

EARTHSCAN FOOD AND  
AGRICULTURE



# Net Zero, Food and Farming

Climate Change and the UK Agri-Food System

Neil Ward



# Net Zero, Food and Farming: Climate Change Lessons from the UK Agri-Food System

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Research Live presentation,  
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# Plan

- Introduction: Climate change and the agri-food system – the UK & global context
  - 1) Dietary Change
  - 2) Land Use Change
  - 3) Farming Practices
- Conclusions: approaching the net zero transition

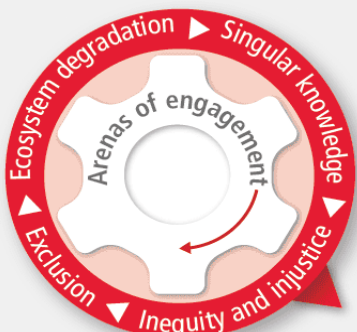
# There is a rapidly narrowing window of opportunity to enable climate resilient development

(a) Societal choices about adaptation, mitigation and sustainable development made in arenas of engagement

Dimensions that enable actions towards higher climate resilient development

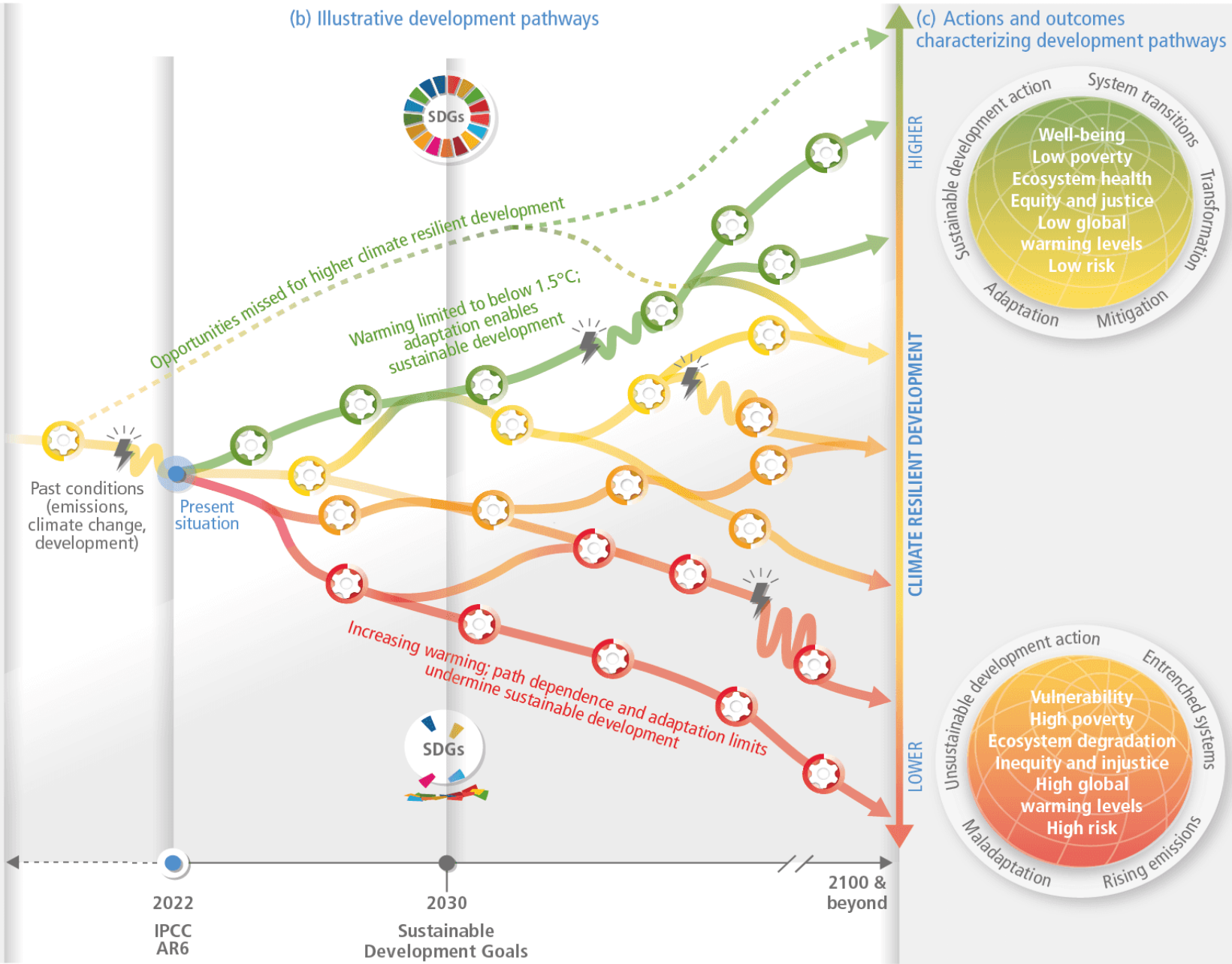


- Arenas of engagement:**
- Community
  - Socio-cultural
  - Political
  - Ecological
  - Knowledge + technology
  - Economic + financial

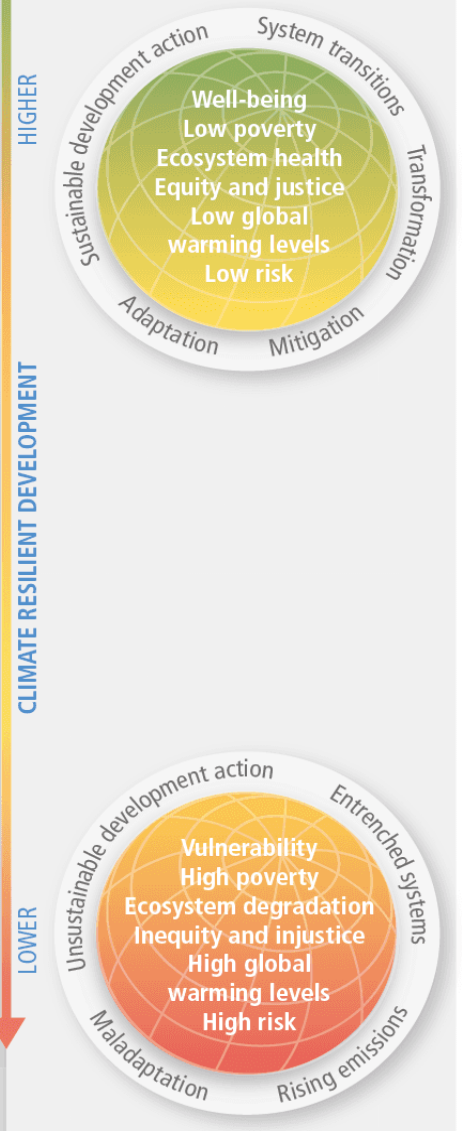


Dimensions that result in actions towards lower climate resilient development

(b) Illustrative development pathways



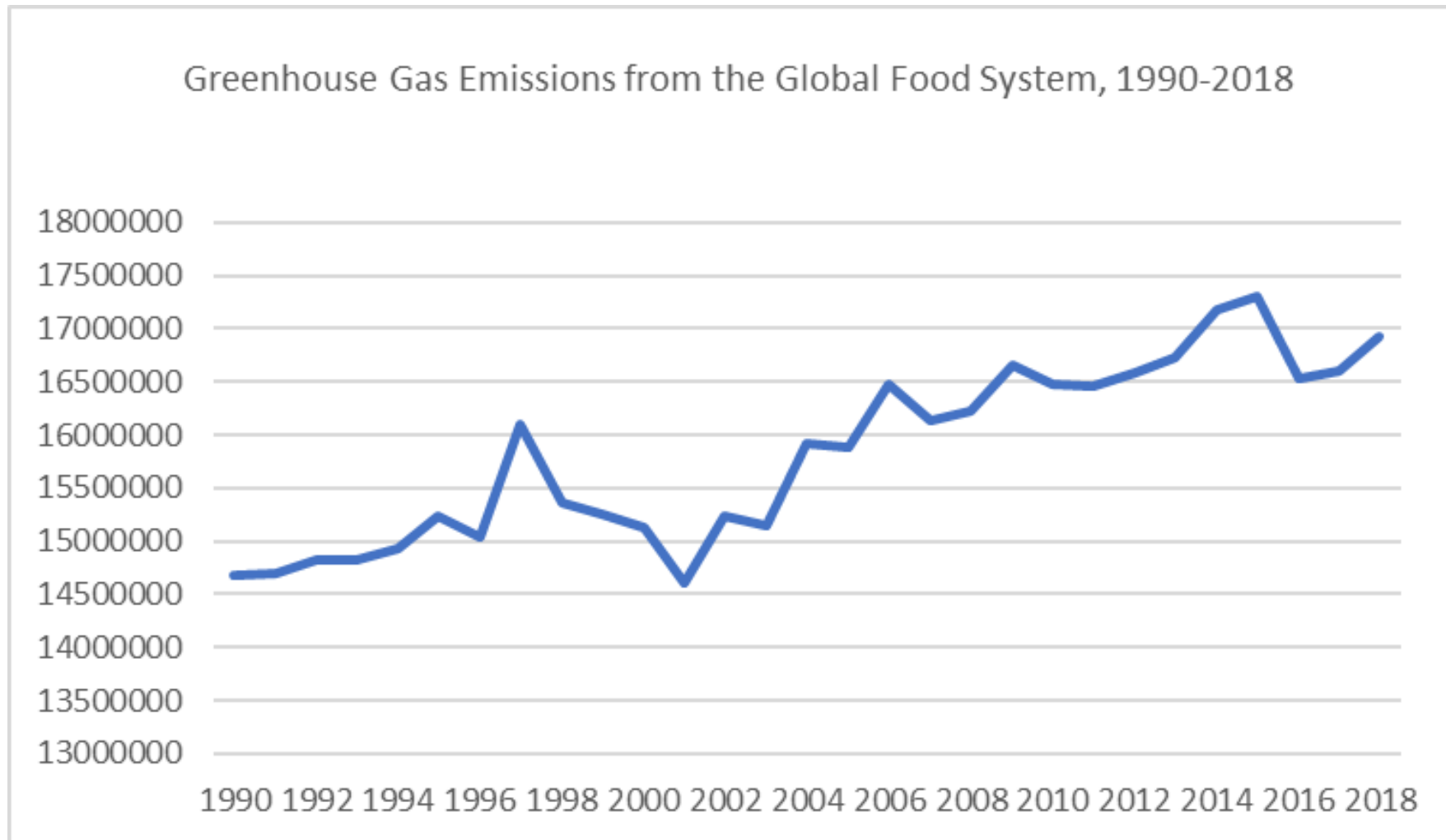
(c) Actions and outcomes characterizing development pathways



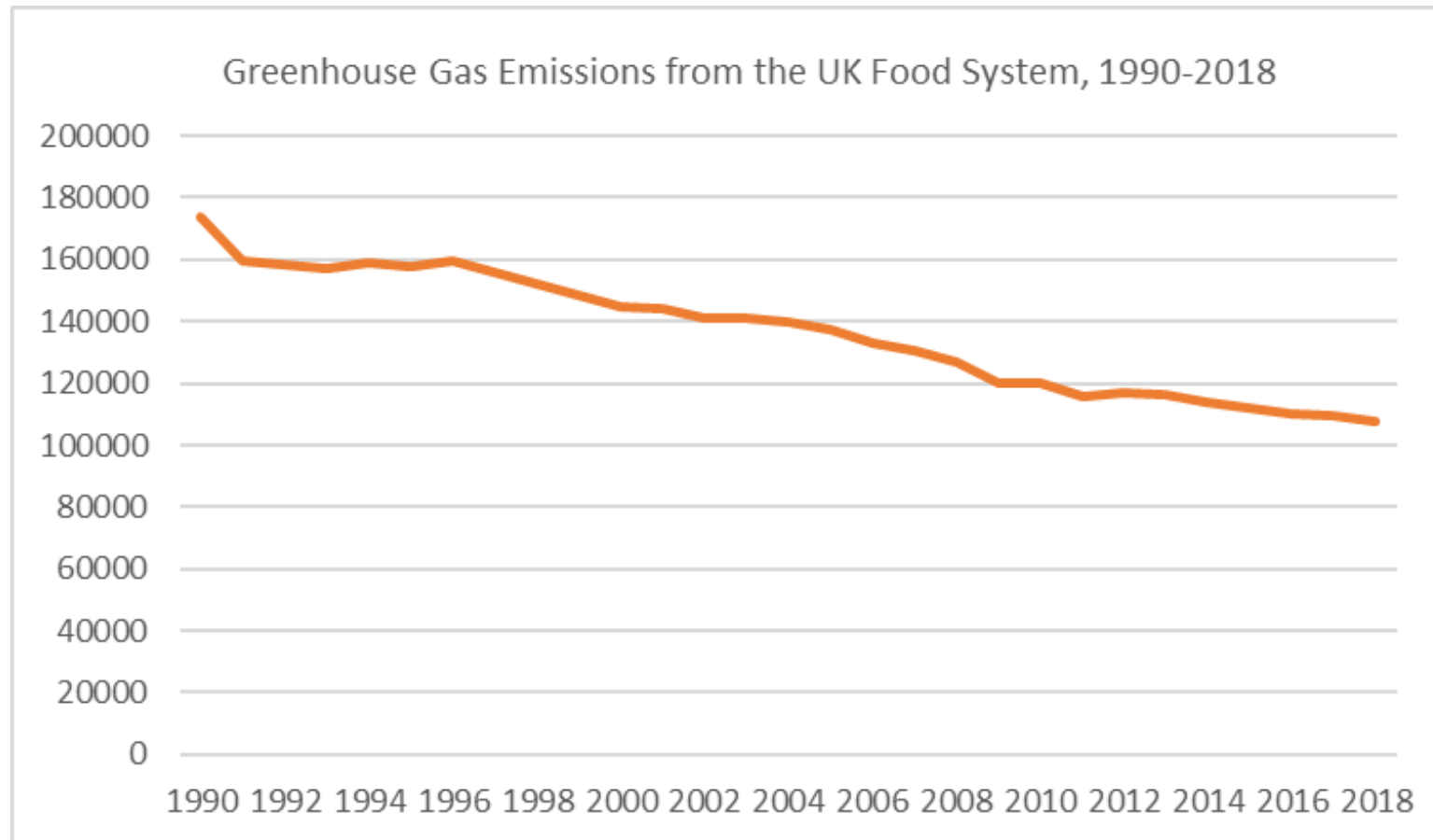
Illustrative climatic or non-climatic shock, e.g. COVID-19, drought or floods, that disrupts the development pathway

Narrowing window of opportunity for higher CRD

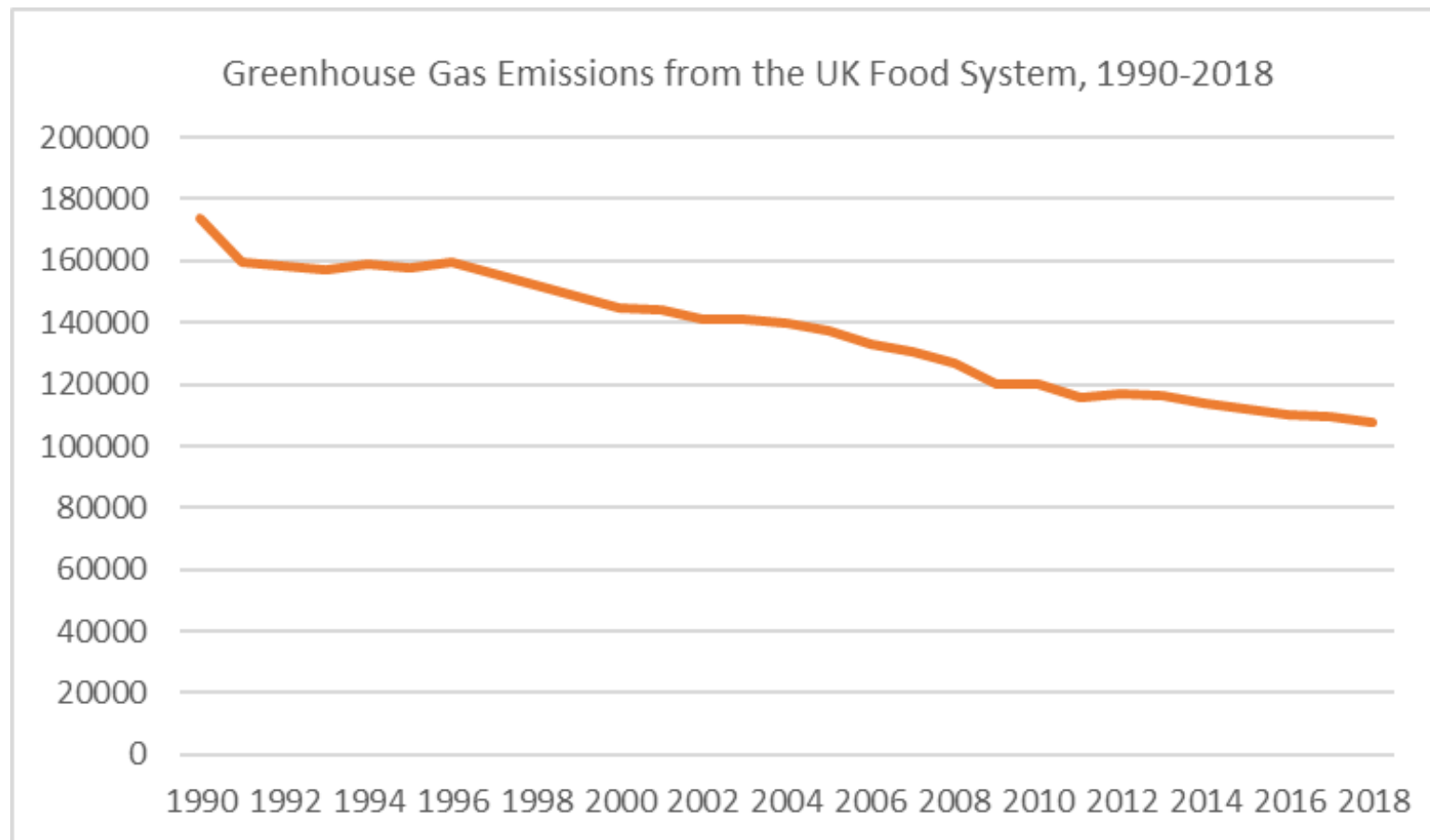
## Greenhouse gas emissions from the global agri-food system are rising



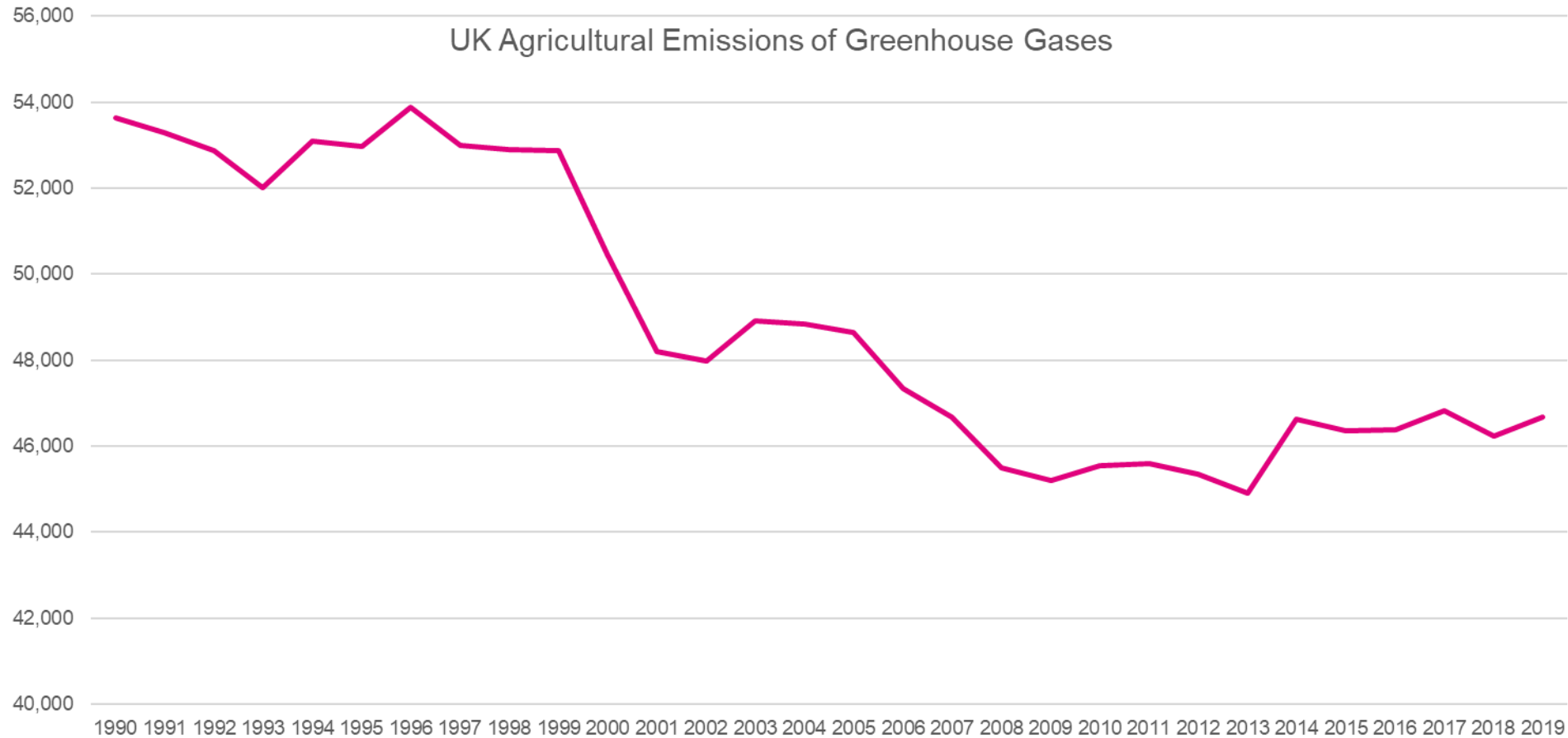
# Greenhouse gas emissions from the UK agri-food system are falling



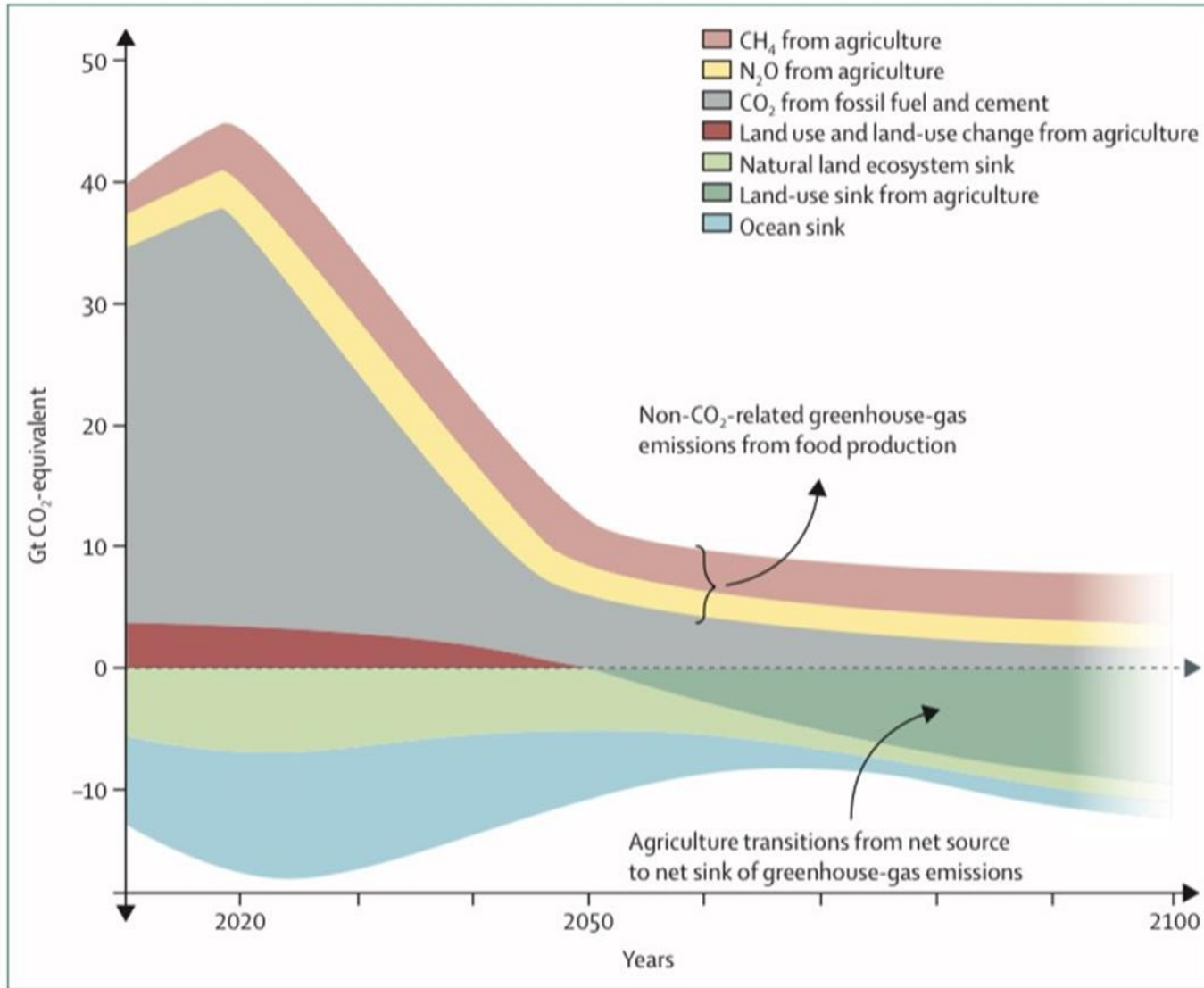
# Greenhouse gas emissions from the UK agri-food system are falling (25% drop since 1990) – but not as fast as they need to, to help meet the UK's net zero by 2050 target



# Greenhouse gas emissions from UK agriculture have not fallen over the past decade



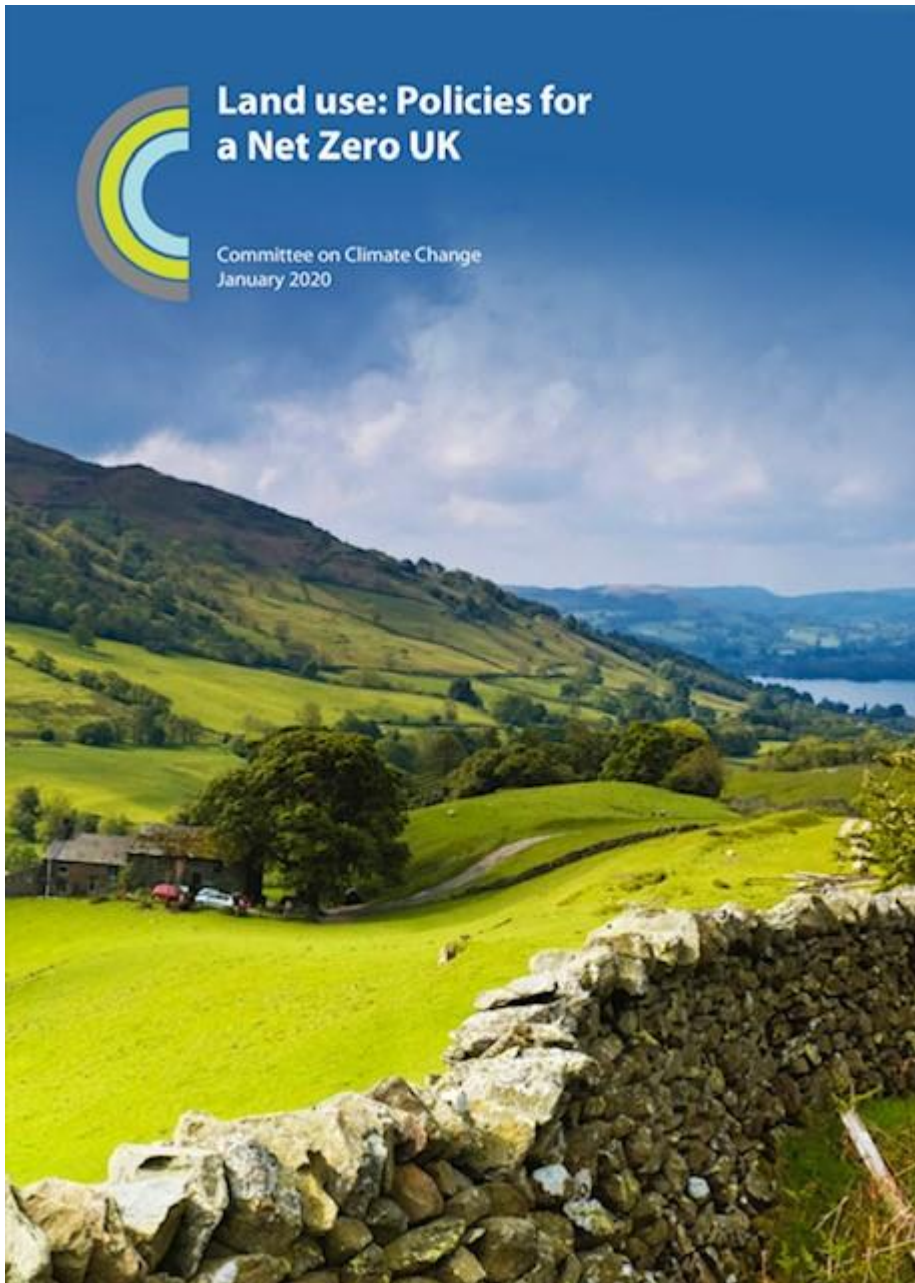
# Climate change and the agri-food system: the global context



**Figure 2: Projections of global emissions to keep global warming to well below 2°C, aiming for 1.5°C**  
Data are from Intergovernmental Panel on Climate Change fifth assessment report (RCP2.6 data for nitrous oxide and methane) and Rockström and colleagues<sup>28</sup> (for fossil-fuel emissions, land use, land-use change, and forestry, and biosphere carbon sinks).

- Rio (1992); Kyoto (1997); Paris Agreement (2015); Glasgow Pact (2021)
- Agri-food system emissions account for one-third of all greenhouse gas emissions
- As decarbonisation of electricity, industry and transport progresses, agri-food system will loom larger as a problem
- Farmers are quite constrained, squeezed within a system dominated by very large companies supplying them and purchasing from them

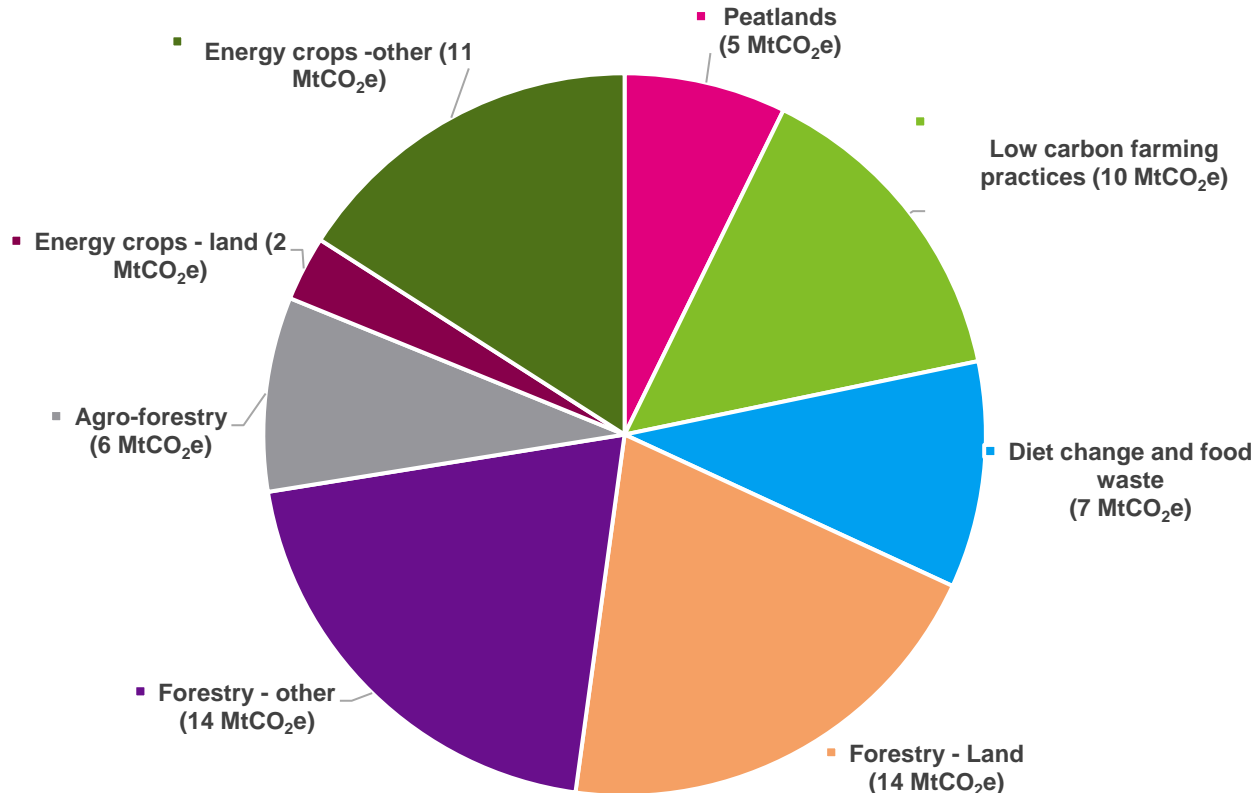




# Climate change and the agri-food system: the UK context

- Net zero statutory commitment by 2050 made in 2019
- Agri-food system emissions not reducing as fast as the whole economy (only about half the rate), and agricultural emissions have not reduced at all since 2009
- Productivist agriculture developed over 1940s to 1980s
- Environmental reforms since 1980s have been voluntary, and 'add-ons' rather than seeking systemic change

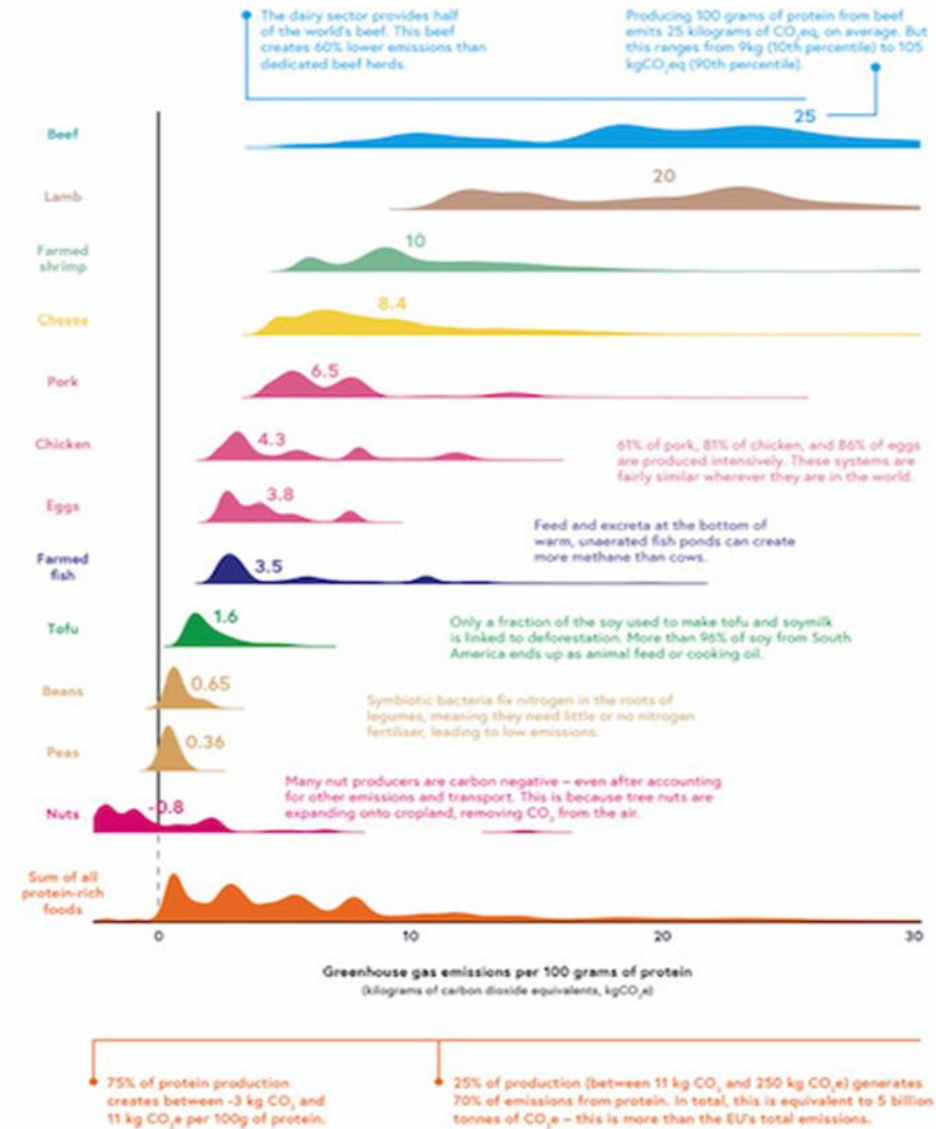
## Greenhouse Gas Savings from Measures to Reduce UK Agriculture and Land Use Emissions, 2050



- UK's Climate Change Committee produced an analysis of agriculture and land use in January 2020
- Three main components:
  - Dietary change and reduced waste (10%)
  - Afforestation and energy crops (60%)
  - Lower-emission farming practices (15%)

Figure 8.1

Vegetable proteins have low carbon footprints, while dairy and meat tends to be more carbon heavy<sup>1</sup>



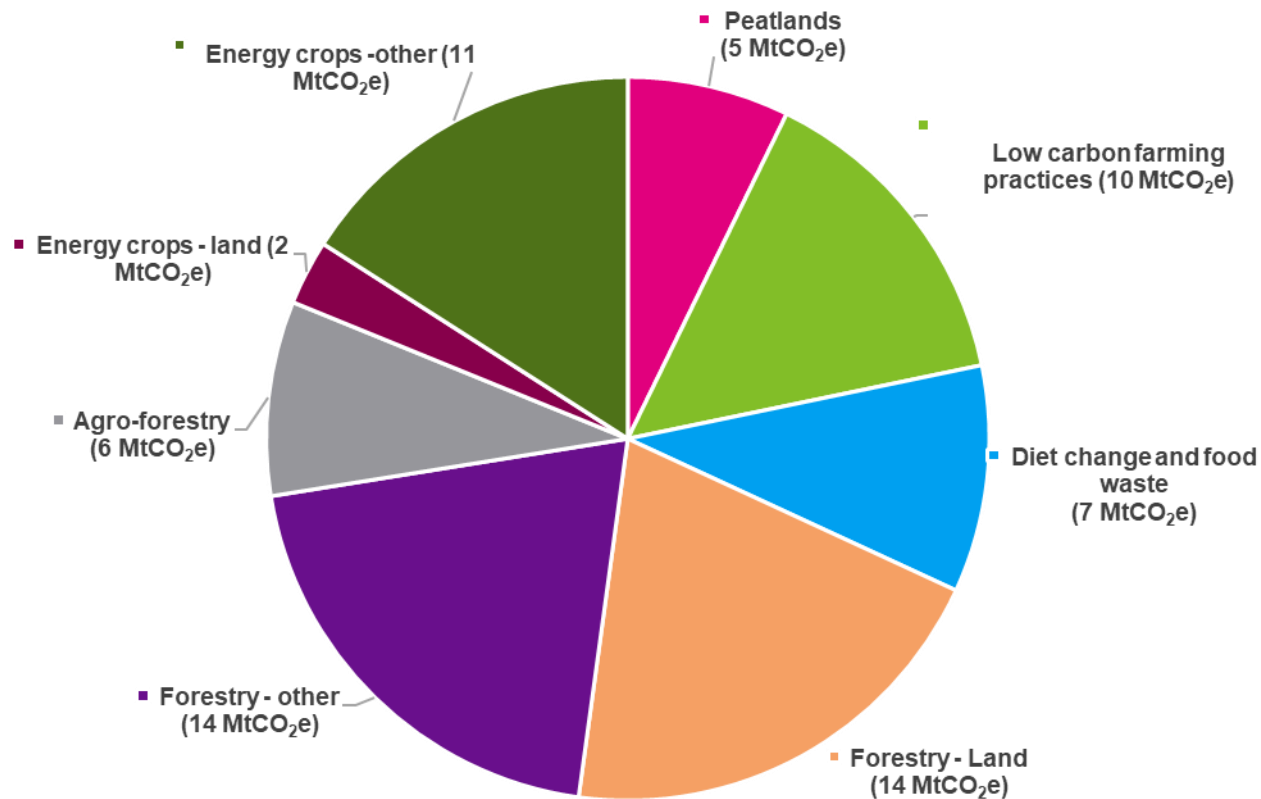
<sup>1</sup> Data refers to the greenhouse gas emissions of food products across a global sample of 38,700 commercially viable farms in 119 countries. Emissions are measured across the full supply chain, from land use change through to the retailer and includes on-farm processing, transport, packaging and retail emissions.

# 1a. Dietary Change: the Global Context

- EAT-Lancet (2019) - healthy sustainable diet and safe operating limits
- Highly processed food and ruminant meat are biggest problems
- Economic development is driving increasing global demand for meat
- Billions now being invested in developing plant-based proteins and lab cultured meat as alternatives

## 1b. Dietary Change: The UK Context

Fig 1 - Greenhouse Gas Savings from Measures to Reduce UK Agriculture and Land Use Emissions, 2050



- Independent scientific opinion suggests UK needs at least a 20-30% reduction in most highly emitting foods by 2050.
- Focus on individual behaviour doesn't work. Need to focus on dynamics of the whole system (Behavioural Insights Team).
- Political fear of accusations of 'nanny statism'
- Agriculture and food not prominent in new national *Net Zero Strategy* (Oct 21)

ipcc

INTERGOVERNMENTAL PANEL ON climate change

# Climate Change and Land

An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems

Summary for Policymakers



WG I WG II WG III



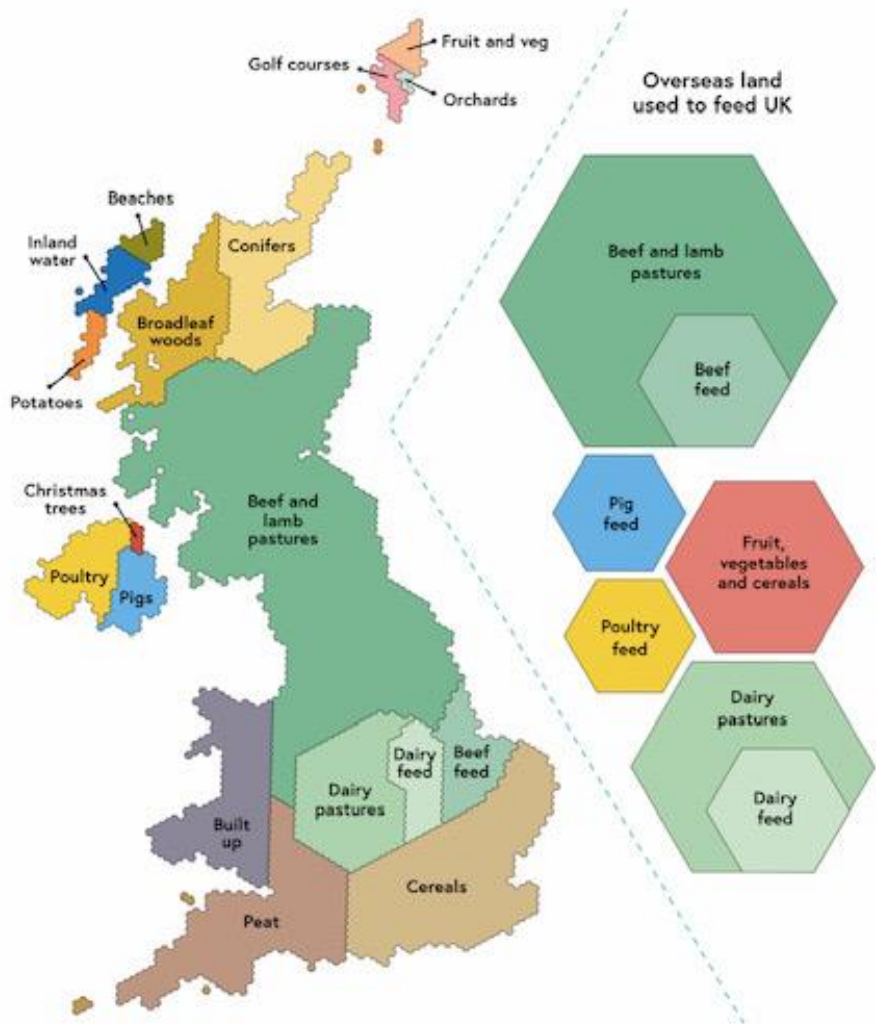
## 2a. Land Use and Land Use Change: The Global Context

- Deforestation commitments at Glasgow COP
- Energy crops and BECCS (Bioenergy, Carbon Capture and Storage), but will compete for agricultural land
- The effects of climate change will impact upon agricultural productivity across much of the world
- Focus on greater productivity from agricultural land



Figure 9.3

We use our land for a great diversity of purposes, but rearing lamb, beef and dairy cattle predominates<sup>12</sup>

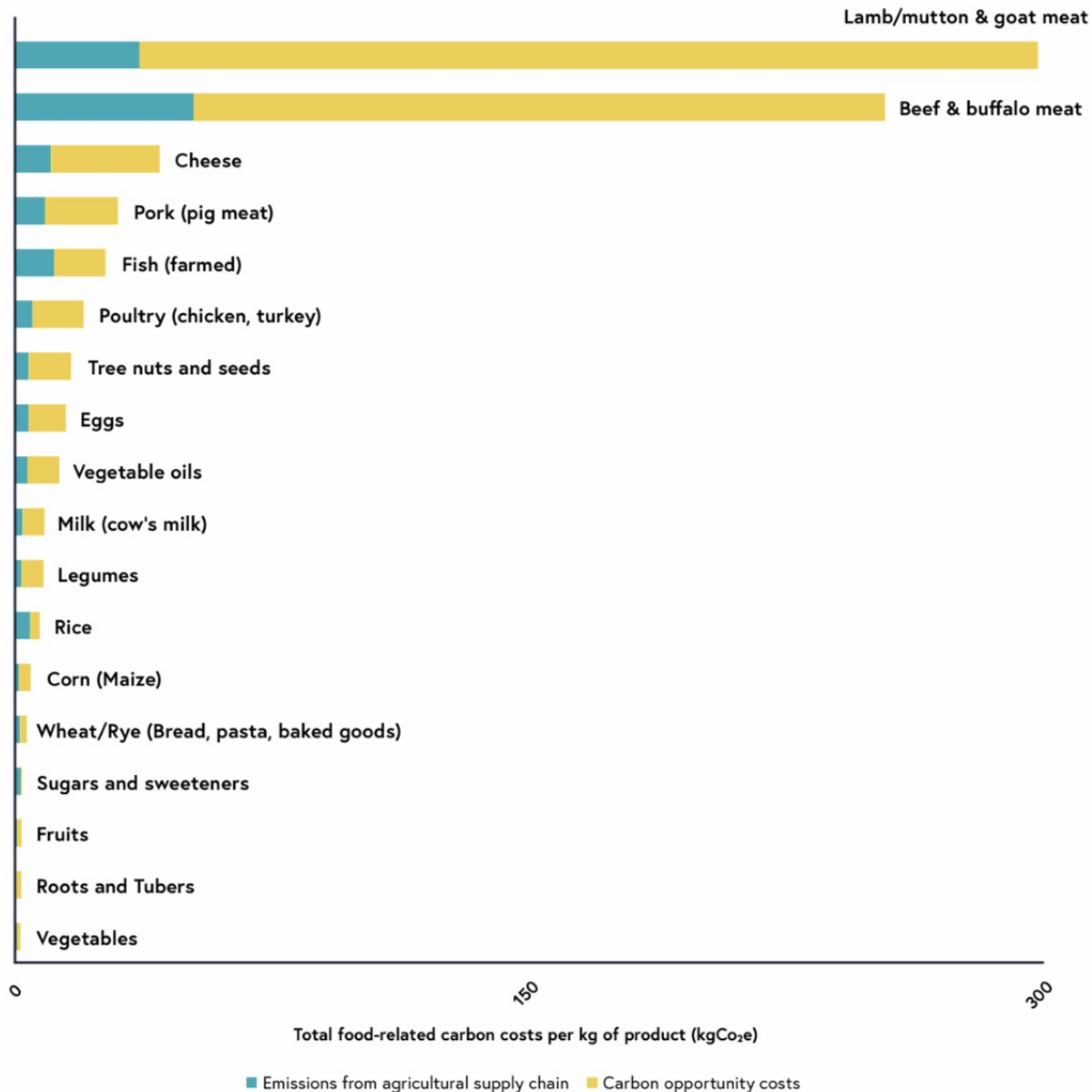


Note: this analysis draws on de Rutter et al. (which uses a top-down methodology) and Poore and Nemecek (which uses a bottom-up methodology). These have a high degree of agreement other than for total land footprint and share of land footprint overseas. The overall size area of land associated with UK diets is estimated to be between 24 and 38 million hectares, and the relative share of this land that is in the UK versus overseas is around 50% (43-54%).

## 2b. Land Use and Land Use Change: UK Context

- Forest cover to expand from 3.2Mha to 4.0-4.5Mha (from 13% to 18-19% of land) (France, 31%; Germany, 33%).  
Approximately trebling new planting rates
- Energy crops and BECCS (Bioenergy, Carbon Capture and Storage); a new technology contributing (significantly) from the 2030s
- Peatland restoration in uplands and lowlands (but lowland peatlands are highly productive)
- Climate Change Committee assumes 23% less agricultural land in 2050 (including from less demand for meat).

The biggest potential carbon benefit of eating less meat is the opportunity to repurpose land to sequester carbon<sup>15</sup>



## 3a. Farming Practices: The Global Context

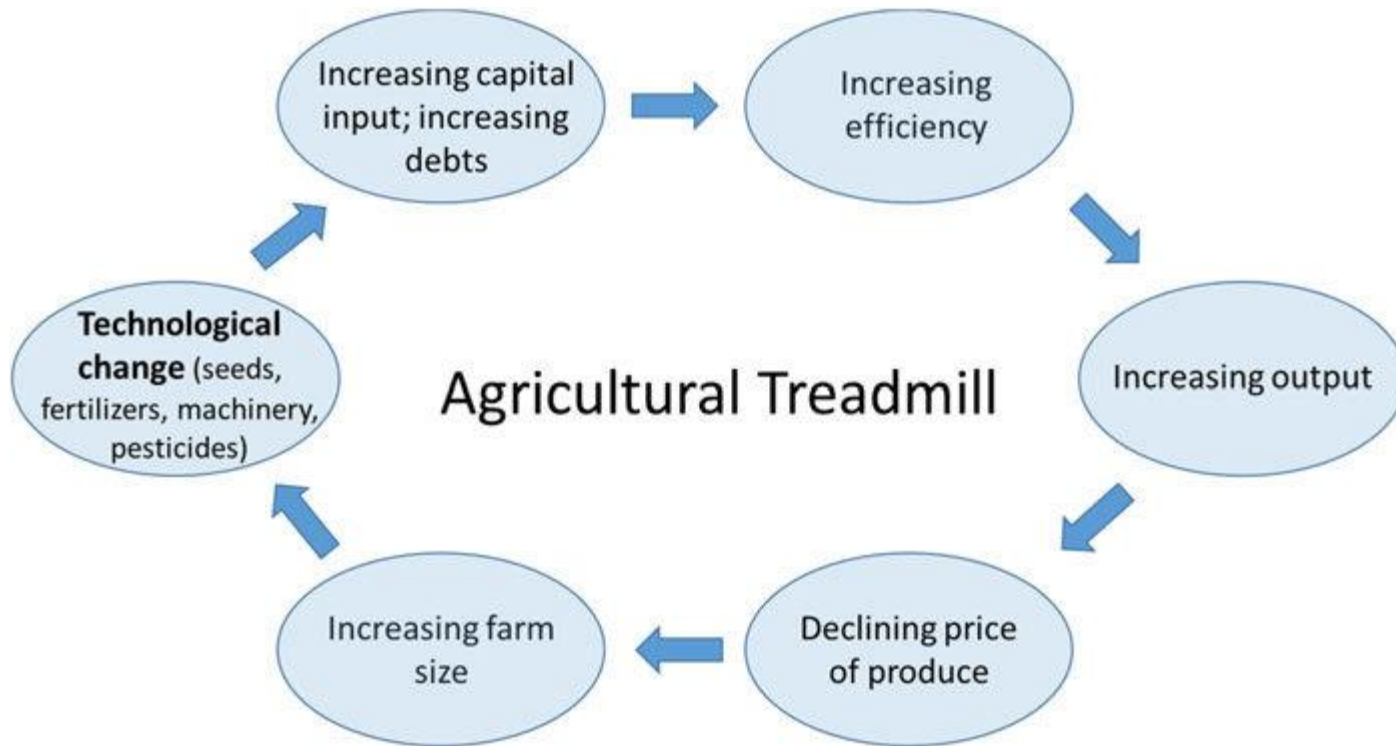
- World Resources Institute strategies for raising productivity:
  - Raise livestock and pasture productivity
  - Improve crop breeding to boost yields
  - Improve soil and water management
  - Plant existing cropland more frequently
  - Adapt to climate change
- Land sparing ('sustainable intensification', productivity-centric) v land sharing (regenerative agriculture or agroecology, eco-centric).



## 3b. Farming Practices: The UK Context

- Ruminants (Cattle & sheep)
- Fertilizers
- Fuels
- Land sparing v land sharing (reflecting earlier debates about ‘multi-functional agriculture’)
- Straightforward technical fix or changing hearts and minds?





## Helping and hindering the transition

- Economics and markets
- Ideology
- Institutions
- Technologies

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## Conclusions: UK Net Zero Transition and the Agri-Food System

- The 2020-40s system transformation is less materially significant than the 1940s-50s, (but implies a more profound mindset change, requiring stronger vision and leadership)
- Agri-food lags other sectors, with risks of foot-dragging and incrementalism
- Important lessons from 40 years experience of trying to 'green' agriculture.
- Biggest obstacle is neoliberal timidity about managing markets

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