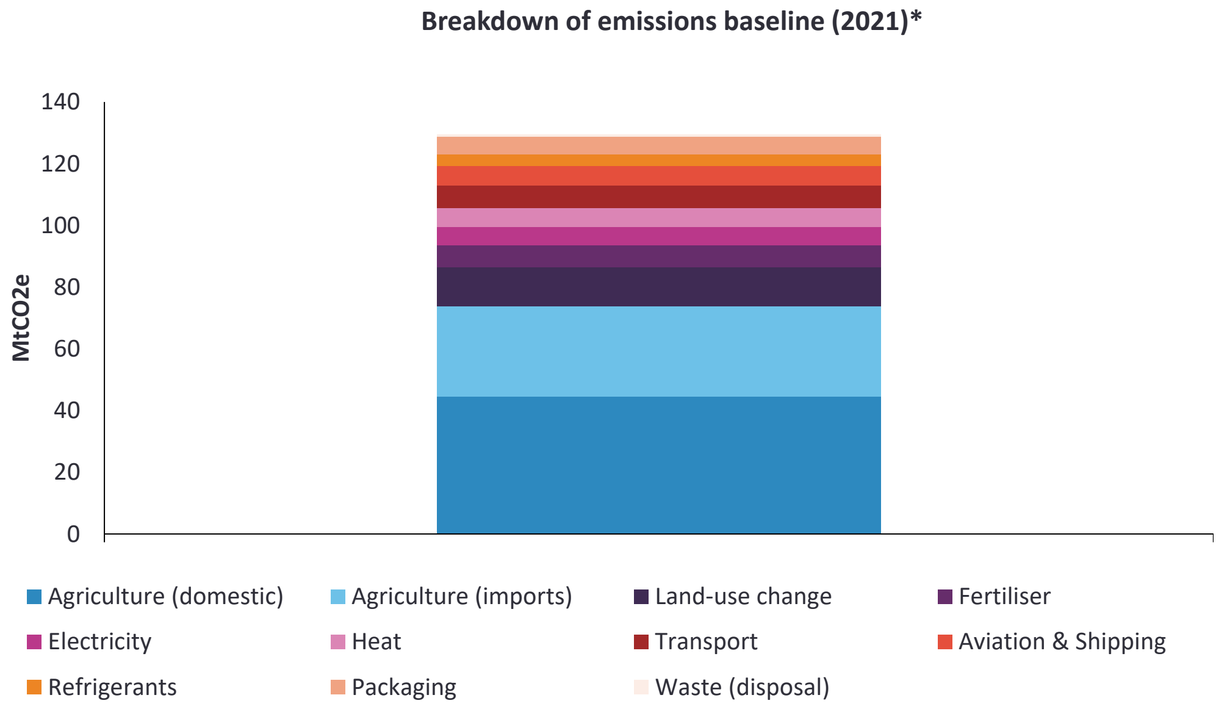
2. Abatement opportunities across the industry can be split between supply (from food production to sale) and demand (consumer choices). These are deeply interconnected, with purchasing behaviours directly impacting upstream emissions sources.

3. Food was a focus of COP 28 in UAE, where there was agreement for each country to integrate agriculture and food systems in nationally determined contributions, strategies and action plans for COP 30 in Brazil. **This report contains the first national food system plan to be produced.**

1 Food systems are responsible for a third of global anthropogenic GHG emissions – Nature Food, 2021

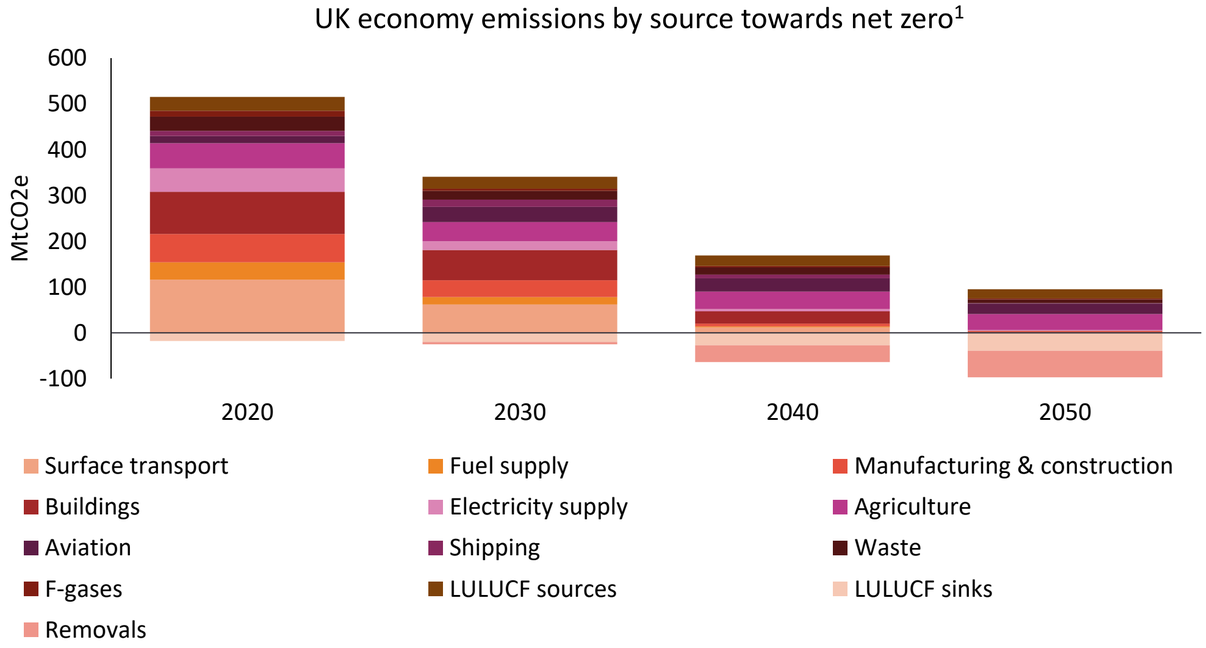
In the UK, deep cuts in food system emissions will be required to meet legislated carbon budgets and industry targets under SBTi.

The UK's food system carbon footprint is 129.5 $MtCO_2e$, equivalent to around 30% of territorial emissions. As at the global level, the UK system footprint is dominated by agriculture and land-use change, with fertiliser production, energy and transport being significant components.



**The scope of this footprint excludes emissions associated with household energy and transportation. As a result, it is different to that presented by WRAP in its report 'Tracking UK Food System Greenhouse Gas Emissions: 2015-2021', Aside from this, the footprints are consistent subject to small adjustments relating to agriculture emissions based on new SRUC analysis.*

Legislated carbon budgets require a 36% emissions reduction from 2020 to 2030 on the path to net zero in 2050. Deep cuts will be required across the economy, including those sectors in the food system carbon footprint. Food system decarbonisation should move in tandem with the wider economy: an early focus on energy efficiency, electricity decarbonisation and agriculture, extending to the electrification of heat and transport.



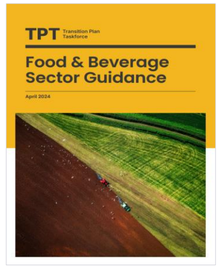
Most companies in the food industry have also made voluntary commitments in line with SBTi, which require achieving net zero by 2050 at the latest. Many have committed to an earlier date for net zero.

1 The Sixth Carbon Budget, The UK's Path To Net Zero – Climate Change Committee, 2020

Transition planning is the bridge between carbon budgets and corporate action. It is an opportunity to set out credible decarbonisation approaches which balance ambitious emissions reductions with commercial objectives, driving value in a changing world. Transition plans are increasingly being scrutinised by a range of stakeholders, including financial institutions and consumers.

There are forthcoming regulatory requirements in the UK for large companies to publish net zero plans in line with the Transition Planning Taskforce (TPT) framework. The TPT recommends that organisations should take a strategic and rounded approach to their transition planning, through decarbonising their own entity, responding to climate-related risks and opportunities and contributing to an economy-wide transition.

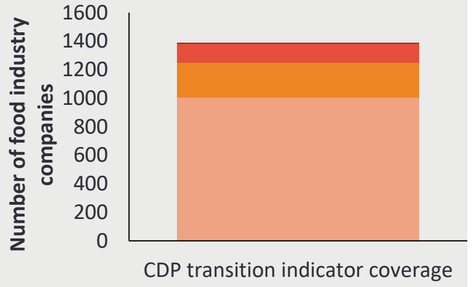
Principles	Ambition	Action		Accountability	
Disclosure elements	1. Foundations	2. Implementation strategy	3. Engagement strategy	4. Metrics and targets	5. Governance
Disclosure sub-elements	1.1 Strategic ambition	2.1 Business operations	3.1 Engagement with value chain	4.1 Governance, engagement, business and operational metrics and targets	5.1 Board oversight and reporting
	1.2 Business model and value chain	2.2 Products and services	3.2 Engagement with industry	4.2 Financial metrics and targets	5.2 Management roles, responsibilities and accountability
	1.3 Key assumptions and external factors	2.3 Policies and conditions	3.3 Engagement with government, public sector, communities and civil society	4.3 GHG metrics and targets	5.3 Culture
		2.4 Financial planning		4.4 Carbon credits	5.4 Incentives and remuneration
					5.5 Skills, competencies and training



Key

Transition plan sub-elements further expanded on in the TPT Food & Beverage guidance

CDP recently released their global study on Climate Transition Plan Disclosures in 2023, which highlights the Food, Beverage, & Agriculture companies as lagging behind other key sectors (such as Energy and Financial Services) on disclosure of “key transition indicators” – as defined by the CDP transition plan questionnaire.



Financial institutions (FIs) have commitments to decrease portfolio emissions, and the UK food system plays a major role in this. FIs are working with farmers directly to improve agricultural practices, and with food companies on their operations and supply chains. A system approach could underpin activity by FIs and align this with the industry approach.

Many major financial institutions have set targets to reduce financed greenhouse gas emissions in their loan portfolios to zero by 2050. They join a growing movement of companies throughout the food supply chain to set ambitious targets to reach net zero by 2050.

Given their unique position in the economy, banks will play an important role in the sector's climate transition, particularly on agriculture. Many banks have already signed onto the Net Zero Banking Alliance (NZBA) and have committed to setting emissions targets for high-emitting sectors, including agriculture.

Banks are developing bespoke approaches to the use of transition plans

Rabobank

- Despite the nascent data landscape, Rabobank was able to establish an initial baseline that provides a valuable starting point to both improve measurement tools and begin to identify strategies to support farmers in reducing emissions
- As it looks to decarbonise its portfolio it will explore target setting and weigh two interconnected dynamics: portfolio optimization, and client engagement.

LLOYDS BANKING GROUP

- Working in partnership with the Soil Association Exchange, Lloyd's is piloting consultancy visits to farms to assist with measurement of baselines, identification of areas for improvement, and development of action plans to implement best practices.
- The bank aims to build up a database of financed emissions across approximately half their lending book, allowing them to extrapolate data across their portfolio

Santander

- To start measuring its agricultural emissions, Santander focused on the farm gate considering physical activity data captured at the origination of the loan such as property location, livestock farming by type and number of animals, commodity production by type, crop area financed by commodity in hectares, or quantity produced by commodity, in tons. Establishing an emissions baseline highlighted the level of complexity of the agribusiness industry

FIs are also developing transition planning approaches, although **food & agriculture is lagging other industries** where there is a clear decarbonisation pathway (e.g. energy, automotive).

Transition finance on favourable terms and conditions is yet to flow to food & agriculture – which reflects the **lack of a clear pathway and drivers**, lack of high quality company transition plans (see previous page) and data limitations.

The food system accounts for

1/3
of *global emissions*[2]

but currently only receives

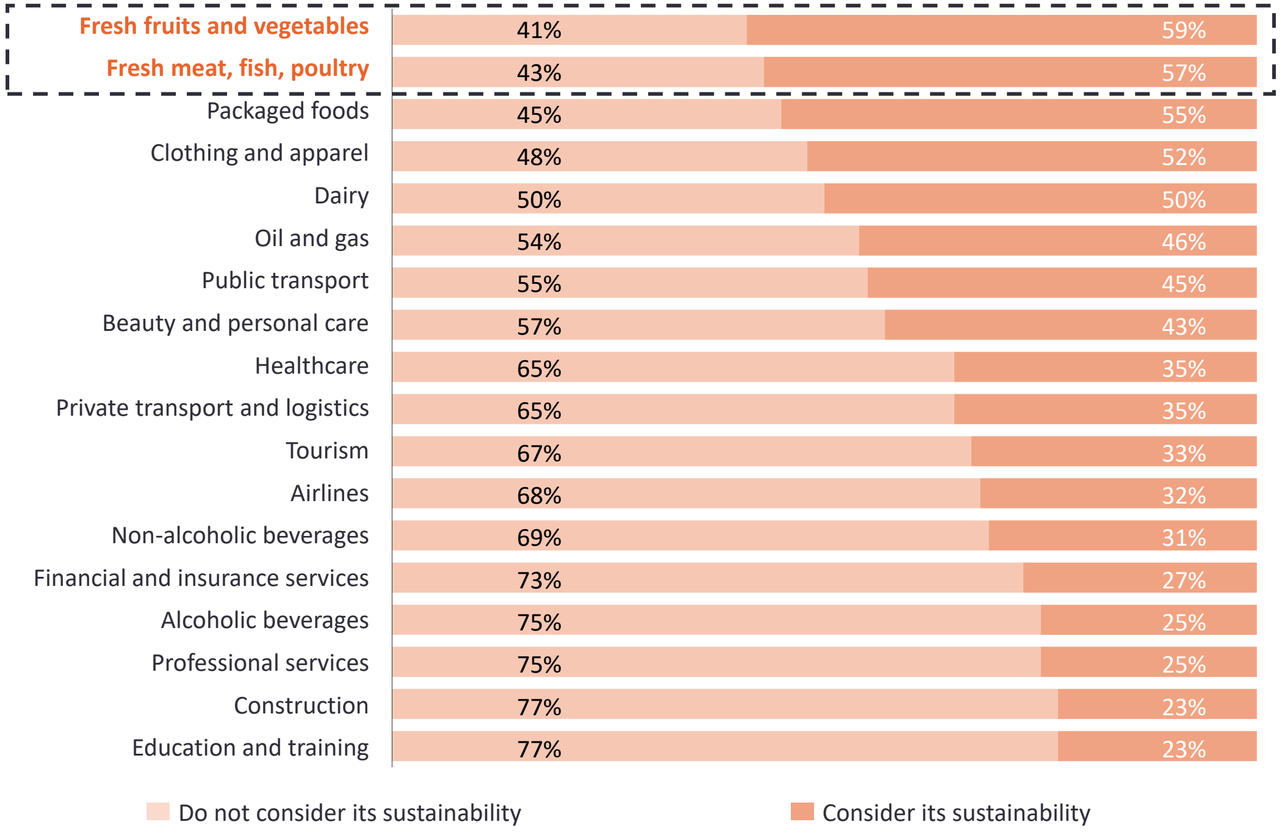
<4%
of *climate finance*[3]

$600 billion (approx. climate finance budget)

Agreement on a system-level transition plan between financial institutions and food companies would drive action and unlock climate finance.

Consumers are increasingly aware of product and company sustainability. While this is yet to translate into large scale purchasing behaviour, particularly in a cost-of-living crisis, consumers expect industry and government to drive change on their behalf within the food system.

Based on EY market research[1], consumers prioritise sustainability most when they buy fresh food…



….and increasingly expect companies (and governments) to drive change

1 EY Future Consumer Index, Oct 2023, UK respondents

We are facing threats to resilience of the food system, nature and health – moving to net zero can help manage the risks.

Climate crisis

The most recent Climate Change Committee Risk Assessment highlights risks to agriculture production from climate change:

- Soil health is at risk due to increased flooding and droughts, for example, flooding causes soil erosion and compaction
- Climate change poses a direct risk to crops and livestock, including through increased exposure to heat stress, drought risk, waterlogging, flooding, fire, pest, diseases, and non-invasive species

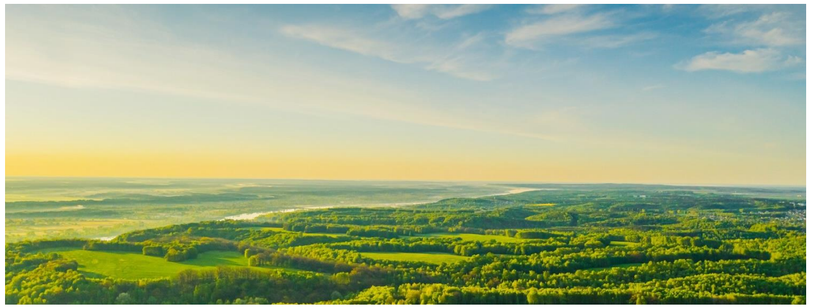
It recommends the need for more widespread adoption of farming practices for managing water and nutrient inputs and improving soil health

Obesity crisis

The Dimbleby review of the food system highlighted the obesity crisis currently facing the UK:

- One in three people in the UK is clinically obese, because of the low price and high availability of unhealthy foods
- Obesity costs the NHS £18 billion annually, is responsible for 1.5 million hospital admissions a year, and reduces life expectancy by 2.7 years

It recommends diet change and refers to the Government's "Eatwell Guide" as the closest available reference diet based on obesity and other important health outcomes.



Nature crisis

The Dasgupta review of the economics of biodiversity highlights risks to agriculture from nature loss:

- While nature is fundamental to the food system, we have degraded nature as an asset: biodiversity is declining faster than at any time in human history because it is not being properly valued and invested in
- This is putting future food production at risk, among other things

The review recommends the adoption of sustainable food systems, including reducing the use of environmentally damaging inputs, the use of precision agriculture, and integrated pest management.

Moving to net zero has wider benefits e.g.: improving soil quality can boost resilience of production, increase biodiversity, reduce run-off of water and chemicals; agroforestry boosts biodiversity and can manage flood risk; less-carbon intense diets can be more healthy.

A system approach to reducing food emissions is needed. This should address abatement opportunities through the supply chain and from demand-side changes in emissions.

Action is required at the system level

Decarbonisation of the food industry requires a systemic approach.

No single company or segment of the food system can achieve the change alone.

There is benefit in collective action.

The industry should work together to capitalise on shared knowledge, set common standards, enjoy economies of scale and engage with government.

Supply-side abatement opportunities

- **Agriculture:** Change farming practice, end land-use change, green fertiliser
- **Energy:** Grid decarbonisation, energy efficiency improvements, low-carbon heat
- **Refrigerants:** Fridges and freezers with minimal F gas emissions
- **Transport:** Fuel efficiency improvements, logistics efficiency improvements, low-carbon vehicles
- **Packaging:** Increase recycling, alternative materials, reuse

Demand-side abatement opportunities

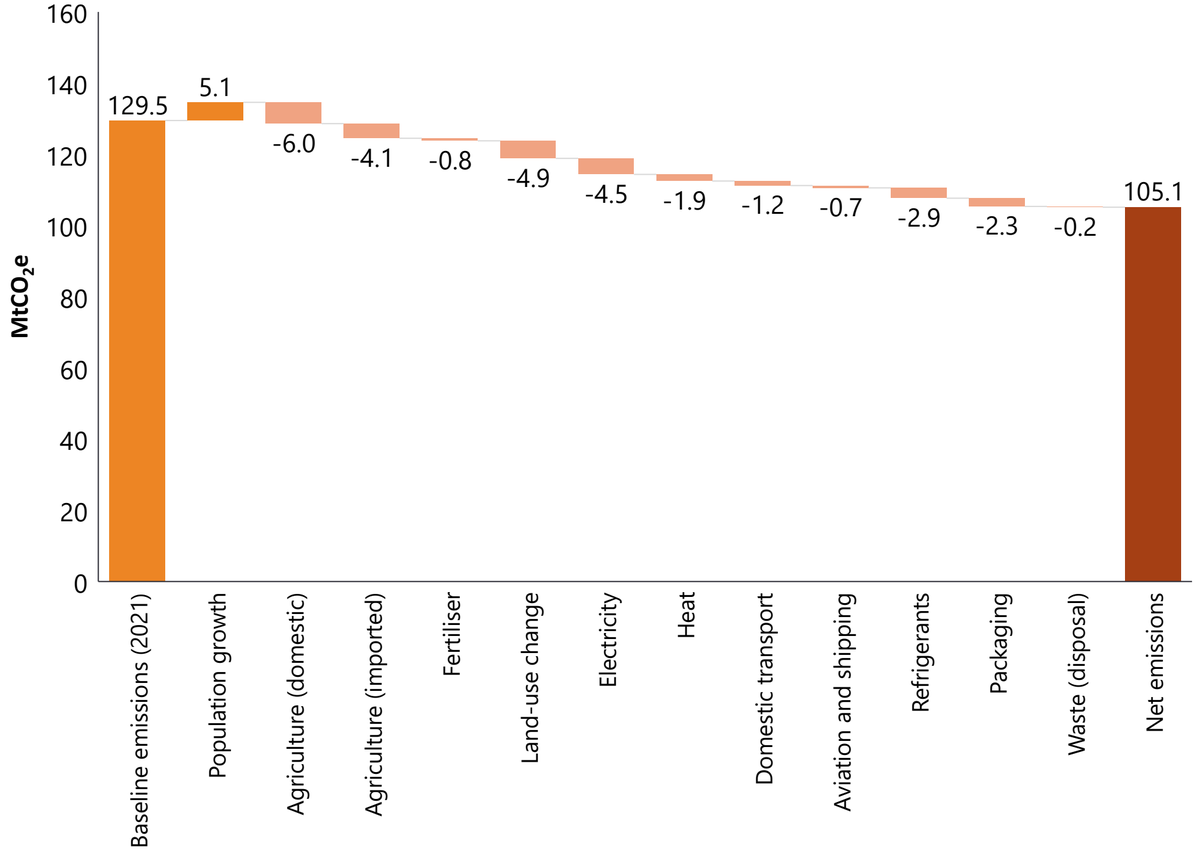
- Food waste reduction: opportunities throughout supply chain, but particularly at household level
- Diet change: eating less of the most carbon intense foods and replacing these with low-carbon alternatives

Note: in this analysis, the geographical footprint of the food system has been kept constant, however, change may be desirable given climate, nature and geopolitical risk, and a further assessment is required to test this, see page 47.

The analysis in this report suggests that there is scope for a 19% emissions cut in 2030 vs the 2021 baseline through supply-side abatement options – with opportunities to go to 25% through pushing hard on agriculture, electricity and transport. This is slightly slower than planned economy-wide decarbonisation to 2030, reflecting the dominance of (hard-to-decarbonise) agriculture in the system footprint.

Key abatement drivers for the 19% reduction are energy and fuel efficiency improvements, electricity sector decarbonisation, and reductions in agriculture and land-use change (LUC) emissions.

Supply side emissions reduction potential across the UK food system by 2030



Opportunities to go further in 2030

There is potential for a system level reduction of 25% in 2030 through system actions, with further reductions at the company level.

Agriculture

- *System:* Accelerate uptake of farming measures in the UK
- *Company:* Substitute green for conventional fertiliser; insect-based feed

Electricity

- *System:* Accelerate pace of grid decarbonisation / sign PPAs for renewable generation

Heat

- *Company:* Deployment of renewable heat (e.g. electric, biomass, waste valorisation), subject to availability of grants

Domestic transport

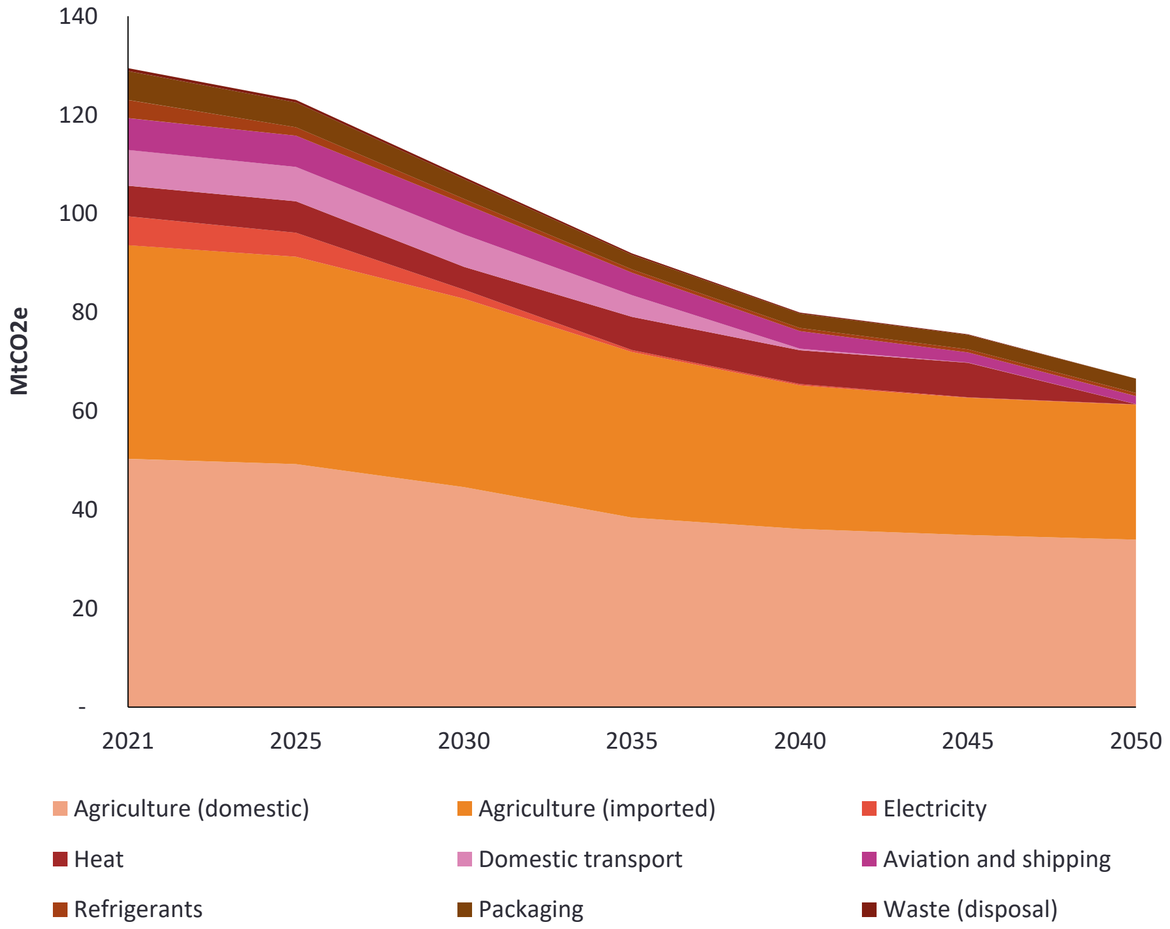
- *System:* Reduce empty running rates of HGVs; switch from road to rail
- *Company:* Use of biofuels, e.g. from waste valorisation and waste vegetable oil

The system-level opportunities offer around a further 7.5 MtCO2e abatement. Company-level trialing in areas above could help meet individual targets, but with limited scope for system scaling given feedstock constraints.

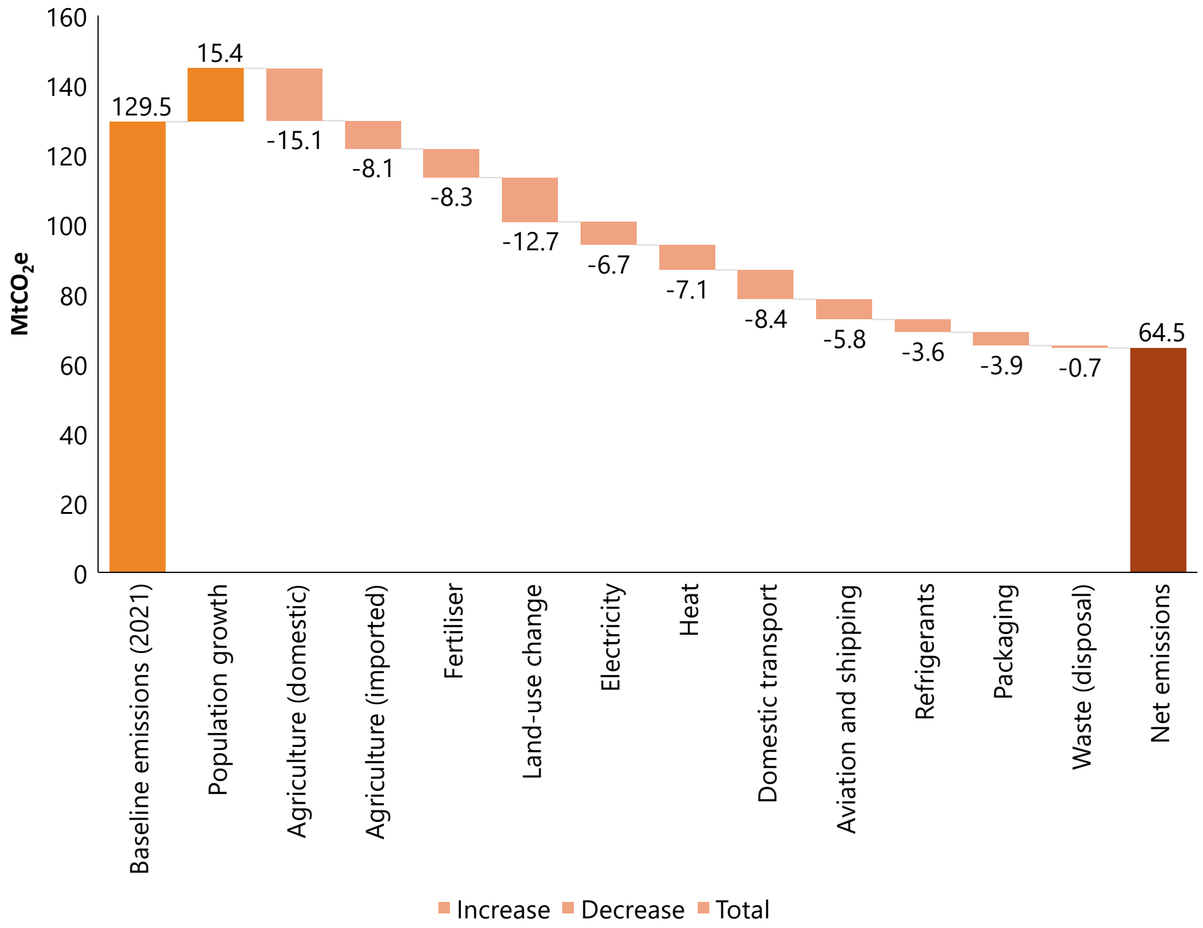
There would be further opportunities for insetting, if this were allowed to be counted against industry commitments, with a decision due on this soon by the GHG Protocol.

The analysis for this report suggests that by 2050 a 50% emissions reduction against the 2021 baseline is possible through supply-side abatement options. This includes deep cuts in agriculture emissions and full decarbonisation of fertiliser, land-use change, electricity, heat, and transport.

UK food system supply side emissions pathway by category



Supply side emissions reduction potential across the UK food system by 2050



The deep cuts in agriculture emissions reflect modelled abatement from the range of measures related to soils and livestock, together with greening of fertiliser and sustainable land-use. Less mature or more challenging measures are also accounted for.

The High Scenario (see Agriculture section) for agriculture abatement includes extensive uptake across the set of measures below by 2035:

Sub-sector	Beef	Dairy	Sheep	Pork	Poultry	Arable	Horticulture	Cross-cutting
Main decarbonisation measures	• Grass-legume mix • Feed additives • Faster LWG • Improved health • Anaerobic digestion • Other manure management • Reducing feed crop emissions	• Grass-legume mix • Feed additives • Increased milking frequency • Anaerobic digestion • Other manure management • Reducing feed crop emissions	• Grass-legume mix • Feed additives • Improved health • Reducing feed crop emissions	• Improved health • Anaerobic digestion • Other manure management • Reducing feed crop emissions	• Reducing feed crop emissions • Poultry manure	• Soil pH • Nitrification inhibitor • Cover crops • Improved drainage • Reducing Nitrogen excess	• Soil pH • Nitrification inhibitor • Cover crops • Improved drainage • Reducing Nitrogen excess	• Decarbonising fertiliser production through use of hydrogen • Decarbonising mobile machinery • Agroforestry • Avoided land-use change

There are less mature / more challenging measures beyond the High Scenario, which together offer potential annual reductions of around 15 MtCO2e:

- Use of **feed additives for grazing livestock**, for which solutions are being developed, could save **3 MtC02e** annually in the UK.
- Use of **biostimulants to reduce use of fertiliser** and associated nitrous oxide emissions, which could save **1 MtCO2e** annually.
- Use of **low-carbon feed**, which could be available in the market at scale in the 2030s, offering a potential annual saving of around **3 MtCO2e**.
- **Inter-cropping** (i.e. intense agroforestry), which offers an annual saving of around **3 MtCO2e** across an area of 700 kHa.
- Application of the above to **imported agricultural products**, offering an annual saving of around 5 MtCO2e.

Soil carbon sequestration: the abatement potential includes soil carbon sequestration related to use of cover crops. The estimates used are specific to the UK and are relatively low compared to countries with better climate conditions (e.g., France). Should clear evidence emerge about higher potential, estimates should be updated. Soil carbon sequestration is also reflected in abatement from agroforestry.

Land use change: the analysis does not include sequestration due to land-use change, e.g., through tree-planting and peatland restoration. This could be regarded as additional, depending on the decision to be made early next year by SBTi. This would not attenuate the need for agriculture emissions reductions to meet carbon budgets, given that land-use change is already fully factored in here.

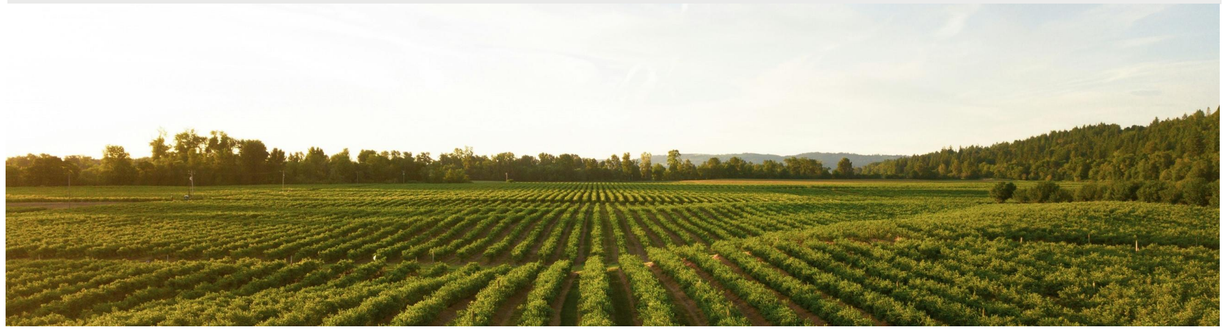
While the abatement opportunities identified could deliver very significant progress towards industry-wide targets, a gap remains to meet SBTi Forest Land and Agriculture (FLAG) targets – changes in demand-side (consumption) will also be required.

SBTi provides specific targets for Food, Land-use and Agriculture (FLAG) related emissions. In contrast to SBTi targets for non-FLAG emissions which require full decarbonisation, FLAG emissions are required to be reduced by 72% to 2050, reflecting that the agricultural sector cannot be fully decarbonised. This system plan embodies supply-side options to largely deliver on Scope 1 and 2 targets, but that only go part of the way to meeting FLAG targets. Therefore, demand-side changes in consumption and food waste will also be required.

Non-FLAG emissions: 95%+ reduction

In 2030, there is potential to reduce non-FLAG emissions by around 35% through a combination energy and fuel efficiency improvement, electricity sector decarbonisation, and reductions of emissions in refrigerant emissions.

Potential abatement options have been identified to reduce non-FLAG emissions close to zero by 2050. Specifically, there is potential for zero emissions in energy and transport, with very low residual emissions related to packaging and international aviation. Further abatement may be available in practice for these categories.



FLAG: ~40% reduction

Potential to reduce overall FLAG emissions by around 40% in 2050 compared to 2021 has been identified across domestic and imported agriculture; the carbon intensity reduction is much higher given 15% projected population growth across the period to 2050.

Further options for emissions reductions may be available beyond what is modelled – see previous page – which could drive an emissions reduction of around 55% in 2050 relative to 2021.

Even in a scenario where such options come through, this would still fall well short of achieving FLAG targets.

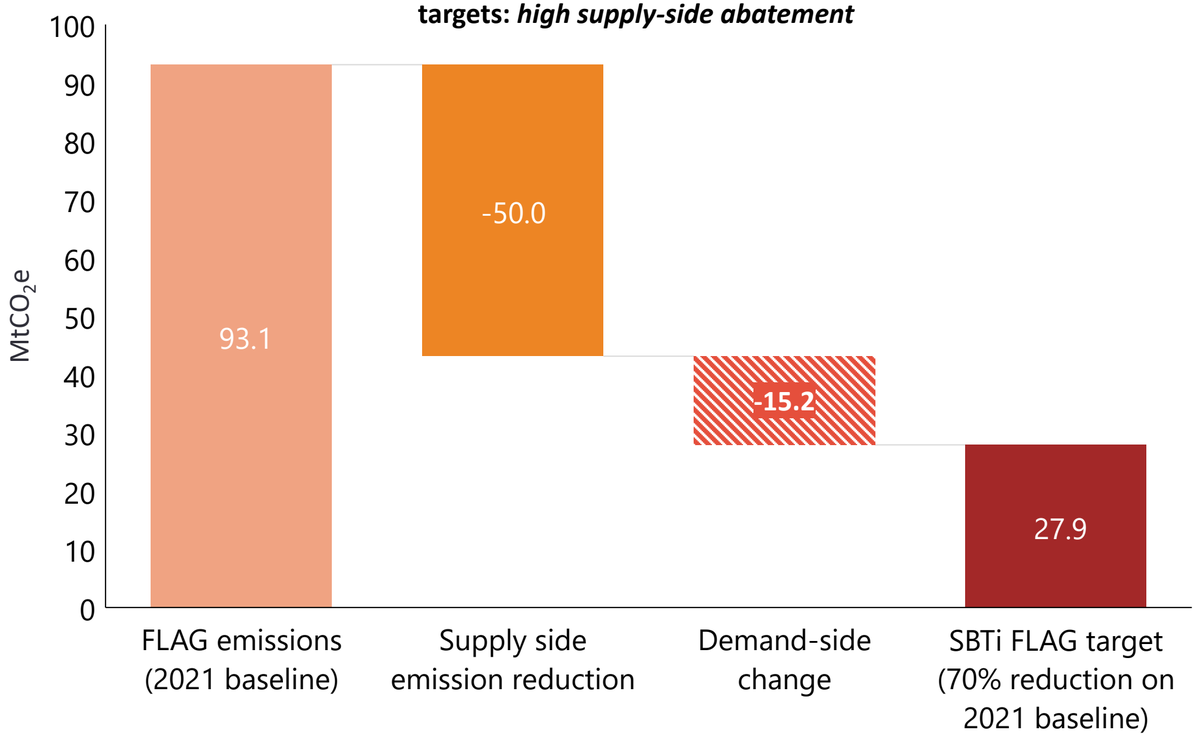
Therefore, demand-side (consumption) change will be required to reduce emissions to target alignment. The two key opportunities for demand-side change are food waste reduction and diet change.

The combination of supply-side reductions together with demand-side consumption change could lead to achievement of FLAG targets.

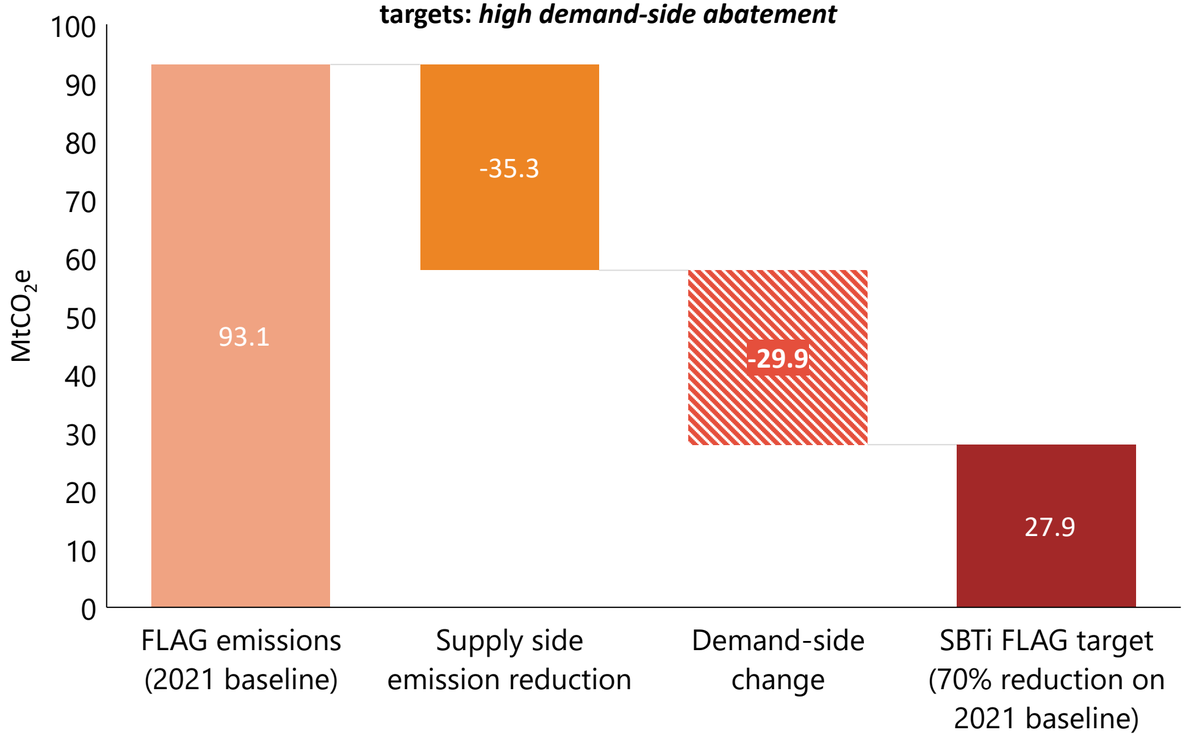
The chart on the left shows residual agriculture emissions in the high scenario plus less mature and very challenging abatement options. The former includes significant cuts from changed farming practice, with land-use change and fertiliser emissions having fallen to zero; the latter includes less mature and more challenging options from the previous page. Required emissions reductions from demand side measures to meet the 2050 SBTi FLAG are 15 $MtCO_2e$, around 23% of the total reduction on a 2021 baseline. Further supply-side reductions offset the impact of population growth.

The chart on the right shows residual agriculture emissions in the high scenario only (i.e. without abatement from less mature and very challenging measures). Required emissions reductions from demand side measures to meet the 2050 SBTi FLAG target are 30 $MtCO_2e$, around 46% of the total reduction on a 2021 baseline.

Illustrative contributions of supply-side and demand-side emissions reduction to meet FLAG targets: *high supply-side abatement*



Illustrative contributions of supply-side and demand-side emissions reduction to meet FLAG targets: *high demand-side abatement*



Demand-side: food waste reduction offers opportunities for significant emissions reductions because of its system effects – less food waste means less production required for a given demand, and consequently lower associated emissions.

Embodied food waste emissions are amongst the largest components of the food system's footprint

Around 25% of all food purchased is wasted in the UK.[1] Production emissions for food that is then wasted were estimated in 2021 by WRAP to be around 36 $MtCO_2e$. Reducing food waste has a significant impact on system emissions for this reason.

The majority of food waste occurs in households, with significant waste also occurring throughout the supply chain.

Meeting the Courtauld Commitment would significantly reduce these emissions

The Courtauld Commitment sets a target for the food industry to reduce food waste by 50% in 2030. This was based on the United Nations' Sustainable Development Goals (SDG) 12.3 (Food Loss and Waste).

WRAP estimates emissions reductions of up to 6.45 $MtCO_2e$ in 2030 through meeting the Courtauld Commitment. This would represent an additional food system emissions saving of around 5% in 2030 relative to 2021.

Progress has been made towards this target, particularly in manufacturing and retail; but much more remains to be done.

There is scope for emissions reductions linked to food waste beyond the Courtauld Commitment, which would make a very valuable contribution to FLAG targets

If the Courtauld Commitment could be achieved by 2030, there would remain a significant amount of food waste throughout the value chain. An additional ambitious reduction to 2050 has therefore been modelled, with this resulting in a further 10% FLAG emissions reduction, and very low levels of food waste in the home and through the supply chain.

This would leave a gap to 2050 FLAG target of between 4 and 20$MtCO_2e$ (4-21% of 2020 FLAG emissions) depending what can be achieved on the supply side.

1 Why we need to take action on food waste – WRAP

Demand-side: diet change towards low-carbon foods would reduce carbon emissions and can offer potential health benefits – but it should not be at the expense of health outcomes, which are complex and uncertain. Diet must remain nutritious, accessible and affordable.

Diet and net zero

Red meat and dairy foods are relatively carbon intense (see chart on the following page). WRAP has highlighted in prior publications the need for a shift in national diets to meet the greenhouse gas aspect of the Courtauld Commitment[1]. The CCC has modelled a central case ("balanced") 20% reduction in red meat and dairy by 2030, with red meat reduction of 35% by 2050; and "tailwinds" with 50% reductions in both red meat and dairy consumption in the UK by 2050.

A more conservative scenario than CCC's central case is modelled, with a 20% reduction in red meat and dairy by 2050, together with their tailwinds scenario; these result in further FLAG emissions reductions of 9% and 22% respectively, based on UK and imported abated agriculture emissions in this report[2]. These numbers assume that protein is instead gained from pulses; substitution to chicken or fish would slightly reduce emissions savings, e.g., doubling chicken and egg consumption would add around 1MtCO2e annually (less than 1% of FLAG emissions); doubling pork consumption would add around 2.5 $MtCO_2e$.

Diet and health

Nutrition impacts of diet are of paramount importance, diet change towards lower carbon foods would reduce emissions and can also offer potential health benefits but any diet change should maintain or improve nutritional balance, accessibility and affordability. This is recognised by consumers, with clear evidence that they prioritise health outcomes related to diet[3].

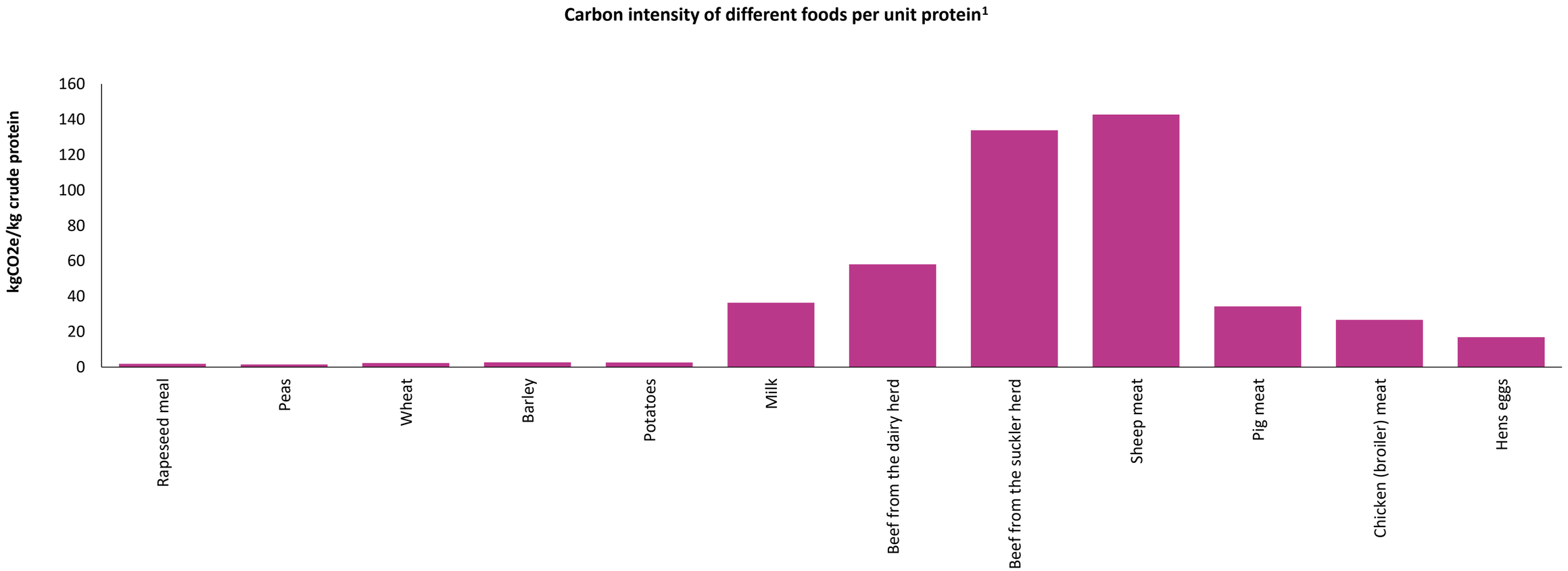
The Eatwell Guide is useful in this context, because it reflects consideration of health, nutrition and sustainability factors, and the benefits that can be achieved by moving more of the population's diet closer to what it recommends:

- More diverse proteins in the shopping basket, to help improve supply chain resilience and support a more nutrient dense diet;
- Grow/switch towards sales of healthier and more sustainable product choices;
- Change the balance of the basket towards more plant-rich choices.

A well-known study based on the Eatwell Guide suggests that a reduction in red meat and some dairy foods could improve health outcomes[4]. However, this should be heavily caveated: the study did not suggest lower consumption of semi-skimmed milk; consumption data upon which the study was based relates to 2008-11, since when there may have been significant changes in consumer behaviour. Therefore, dairy may be seen as an important part of a balanced diet at current levels of consumption, as per the Eatwell Guide and other international guidance[5]. Evidence from Food Standards Scotland[6] also suggests that reductions of red meat consumption could deprive people of essential nutrients, although these effects can be mitigated; a more nuanced approach is required (e.g. targeting high consumers of red meat or processed meat). More generally, the nation's diet varies greatly regionally and through different groups in society, and this should be fully allowed for when considering diet change.

1 UK Food System GHG Emissions: 2022-23 Update (Summary Report) – WRAP, 2023
2 SRUC
3 Consumer Insights Tracker February 2024 – Food Standards Agency
3 Consumer Insights Tracker February 2024 – Food Standards Agency
4 The cost of achieving the Eatwell Guide diet – University of Oxford, 2023
5 Nordic Nutrition Recommendations 2023 – Nordic Co-operation
6 Modelling the impact of reductions in meat and dairy consumption on nutrient intakes and disease risk – Food Standards Scotland, 2024

There is wide variation in carbon intensity of proteins – moving towards less carbon intense foods would reduce emissions – but this must not be at the expense of health considerations.



There is a high degree of variation in the carbon intensity of different foods, with red meat and dairy having relatively high carbon intensities by unit of protein compared to chicken and eggs. Vegetable sources of protein have a much lower carbon intensity than meat; the chart illustrates this for selected plant-based foods, chosen because they have a relatively high protein content.

1 UK Food System GHG Emissions: 2022-23 Update (summary report) – WRAP, 2023

Diet change will be needed, but to what extent will depend on how other abatement options are exercised. Health effects should be fully accounted for. Diet change does not imply the need for reduced production.

A modest change in diet could be sufficient to meet targets, depending on emissions reductions in agriculture and food waste, but greater dietary shifts can support deeper cuts in carbon emissions.

- If more challenging and less mature agriculture emissions reductions could be delivered, together with food waste reductions, a 20% reduction in red meat and dairy by 2050 would be sufficient to meet carbon targets. More would be needed if such measures are not successful.
- The 20% scenario should be regarded as illustrative. In practice, there could be more reduction in different categories of carbon intense food and less in others.
- Interventions to support dietary shift will need to be appropriately targeted to ensure the achievement of desired health outcomes. Greater alignment with the Eatwell Guide at a population level would be an appropriate direction of travel.
- **The key challenge to address is that the industry, working with government, should agree a position on diet change which balances net zero and health outcomes, fully accounting for impacts on nutrition.**

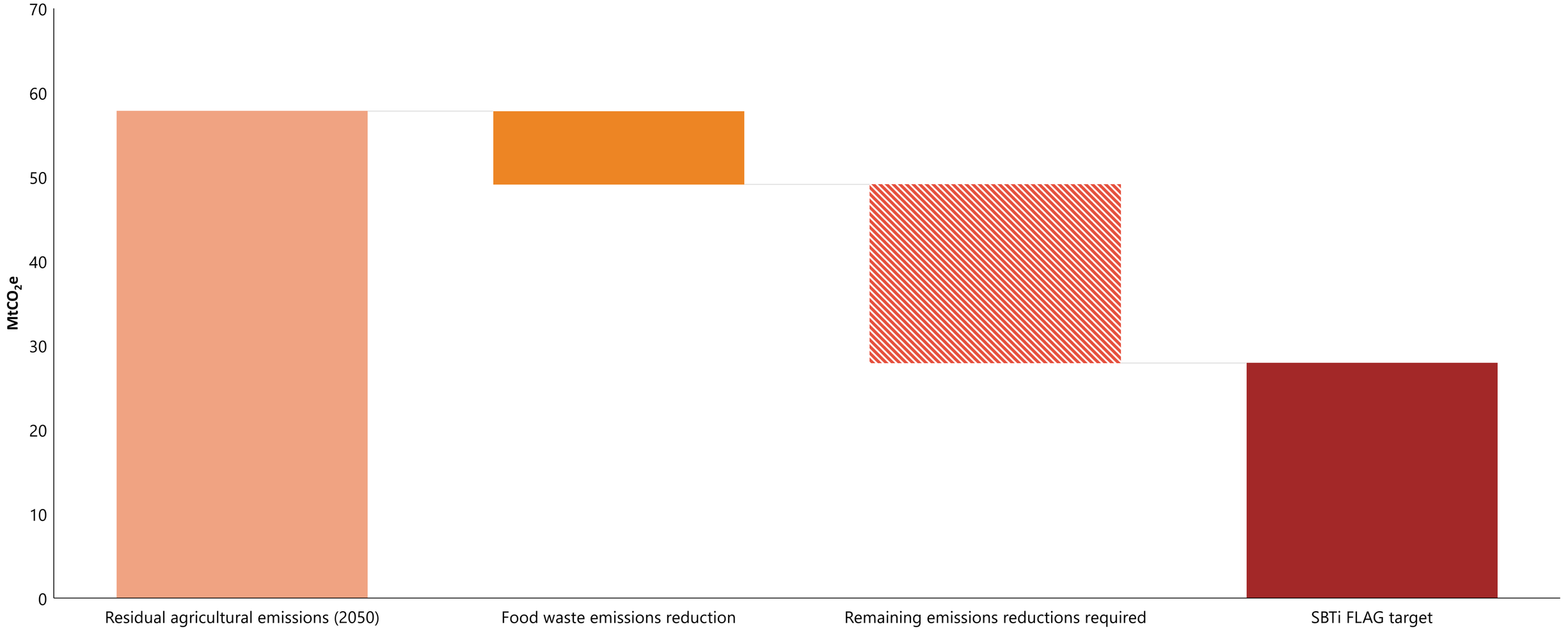
The modelling includes a 15% increase in population to 2050.

- With a proportionate increase in food demand, the consequence will be 15% growth in total food production.
- Diet change would reduce consumption per capita of certain products, and the two could broadly cancel out in terms of net impacts on production.

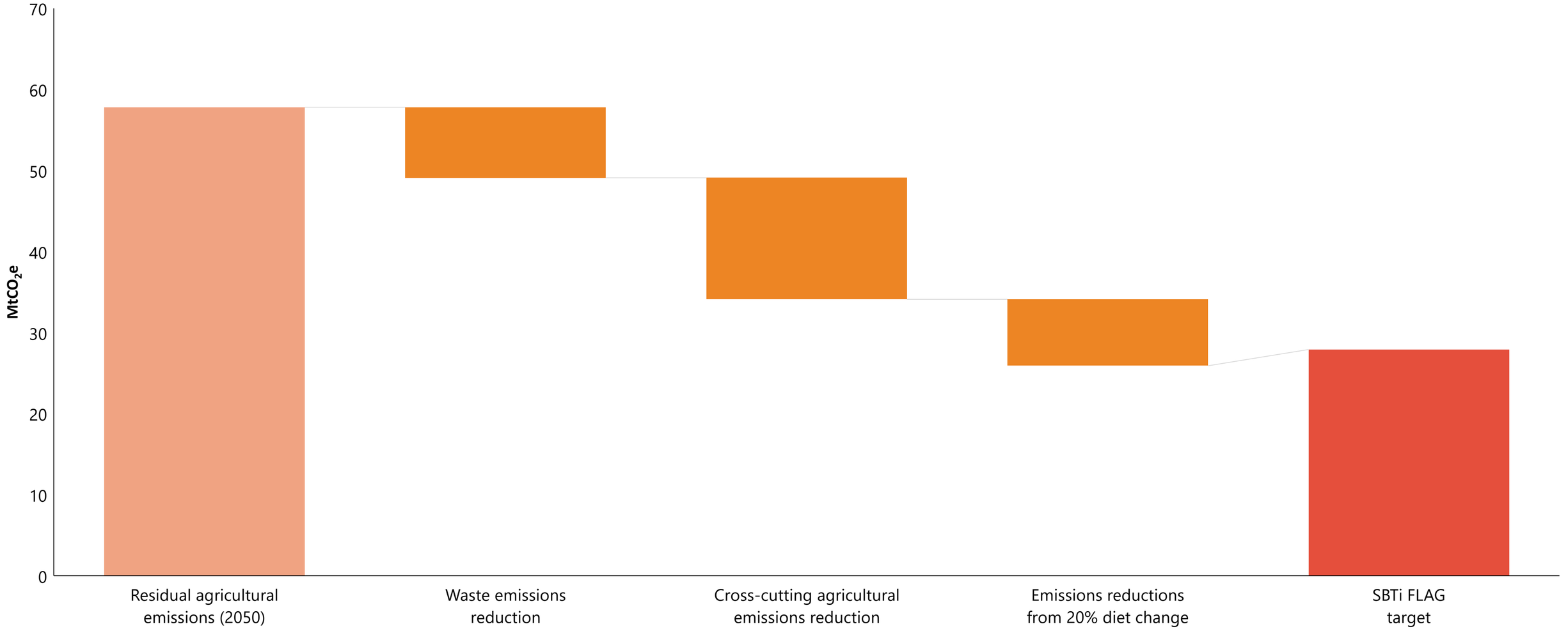
De-coupling production and consumption should be supported by trade policy

- Where there are further reductions in consumption (due to food waste reduction or diet change), this does not imply reduced production: there could be import substitution or increased exports. The rationale for this would be that the UK has relatively high environmental and animal health/welfare standards, and is comparatively climate resilient, and should therefore be supplying markets at home and growing markets abroad.
- For import substitution, this would be supported by environmental standards and carbon-based tariffs for imports and conditional trade preferences. For increased exports, trade promotion and facilitation would be the appropriate levers to build on the UK's unique selling points of high standards. Ways would have to be found to support such exports given the national carbon accounting convention based on territorial emissions, and the Government should consider this.
- It may be the case that there needs to be some land-sparing in order to achieve environmental objectives for carbon and nature; the Government should set out a draft land-use framework for consultation.

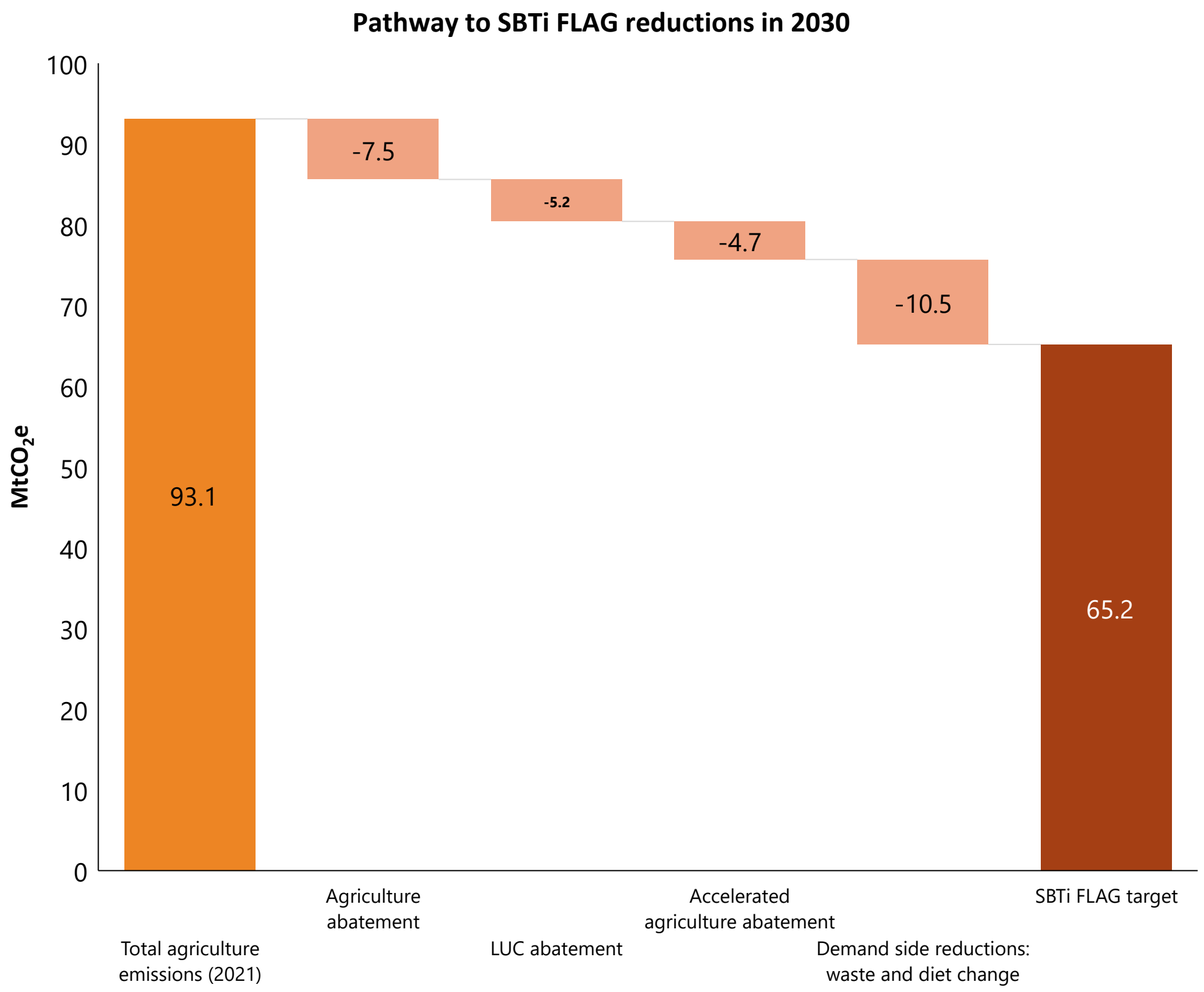
If food waste can be reduced to very low levels, in combination with the High Ambition scenario for agriculture, this would leave a gap of 20 $MTCO_2e$ to achieve SBTi FLAG targets.



In combination with the High Ambition scenario for agriculture and less mature or more challenging measures, this would leave a gap to the SBTi FLAG target which could be more than filled by a(n illustrative) 20% reduction in consumption of red meat and dairy.



SBTi FLAG 2030 targets of 30+% remain feasible but will be very challenging – they require urgent and concerted action to drive deep cuts on supply and demand sides - beyond the High Ambition agriculture scenario and / or involving diet change.



SBTi FLAG commitments to cut emissions in 2030 by 30% and above could be met but only if very ambitious emissions cuts were delivered:

Agriculture (up to 18 MtCO2e reductions)

- Emissions reductions through agriculture and avoided land-use change would be around 13 MtCO2 in 2030, compared to 27.9 MtCO2e required to deliver a 30% cut (and more to go beyond 30%).
- It is possible that further agricultural emissions reductions could be achieved by accelerating uptake of measures from 2035 to 2030 across the UK, which would result in additional savings of 4.7 MtCO2e in 2030. This would be very challenging, given incentives are not in place in DAs, and lead-times for farmer participation. **It reinforces the need for food companies to work in partnership with farmers and support their transition, within a framework of government incentives (pages 42 and 49).**

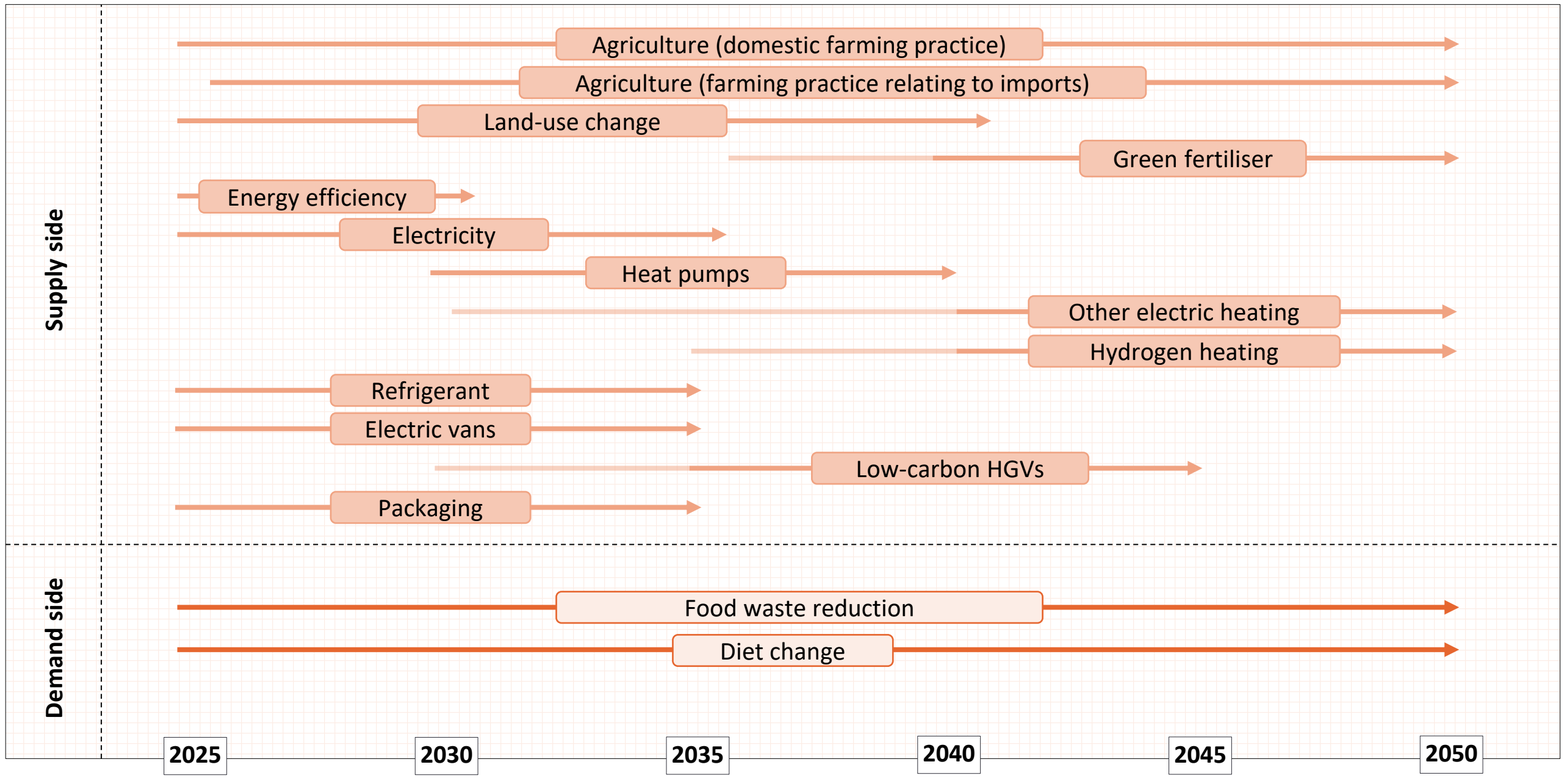
Demand-side measures (at least 10.5 MtCO2e reductions)

- Food waste reduction consistent with the Courtauld Commitment could reduce agriculture emissions by 5.6 MtCO2e in 2030; **this would require very significant change in consumer choices, supported proactively by industry and government (page 33).**
- Diet change could also contribute to agriculture emissions reduction in 2030, subject to previous caveats. **It may be the case that continuation of underlying trends could make a significant contribution here, This could be buttressed through early action by industry and government.**

The net zero transition plan for the food system to 2050 and its dependencies: technology innovation and policy development to support commercial viability.

Timing of key abatement measures

The figure shows a high-level view of the net zero transition plan for the UK food system, provided certain dependencies are met. Out to 2030, the plan is dominated by energy and fuel efficiency improvements, electricity sector decarbonisation, domestic and foreign agriculture practice and LUC. From 2030 to 2050, key areas of focus for FLAG emissions are further adoption of low-carbon practices and technologies, driving minimum emissions cuts of 40% and ideally more than 50%. For non-FLAG emissions, the focus should be completion of the transition to a low-carbon power system and electrification of heat and transport, with full decarbonisation of these sectors. Demand side requirements (food waste reduction and diet change) are a driver throughout.



Dependencies

- The plan has a number of dependencies, i.e. conditions that must be met in order for the plan to be implemented. The start dates shown opposite are consistent with what would ideally happen in the context of net zero strategy for the country.
- While there is good momentum already in many areas, these start dates will be particularly challenging for green fertiliser, electric heating, hydrogen-based heating and low-carbon HGVs. The dependencies here are new policies with very high carbon prices, and significant technology innovation. Should dependencies not be met, the pathway might entail delayed deployment of these technologies towards the end of the 2030s. Achieving net zero would then require accelerated deployment through the 2040s.
- The actual pathway will depend largely on policy implementation. Industry should engage with government on policies, make plans for low-carbon investment, monitor developments closely, and execute strategies when supporting conditions are in place. Where there is policy uncertainty, existing assets should be extended as long as possible.

Repeated from Executive Summary:

Costs of decarbonisation: Funding of at least £500 mn annually will be required to support low-carbon agriculture measures – without this, key measures will not be adopted by farmers.

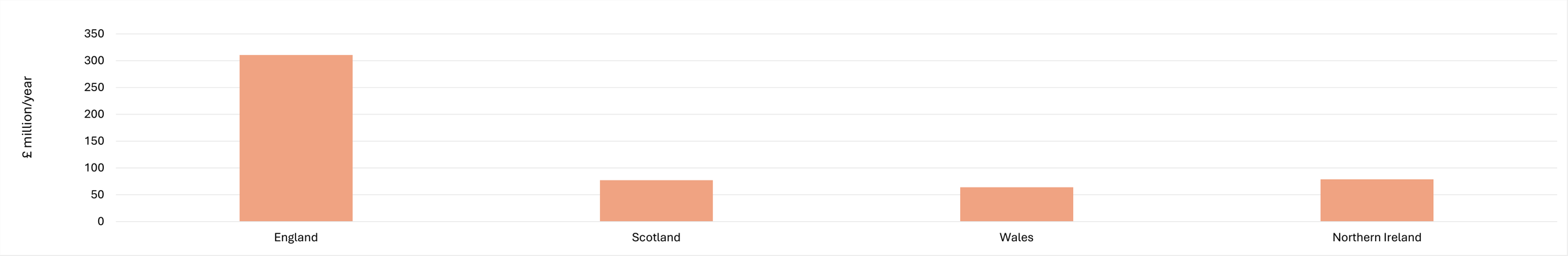
There are two categories of measures for agriculture abatement: those that save money and those that cost money on a net basis.

Even for the former, farmers will need to be supported in their net zero transition. For example, it is recommended that funding should be made available for farm-level carbon audits, benchmarking and planning; in Northern Ireland, these are funded in effect through direct payments, for which they are a qualifying condition. There are some measures where there is lag between investments and payoffs. Again, these will have to be funded.

Measures which cost money will have to be funded or they are highly unlikely to be adopted. While a net cost, these pass a value-for-money (VfM [return on public investment]) test: abatement costs are well within the UK Government's carbon values, and there are significant nature co-benefits. Annual costs are estimated of the order £500 mn, which are distributed across England and the DAs as shown in the chart below. These are funded in England under ELM, and it is recommended that these should similarly be funded in the DAs. Funding would typically be in the form of ongoing payments, given the vast majority of costs are operating. For the fewer measures where there are significant capital outlays, these should be funded through grants; for example, grants are available for slurry investment in England and Scotland. Over time, grants for low-carbon mobile machinery are likely to be needed.

There are much higher costs associated with supporting the broader farming transition and meeting national environmental objectives, which requires a more extensive scope of changed farming practice together with taking land out of production (e.g., for forestry, peatland restoration and nature recovery). For example, a recent NFU report estimated this cost to be over £4 bn annually[1].

Positive abatement cost per DA in 2050 (Section 3.4)



1 An agricultural budget that delivers for the environment – NFU asks of government – NFUonline, May 2024

Repeated from Executive Summary:

Costs of decarbonisation: There are significant costs of decarbonisation currently facing the food system. These relate to imported agriculture, sustainable feed and commodities procurement, and sustainable packaging.

Net cost and capital cost are differentiated: the former reflects any operating cost savings associated with the latter. Costs of low-carbon options are compared with business-as-usual alternatives. Costs are assessed on an annual basis to allow comparison with system revenues and consequently infer potential price impacts, as is the convention in effective transition planning.

To 2030:

Net costs:

In addition to domestic agriculture, there are three significant areas of cost related to decarbonisation facing the food system:

- **Imported agriculture:** Where the recommendation is that farming costs in the UK should be funded by government, there is not an equivalent mechanism for imported products. It is recommended that an industry programme should be considered to reduce emissions from imported products. While this would be costed as part of scoping work, based on UK costs and a comparison of farming products in the UK and foreign supply chains, funding of several hundred million pounds annually could be required.
- **Commodities caught by deforestation regulations:** There will be a premium associated with sustainable soy and commodities. This is currently uncertain, with a wide range of estimates in the market related to cost premia for EUDR. However, across the range of commodities, this could be in the hundreds of millions of pounds at the system level. It should only be temporary, because costs associated with establishing new supply chains and traceability systems are non-recurring.
- **Sustainable packaging:** There are a range of policies to drive sustainable packaging (e.g., EPR, plastics tax, PRNs), which together would add around £2.5 billion annually according to industry estimates.

Capital cost:

There are significant capital costs in the near term related to energy efficiency improvement. While related investments should have short payback periods, they still need to be funded (e.g., for waste heat recovery). Replacing ageing cold storage also requires large investments. These have typically been costed at the company level and included in financing plans. For purposes of illustration, the CCC estimates an annual investment requirement of £300 million across all industry for energy efficiency improvement. Costs associated with Anaerobic Digestion (AD) and renewable heat will need to be funded if they are to happen.

Repeated from Executive Summary:

Costs of decarbonisation: Beyond 2030, there will be further costs equivalent to 1-2% of system revenues, related to heat, transport and fertiliser decarbonisation. There will be significant capital requirements throughout the period for low-carbon investments.

To 2050:

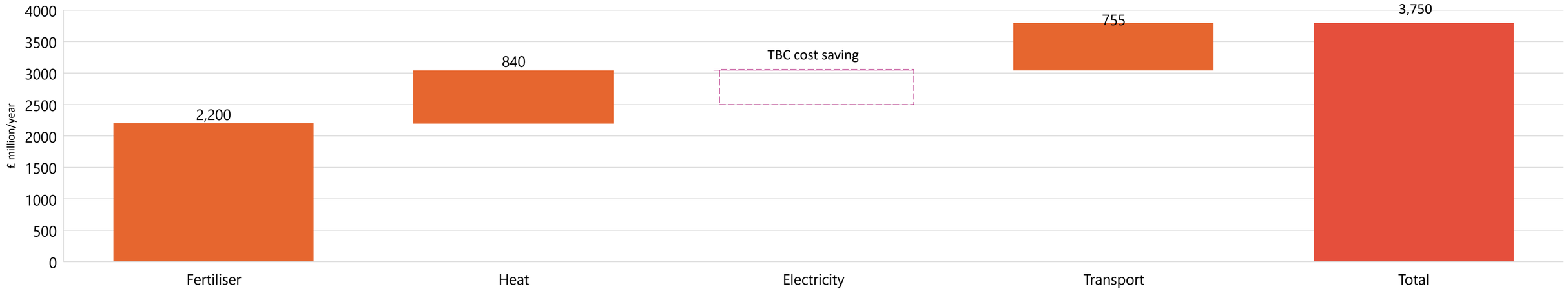
Net costs (additional to 2030):

Net costs will be added to the system through renewable heat, low carbon-HGVs and green fertiliser. For full abatement approaching 2050 across these three categories, the associated costs are estimated to be around £3.5 bn annually, which is equivalent to around £1.5 bn in present value terms, i.e. 1-2% of annual food expenditure of £140 bn. New policies will be required, with these costs to be funded by government (e.g., grants) and/or consumers (e.g., carbon pricing impacting food prices).

Capital cost:

There will also be significant capital outlays required for these technologies. For example, heat pump capital costs are around 4-8 times those of gas boilers, and battery HGVs are currently 3.5 times the capital costs of conventional alternatives, with further investment required for charging infrastructure. This raises a question about how investments can be financed within capital constraints. Opportunities to be considered further here are the roles for sustainable finance from banks (i.e. finance dedicated to support sustainability) and for government finance, to complement commercial finance.

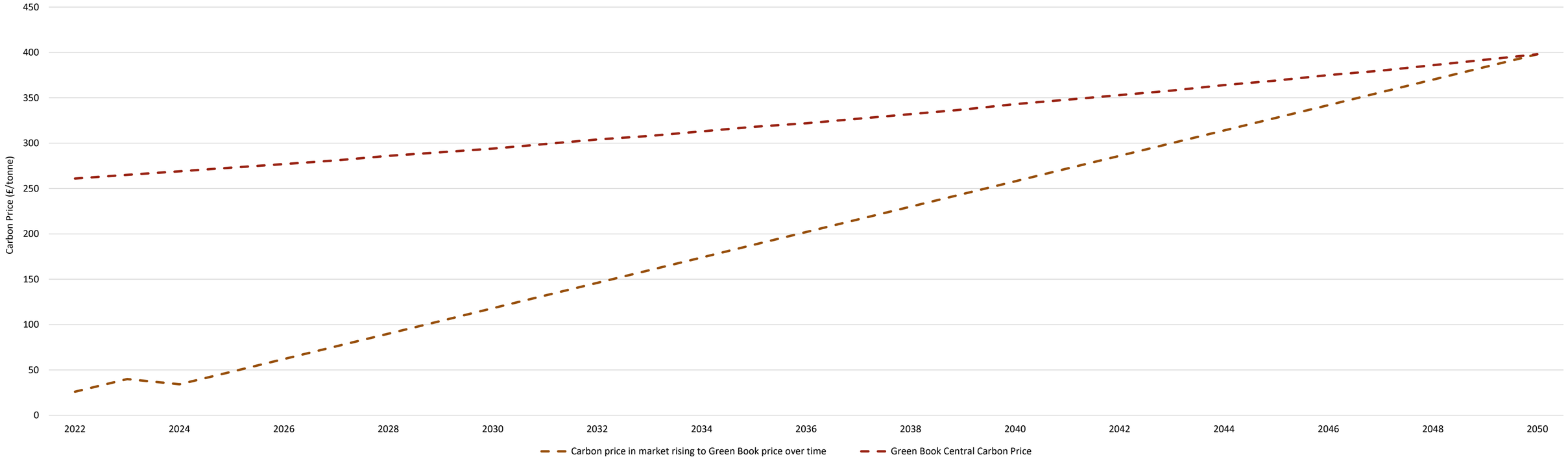
Annual cost of decarbonisation 2050



Costs of decarbonisation: Offsetting residual emissions through purchase of credits in the market would be very expensive compared to abatement measures – emphasising the need to unlock emissions cuts through this plan in order to manage costs.

If residual emissions of around 30 MtCO2e in 2050 were to be offset through the purchase of credits, this would be very expensive. For example, while the cost of credits in 2050 is highly uncertain, this is likely to be above £200/tCO2e (see graph below) implying a total cost of £6 billion annually (i.e., well exceeding the costs of industry-wide abatement outlined above). This highlights the importance of pulling policy levers for demand-side consumption change (food waste and diet change). It also highlights the benefits of early investment in insetting, as the value of related assets should grow very significantly over time. Determination of a carbon credit strategy does not need to be an immediate priority. However, there should not be an assumption that this will be used to get to net zero.

Carbon Price Projections



The food industry should embrace ambition consistent with SBTi targets for 2030 – and deliver this through driving action and managing dependencies.

Subsector	2030 ambition	Levers	Key players	Dependencies
UK agriculture	22% reduction versus 2021	• Very extensive uptake of key abatement measures across UK • Reduced LUC emissions	• Industry • UK and DA governments	• Overcoming financial and non-financial barriers to uptake of measures through policies and industry support • Deforestation regulation
Imported agriculture	15% reduction versus 2021	• Uptake of abatement measures in supply chains • Reduced LUC emissions	• Industry	• Successfully setting up a programme to support farmers outside the UK • Deforestation regulation
Power sector	70-100% reduction versus 2021	• Grid decarbonisation • Signing of PPAs	• Government • Industry	• Pace of grid decarbonisation
Energy efficiency improvement	20% reduction in energy consumption and emissions	• Investment in energy efficiency	• Companies	• Capital availability
Transport decarbonisation	10-30% emissions reduction versus 2021	• Electric vans • Fuel efficiency improvement • Reduction in empty running	• Companies	• Successful coordination across logistics companies to reduce empty running
Refrigerants	73% emissions reduction versus 2021	• New fridges with low fluorinated greenhouse gas (F-gas) emissions	• Companies	• Capital availability
Packaging	32% emissions reduction versus 2021	• Increased recycling and reuse • Alternative packaging	• Industry • Companies • Government	• Policies to support recycling and reuse • Recycling capacity
Food waste	Deliver Courtauld Commitment	• Build on efforts in supply-chain; develop approaches to reduce household food waste	• Industry • Government	• Consumer response to industry and government efforts
Diet change	TBC	• Moderate consumption of carbon-intense goods subject to nutrition objectives	• Industry • Government	• Agreement on approach • Consumer response to industry and government efforts

Detailed actions, metrics and leading indicators should be set following agreement on ambition and related levers.

Policy strengthening will be essential in order to align government and commercial objectives to deliver emissions reductions. The industry should engage with the UK Government on the areas outlined below.

	Problem to be solved	Policy/action	Alignment with government objectives	Budget
Farming budget	Current uncertainty over how the overall farming budget will be spent, particularly as regards land-sharing versus land-sparing.	Confirm farming budget to support net zero and wider sustainable farming practices; and publish a land-use framework, including ambition and funding.	Government has previously expressed commitment to focus on land-sharing, but has not published a land-use framework setting out the balance between land sharing and sparing.	The cost of funding all low-carbon measures in England is low relative to the farming budget (e.g. £310 mn versus £2.4 bn), much of which remains unallocated. However, it is important to recognise that this budget also needs to support broader environmental objectives.
Farm-level carbon planning	Need to boost uptake of the Sustainable Farm Incentive from current low levels.	Strengthen incentives for farm-level agri-environment practices through funded carbon audits, benchmarking and plans for farmers, to buttress their engagement with sustainable farming and related schemes.	Government wants to engage farmers and has previously acknowledged the benefit of farm planning to this end. Government needs a carbon baseline against which to assess scheme impacts.	To be determined by government as part of a review, noting there is a wide range of options currently in use, from light-touch tools to more extensive audits.
Sustainable Farming Incentive uptake	Current low levels of uptake for the Sustainable Farming Incentive (less than 25% of eligible farmers including recent EOIs) could reflect still low financial rewards, particularly for more productive farms who are penalised under the income-foregone approach.	Assess impact on uptake from uplifting payment rates in the Sustainable Farming Incentive scheme and consider the case for a further increase to improve uptake across farming types.	The Government is committed to increasing uptake of the Sustainable Farming Incentive and has previously increased payment rates to this end.	This could cost £10s of millions depending on the increase.
Feed additives	Feed additives are cost-effective from a societal but not a commercial perspective.	Extend farming support schemes to include full or partial payment for use of feed additives to support rollout.	The Government has previously recognised the importance of feed additives in its net zero strategy.	A cost of £65 million annually is estimated to support full rollout of feed additives for dairy, with lower costs for partial funding, lower levels of uptake, and falling prices as scale is reached; based on feed additive recently approved by the Food Standards Agency.

Policy strengthening will be essential in order to align government and commercial objectives to deliver emissions reductions. The industry should engage with the UK Government on the areas outlined below (cont.).

	Problem to be solved	Policy/action	Alignment with government objectives	Budget
Anaerobic digestion (AD)	Funding available for farm AD will end in 2028, such that socially desirable investment may not happen.	To commit a new round of funding to support farm AD for farm waste (not crops).	The Government recognises that AD is an important part of net zero strategy and that this requires funding.	It is currently funded; extending this beyond the current window would require the same fiscal space as now; annual funding across all sectors of the economy is £200 mn.
Stacking of benefits / framework for accessing private finance	Limited opportunities for farmers to monetise benefits of improved farming practice beyond government schemes.	Develop a framework for farmers to access private finance, namely through generating revenue from carbon and nature markets and selling of ecosystem services, over and above what they are paid for through ELM, in order to monetise benefits of sustainable farming. This should take into account any new industry schemes.	If the Government is to achieve its environmental objectives, it will need farmers to do more than can be paid for through schemes.	While the farming budget is sufficient to fund the net zero measures identified in this report, it is not sufficient to fund the full range of activities to achieve national environmental objectives, which will need to leverage private finance.
Farm regulation	Farm regulations are largely inherited from the EU Common Agricultural Policy (CAP) and were designed to achieve previous objectives. In some cases, they are at odds with net zero objectives (e.g. the Farming Rules for Water do not support the use of organic fertiliser).	Undertake a regulatory review with respect to three objectives for farming: food production, net zero, nature.	The government should support a review to ensure alignment of regulations with its own net zero and wider objectives.	A regulatory review has limited budget implications.
Deforestation legislation	Imports of soy and tropical commodities are associated with deforestation and land conversion, with significant adverse consequences for climate and nature.	Introduce a regulation that prevents land use change from imports of soy and tropical commodities consistent with the EUDR, while managing risks related to land conversion.	The Government is committed to tackling emissions associate with deforestation and land conversion.	Associated costs fall largely on industry rather than government.

Policy strengthening will be essential in order to align government and commercial objectives to deliver emissions reductions. The industry should engage with the UK Government on the areas outlined below (cont.).

	Problem to be solved	Policy/action	Alignment with government objectives	Budget
Farm data	There are many competing methodologies for calculating farm carbon footprints, leading to unnecessary administrative burdens for farmers and lack of confidence in data.	Standardise carbon calculations, data and reporting through agreeing common methodologies and standards. These should differentiate between different types of farming practice and, as a matter of urgency, reflect improvements due to SFI participation. With more confidence in data, reporting should be mandated, to support consumer decision making.	This is well aligned with the Government's Food Data Transparency Partnership (FDTP).	The value add of the Government is to act as a facilitator and to set standards. Budget implications are limited, although it is important to ensure that FDTP is adequately resourced.
Trade policy	There is a risk that domestic production held to high environmental standards could be displaced by imports produced to lower environmental standards.	Ensure a level playing field between domestic produce and imports through common environmental standards, border tariffs for carbon-intense products, and trade preferences in Free Trade Agreements related to environmental standards and animal health/welfare; export promotion and trade facilitation for British products.	The Government is committed to a level playing field to ensure protection of UK production.	Budget implications are limited for import measures; affordability impacts limited given small share of carbon costs in total household food expenditure; funding is already available for exports and should be continued.
Agriculture – Welsh Government	Incentives for uptake of net zero measures are currently limited.	Ensure that net zero measures are funded under the new Welsh framework, by testing them against the key net zero measures identified in this report to ensure that there are no gaps.	The Welsh Government is very committed to supporting farmers on their net zero and nature-positive transition; agriculture emissions are 15% of total greenhouse gas emissions in Wales.	The Welsh farming budget is being repurposed to support this transition; required funding for net zero measures is around £65 mn, relative to a farming budget of £420 mn.

Policy strengthening will be essential in order to align government and commercial objectives to deliver emissions reductions. The industry should engage with the UK Government on the areas outlined below (cont.).

	Problem to be solved	Policy/action	Alignment with government objectives	Budget
Agriculture – Northern Ireland Government	Financial incentives are very limited under current policies, and measures are unlikely to be taken up.	Provide financial incentives for the key measures identified in this report to drive down emissions from dairy and beef farming, which dominate Northern Ireland's farming carbon footprint.	The Northern Irish Government recognises the benefits of the key measures for driving down agriculture emissions.; agriculture emissions are 25% of total greenhouse gas emissions in Northern Ireland.	Funding of financial incentives would require repurposing of the farming budget, along the lines of what is being done in England and Wales; required funding for net zero measures is around £80 mn, relative to a farming budget of £550 mn.
Agriculture – Scottish Government	Financial incentives are very limited under current policies, and measures are unlikely to be taken up.	Provide financial incentives for the key measures identified in this report to drive down emissions from dairy and beef farming, which dominate the carbon footprint of farming in Scotland.	The Scottish Government recognises the benefits of the key measures for driving down agriculture emissions; agriculture emissions are around 15% ot total greenhouse gas emissions in Scotland.	Funding of financial incentives would require repurposing of the farming budget, along the lines of what is being done in England and Wales; required funding for net zero measures is around £80 mn, relative to a farming budget of £330 mn.
Grid decarbonisation	Uncertainty over the pace of grid decarbonisation and related contribution to carbon commitments for the industry.	Clarify target date for grid decarbonisation (2030 vs 2035) and disclose credible plans to achieve this. Change regulatory guidance to support running of freezers at 15 degrees, to unlock energy efficiency savings.	Power sector decarbonisation is one of the new Government's missions, and 2030 decarbonisation was a manifesto commitment.	Power sector decarbonisation is funded by consumers (at limited cost relative to a counterfactual of running the system on combined-cycle gas turbine) .

Policy strengthening will be essential in order to align government and commercial objectives to deliver emissions reductions. The industry should engage with the UK Government on the areas outlined below (cont.).

	Problem to be solved	Policy/action	Alignment with government objectives	Budget
Heat	Currently the relative prices of gas and electricity are imbalanced, given lack of a carbon price on the former and policy cost uplifts to the latter.	Incentivise decarbonisation of heat processes in the food system by extending the Industrial Energy Transformation Fund (IETF) to support interim investment in low-carbon heat technologies. Rebalance gas and electricity prices, adding carbon costs to the gas price and removing policy cost uplifts from the electricity price.	Heat decarbonisation is required to meet legislated carbon budgets.	This would be a continuation of current funding for the IETF.
Grid connection	While electrification of food manufacturing and logistics is an important part of food system decarbonisation, current grid connection timelines can be many years.	Food companies and logistics companies should be prioritised for grid connection from the 2030s, which is when electrification becomes an important part of food system decarbonisation.	Heat and logistics decarbonisation through electrification are an important pillar of the Government's decarbonisation strategy.	Grid connection costs would either be paid for by companies or socialised across electricity consumers.
Transport decarbonisation and hydrogen economy	Transport decarbonisation and use of hydrogen have an important contribution to make to sector decarbonisation.	Building on participation of food companies in current programmes for transport decarbonisation (vehicles and infrastructure) and development of the hydrogen economy, ensure continued uptake as efforts are scaled up.	Transport decarbonisation and development of a hydrogen economy are key pillars of the Government's decarbonisation strategy.	Programmes are funded in these areas.

Further work is required to assess system resilience and land-use, and to develop a program for driving down imported agriculture emissions.

System Resilience

As previously noted, the analysis for this plan assumes that the geographic footprint of the system remains constant. In practice, it is not clear whether the current footprint is optimal, in light of climate, nature and geo-political risks on the one hand, and the need to take land out of production in the UK on the other. This is further cast into doubt with potential impacts of trade deals on supply chains.

A next step from the current project would be to assess supply chains with respect to these factors in order to identify vulnerabilities and mitigating mechanisms, whether this be might land-use change in the UK, or invest in vertical farming, or for design of trade deals and border tariffs.

This a very live issue for Government, and an existential issue for the industry, on which it does not currently have a position.

Imported Agricultural Emissions

As previously noted, these form a major part of the system drive change. The optimal solution would be to establish a pan-industry programme and platform for supply-chains outside of England, which would function similarly to the Sustainable Farming Incentive (SFI) in England, except that this would be funded by industry. The benefit of a pan-industry approach would be to establish common standards and to benefit from economies of scale.

Repeated from Executive Summary:

Implementing the System Plan: Areas for Action

Asks of government

What: In this strategic plan there are 19 asks of government (see previous pages), which are key to supporting a level playing field and providing incentives for action to net zero.

Action: Industry to engage with government on policy asks at the earliest opportunity.

How: Structured discussions between industry and government convened by IGD.

Collective industry action

What: The areas for collective action are many, but prioritisation is needed in those which will generate faster progress to net zero and model ways of driving system change, taking account of the nature emergency and human health. There are a set of proposed areas, which have been under discussion with representative sector organisations from across industry since April this year.

Action:

Supply

1. Supporting farmers to join schemes through facilitation and incentives, in order to boost adoption of low-carbon practices (reduced fertiliser use, feed additives, etc.).
2. Convening on soil carbon, to understand the evolving evidence base and draw out implications for transition planning in the sector, including potential opportunities for farmers.
3. Aligning and further driving detailed design of regulation for deforestation-free soy and its implementation, to minimise costs while achieving policy objectives.
4. Consultation on establishing an import standard platform and programme for adoption of low-carbon practices in foreign supply chains.

Demand

5. Recommitting to reducing household food waste with greater adoption of all proven tactics across businesses.
6. Aligning industry to a position on diet change that balances net zero and health objectives, including an action plan.

How: IGD in partnership with WRAP to convene working groups to identify approaches for developing strategies and action plans in each of the above areas. These should be done on the basis of clear mapping of existing forums/initiatives/working groups to avoid duplication and ensure efficiency.

Sector and company transition plans

What: Sector and company transition plans should be aligned with – or go beyond – the strategic plan.

Action: Review sector and company plans against the strategic plan and update as appropriate, and be open to sharing learnings.

How: IGD to support this process and to facilitate greater sharing of learnings through lifting outputs into progress reporting (see below).

Review of progress

A first overall review of progress from the plan and the areas for action above will be publicly shared via a Webinar and Food System Net Zero Transition Plan Progress Report in June 2025, then bi-annually with a focus on the progress of actions.

02 Report methodology and key assumptions

Methodology: The criteria and assumptions informing the reduction pathways
The emissions reduction pathways build in abatement options which are assessed to be feasible and cost-effective.

Pathways have been developed based on assessment of feasible and cost-effective abatement opportunities for each component of the system footprint.

Feasibility of abatement options relates to technology readiness, ability to absorb technology into the capital stock given asset lifetime and turnover, and any barriers to uptake.

Cost effectiveness assessment compares the cost premium of low carbon options with the UK Government's carbon values and determines that options should be in scope where the former is less than the latter. It is important to note that this does not ensure commercial viability, which will require policies to be in place to mimic the effect of the carbon values, either in the form of carbon prices, grants or regulations.

Assumptions

- UK population is assumed to grow in line with Office of National Statistics projections, reaching 78 million by 2050 (i.e. ~15% increase from 2021).
- Food demand is assumed to grow in line with the population, therefore making net zero more challenging.
- The geographical footprint of the food system is assumed to remain constant over time. There are important questions about whether this should change, on the one hand to strengthen resilience, and on the other to achieve domestic environmental objectives. A separate study is proposed to test how these factors should be balanced through industry resilience and land-use strategy.

Sources - sources are named and linked throughout the report where relevant.

- WRAP has contributed to the report and their estimate of the food system carbon footprint in 2021 was used as a basis.
- Scotland's Rural College (SRUC) has contributed to the report and their analysis of abatement opportunities in the UK is used; this is consistent with analysis used by the Climate Change Committee for its seventh carbon budget advice. SRUC have provided various scenarios; given the levels of abatement required across the food system, we have used the high ambition scenario.
- Climate Change Committee analysis is drawn on for various industries.
- Evidence and analysis published by the UK Government is used, alongside discussion with representatives from the DAs.
- Extensive discussions with stakeholders through the food supply chain and evidence that they have provided has been drawn on.

03 Appendices

Appendix A: Acronyms/Glossary

Acronym	Meaning
3NOP	3-Nitrooxypropanol
AD	Anaerobic Digestion
AD cattle	Anaerobic Digestion for cattle
bn	Billion
CAP	Common Agricultural Policy
CapEx	Capital Expenditure
CCC	Committee on Climate Change
CCS	Carbon Capture and Storage
CCUS	Carbon Capture, Utilisation, and Storage
CDP	Carbon Disclosure Project
CH_4	Methane
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
COP	Conference of the Parties
DA	Devolved Administration
Defra	Department for Environment, Food & Rural Affairs
EI	Emissions Intensity
ELM	Environmental Land Management
EMR	Electricity Market Reform
EUDR	EU Deforestation-free Regulation
FDTP	Food Data Transparency Partnership
FEED	Front End Engineering Design
FIs	Financial Institutions
FLAG	Forest, Land and Agriculture
FSA	Food Standards Agency
GHG	Greenhouse Gas
GW	Gigawatt
GWP	Global Warming Potential
H2	Hydrogen
HaFS	Hospitality and Food Service
HAR2	Hydrogen Allocation Round
Heat pump LT	Heat Pump Low Temperature
Heat pump MT/HT	Heat Pump Medium/High Temperature
HGVs	Heavy Goods Vehicles
HPBM	Hydrogen Production Business Model
HPP	Hydrogen Power Plant
IETF	Industrial Energy Transformation Fund
IGD	Institute of Grocery Distribution
NUE	Nitrogen Use Efficiency
Industrial NRMM	Industrial Non-Road Mobile Machinery
LRVC	Long Run Variable Cost
LUC	Land Use Change
LULUCF	Land Use, Land-Use Change, and Forestry
LWG	Live Weight Gain
$MtCO_2e$	Million Tonnes of Carbon Dioxide Equivalent
MW	Megawatt
N_2O	Nitrous Oxide
NHS	National Health Service
NZBA	Net Zero Banking Alliance
OpEx	Operational Expenditure
pH	Potential of Hydrogen (acidity/alkalinity measure)
PPAs	Power Purchase Agreements
SBTi	Science Based Targets initiative
SDG	Sustainable Development Goals
SFI	Sustainable Farming Incentive
SRUC	Scotland's Rural College
tCO_2e	Tonnes of Carbon Dioxide Equivalent
TPT	Transition Plan Taskforce
UAE	United Arab Emirates
UK	United Kingdom
UKDR	UK Deforestation-free Regulation
WRAP	Waste and Resources Action Programme

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