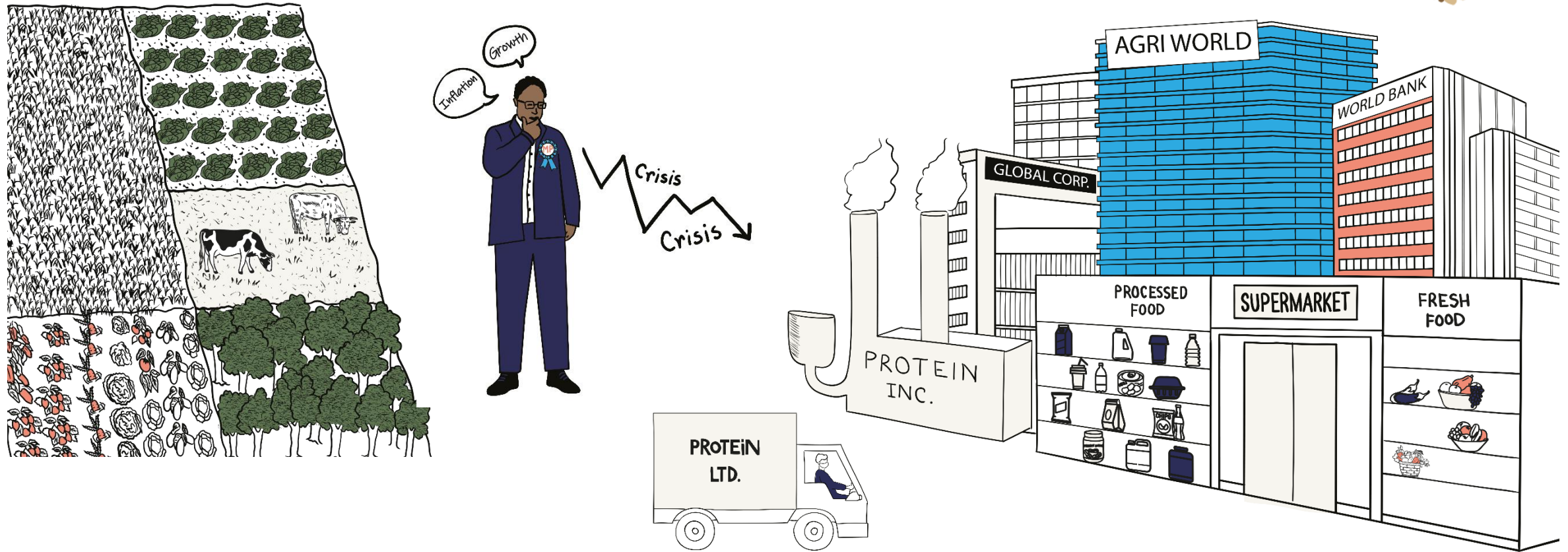


Agri-food System Pathways to a Net Zero UK

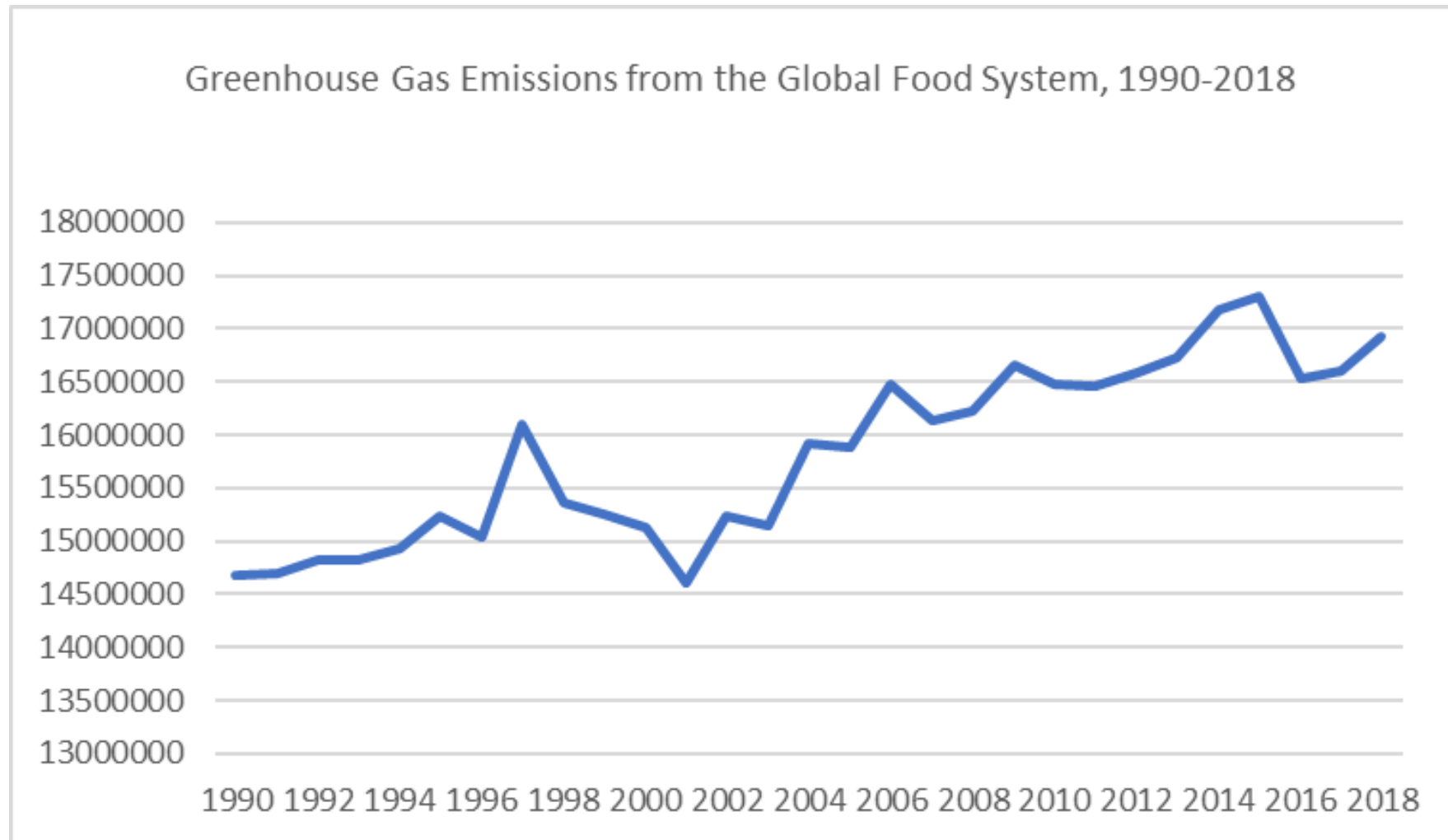
Prof Neil Ward, University of East Anglia



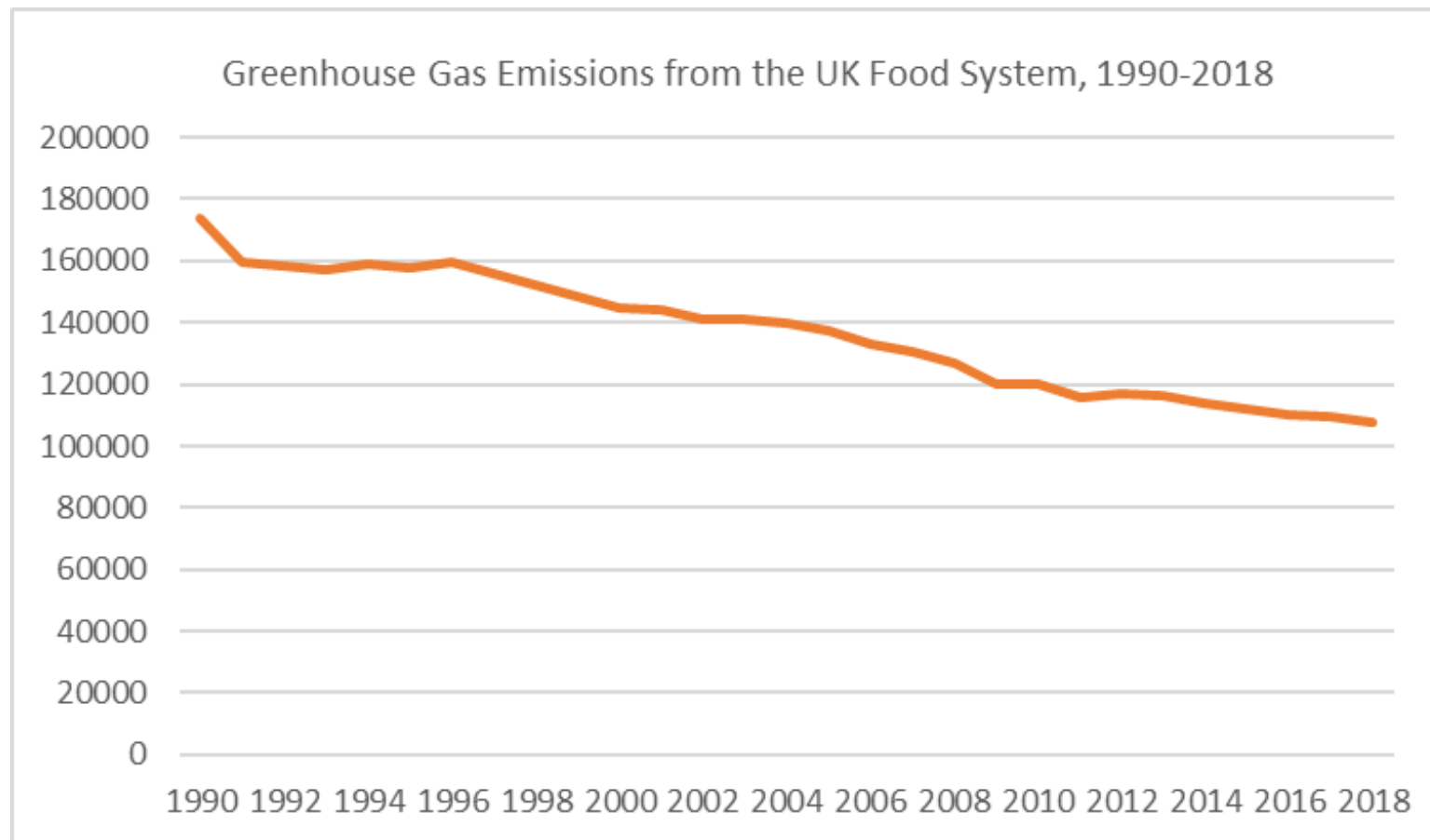
Plan

- Greenhouse Gas Emissions from the UK Agri-food System
- UKRI's Agri-Food4NetZero Network+ and the Net Zero Challenge
- Envisaging Plausible Futures
- Four 2050 Scenarios for the UK Agri-Food System
- Conclusions: Breaking out of business-as-usual thinking

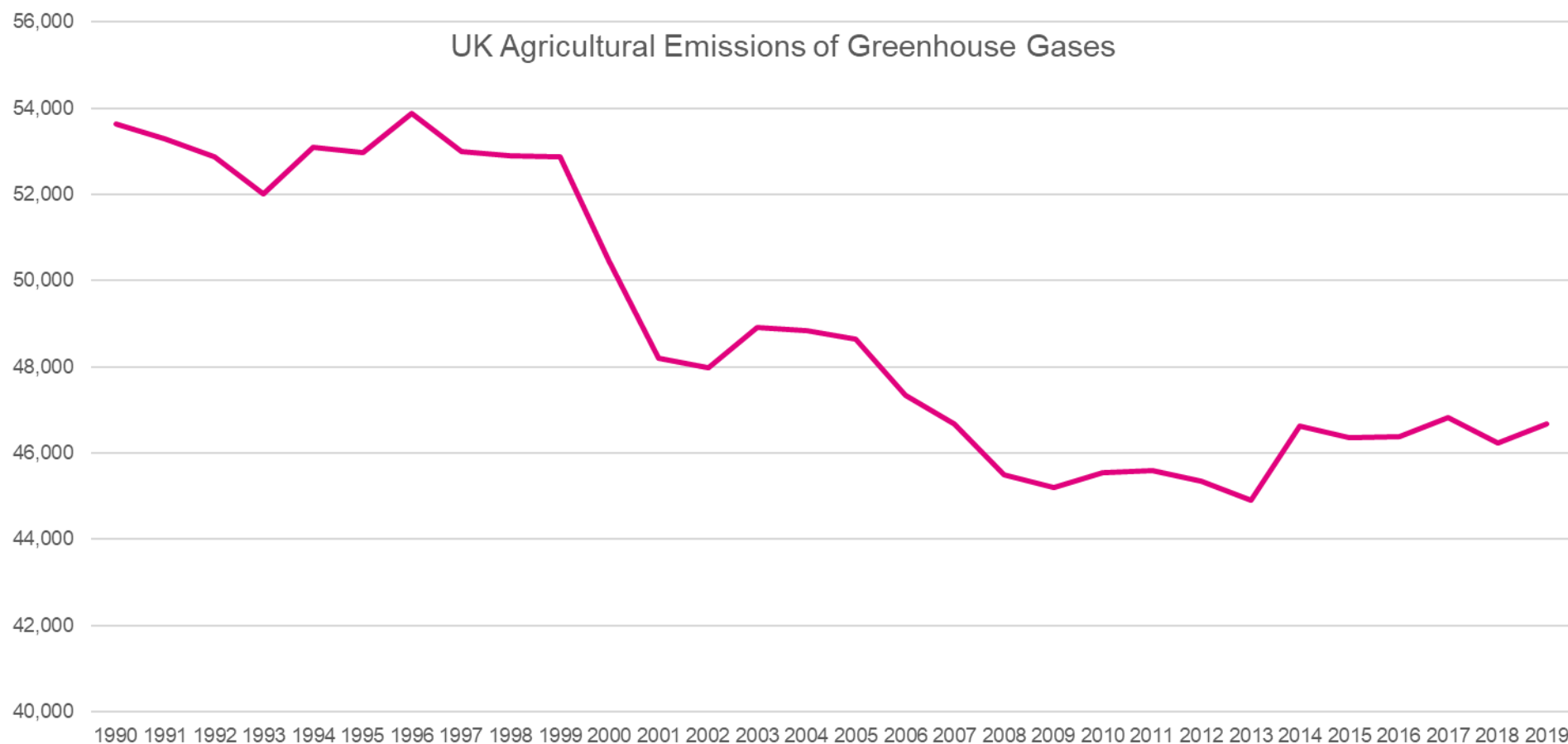
Greenhouse gas emissions from the global agri-food system are rising



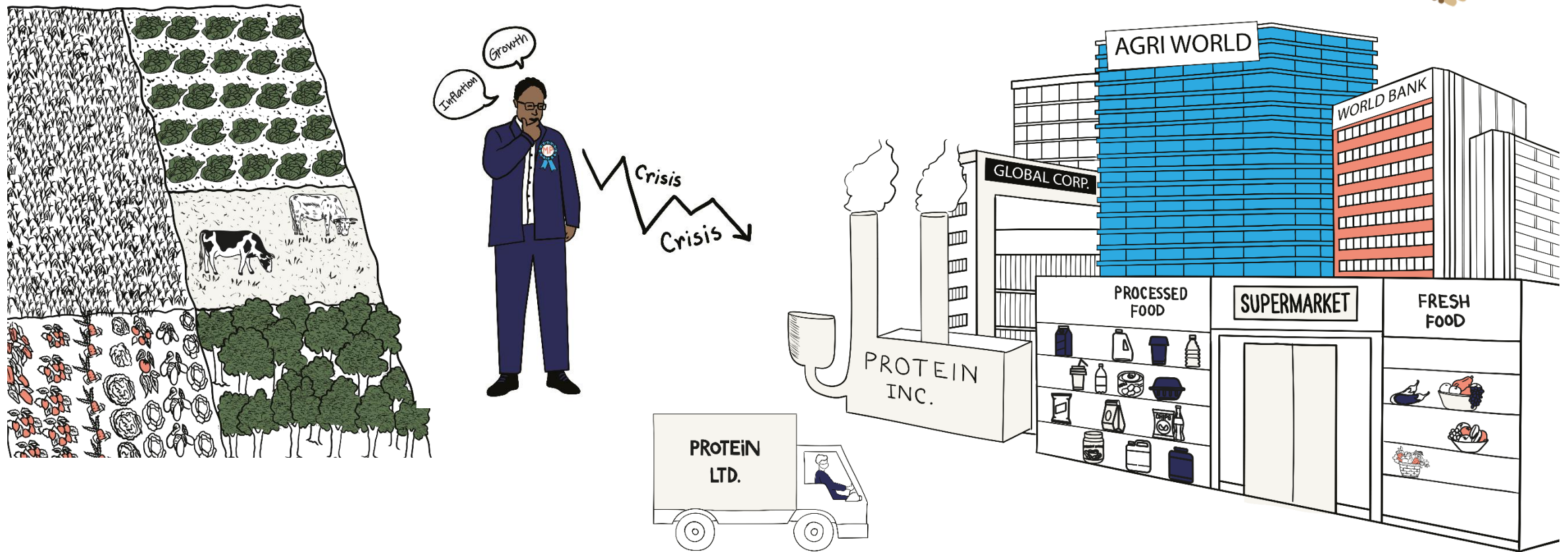
Greenhouse gas emissions from the UK agri-food system are falling – but not as fast as they need to, to help meet the UK's net zero by 2050 target



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



UKRI's Agri-food for Net Zero Network+



AFN NETWORK+



- A unique network of 1,700+ academics, researchers, third sector organisations, policy makers, and agri-food industry professionals from farmers to retailers.
- Working to identify key research gaps holding the UK food system back from transitioning towards a net zero UK by 2050.
- Findings will inform the next decade of UKRI research investments
- Alongside core research, we run in-person and online events, produce topical resources, and fund small research projects.
- £5m, 3.5-year project to end of 2025



AFN Team



PI



Pro Angelina Sanderson Bellamy
University of the West of England.

Co-PI



Prof Tim Benton
University of Leeds.

Co-PI



Prof Sarah Bridle
University of York.

Co-PI



Prof Neil Ward
University of East Anglia.

Champions Co-Ordinator



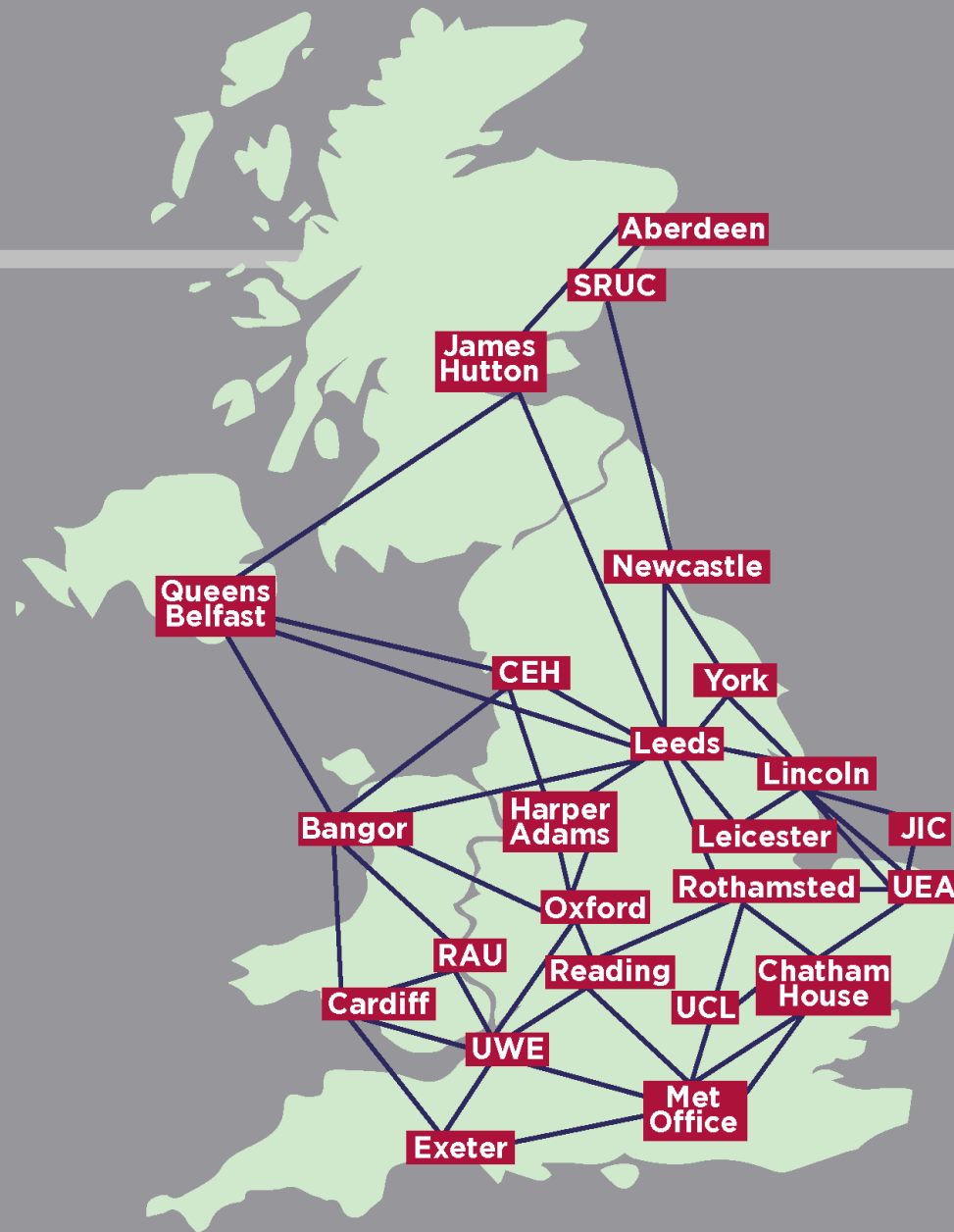
Prof Stefan Kepinski
University of Leeds.

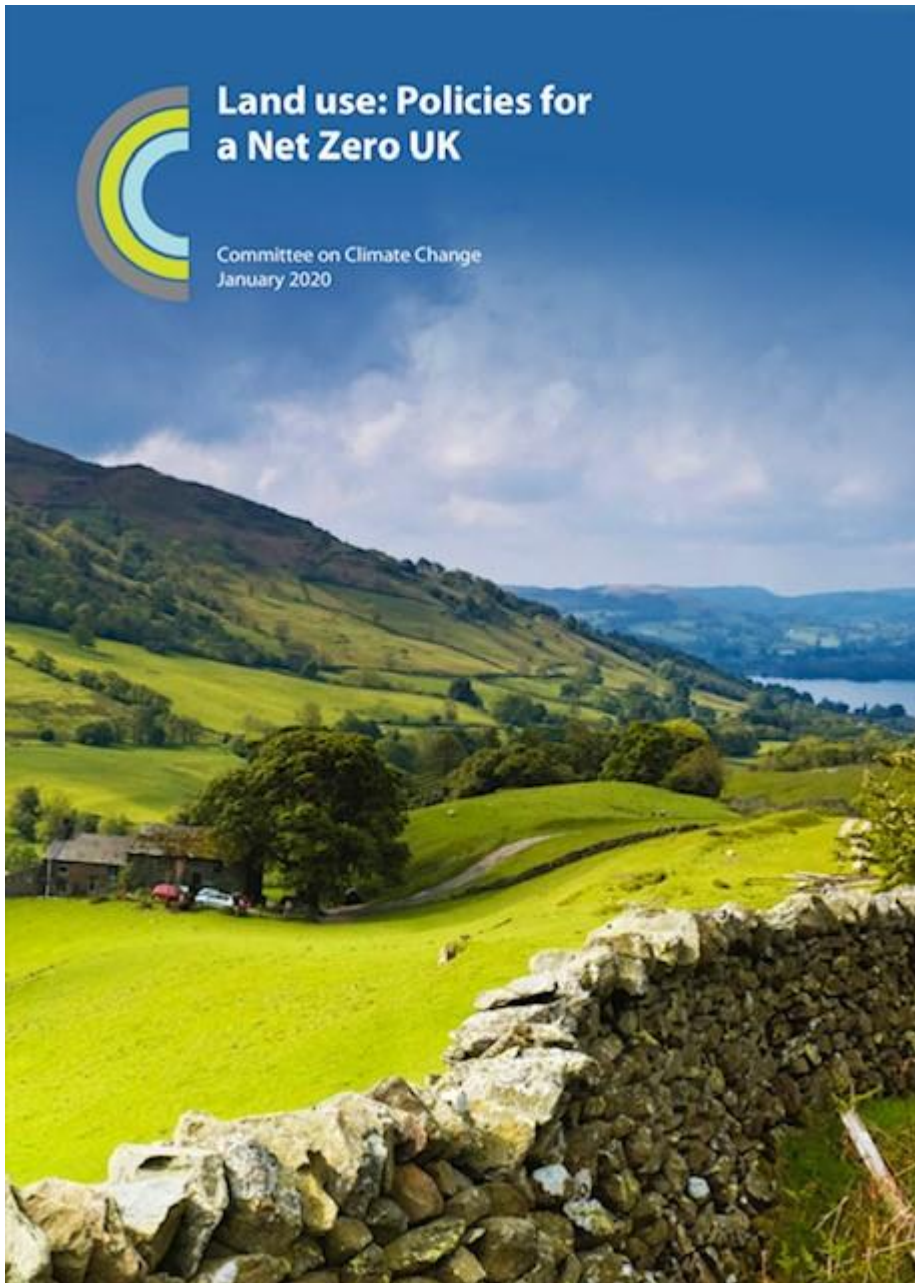
Knowledge Exchange Fellow



Jez Fredenburgh
University of East Anglia.

OUR NETWORK





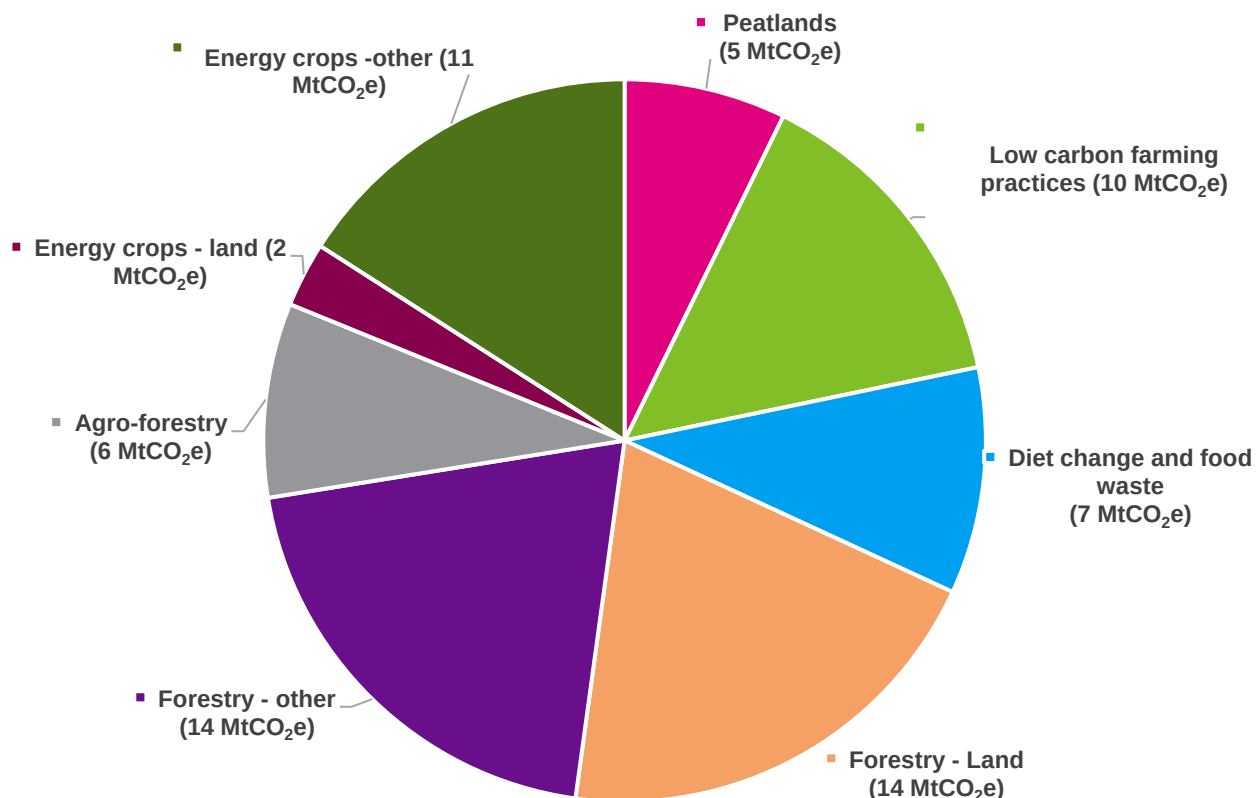
The Climate Change Committee

- Established in statute by 2008 Climate Change Act
- Statutory independent advisor to UK Government on climate change
- Net zero statutory commitment by 2050 made in 2019
- Increasingly critical of Government in general and Defra in particular about net zero when it comes to land, food and farming
- Key areas of reduction:
 - Dietary change
 - Land use change
 - Changing farming practices

Climate Change Committee (2020 Sixth Carbon Budget)

Food	20% drop in meat / dairy consumption by 2035 and a further 15% drop in meat consumption by 2050 (p.165); 50% reduction in food waste by 2030, (p.165) and 60% by 2050 (p.169)
Farming	Agricultural emissions fall from 54.6 MtCO ₂ e in 2018 to 39 MtCO ₂ e in 2035 and 35 MtCO ₂ e in 2050 (p.164); Uptake of low emission farming practices reduce emissions by 4 MtCO ₂ e by 2035 (p.164); Productivity improvements reduce emissions by 1 MtCO ₂ e by 2035 (p.165); Fossil fuel use in agriculture halves from 4.6 MtCO ₂ e of emissions in 2018 to 2 MtCO ₂ e in 2035 (p.165)
Land	440,000ha of woodland planted by 2035 and 260,000ha shifted to bioenergy production (p.67); Total woodland to 18% and additional energy crops to 720,000 by 2050 (p.68); 30,000 ha a year planted by 2025, rising to 50,000 ha per year by 2035 (p.170); Around a third of agricultural land is freed up by 2050 (p.72); 25% of UK land area is covered by forestry and energy crops (compared to 15% today) (p.72); 80% of peatland is restored by 2050
Emissions	Net emissions from agriculture and land fall from 67 MtCO ₂ e in 2018 to 40 MtCO ₂ e in 2035 and 16 MtCO ₂ e by 2050 (p.163)

Greenhouse Gas (GHG) Savings from Measures to Reduce UK Agriculture and Land Use Emissions, 2050

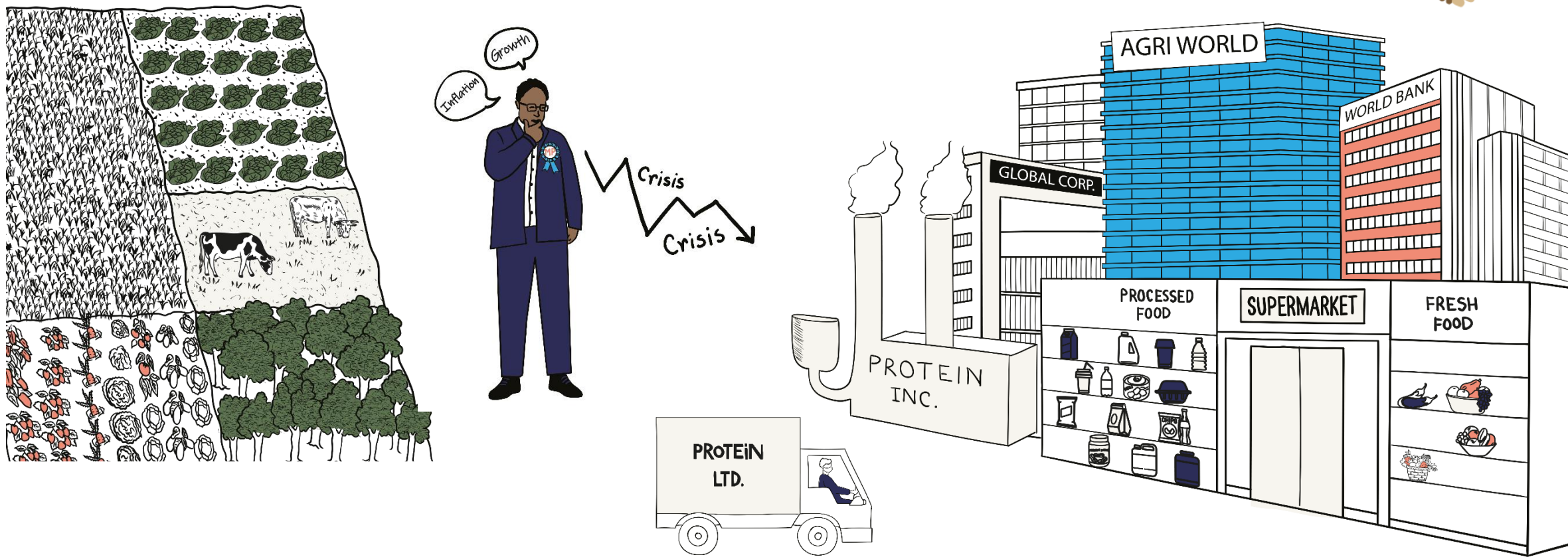


- UK's Climate Change Committee produced an analysis of agriculture and land use in January 2020
- Three main components:
 - Dietary change and reduced waste (10% of GHG reduction)
 - Afforestation and energy crops (68%)
 - Lower-emission farming practices (15%)

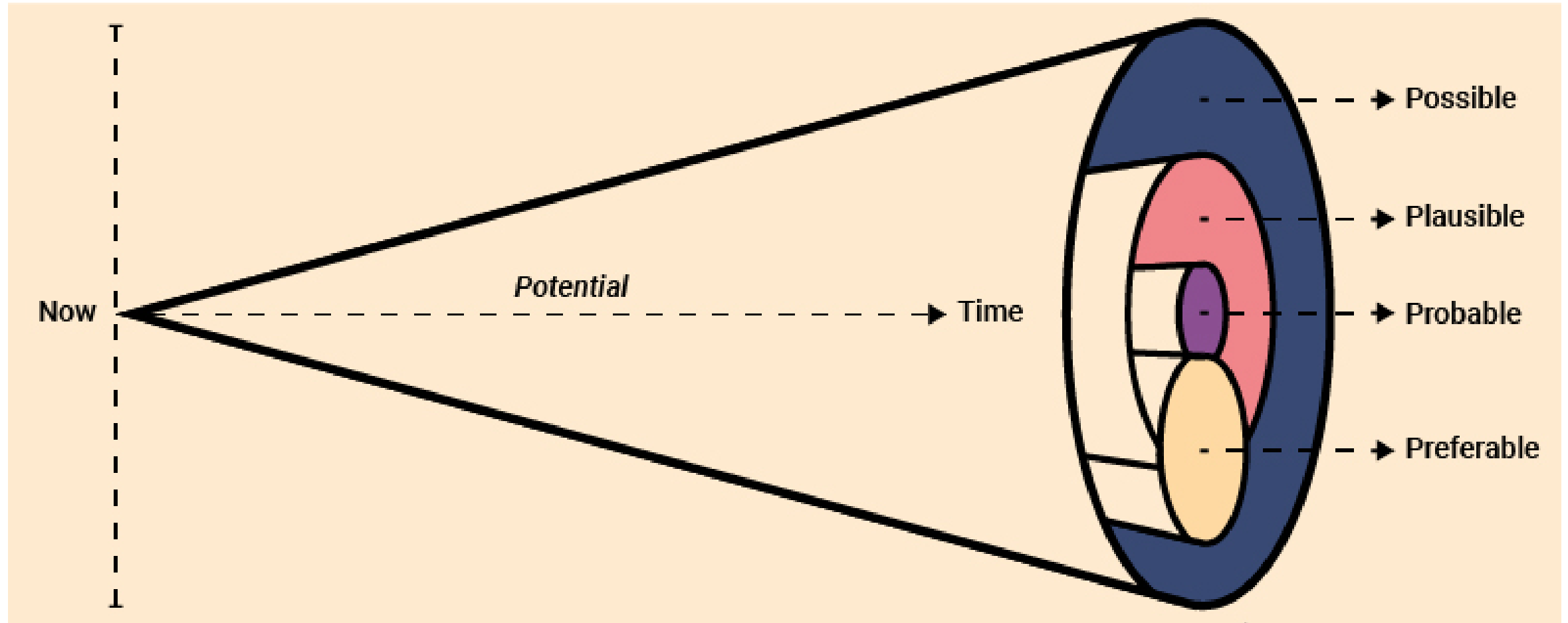
Some Key Issues in the Agri-Food Transition

- **Food production for domestic consumption or food for export?**
- **Land for food production, carbon sequestration, nature recovery, other uses**
- **Land footprint (hoofprint?) of animal agriculture**
- **Mixed farming and circular systems**
- **Dietary change (consumer behaviour)**
- **Livelihoods of livestock farmers (and farmer behaviour)**

Plausible Futures



Plausible futures

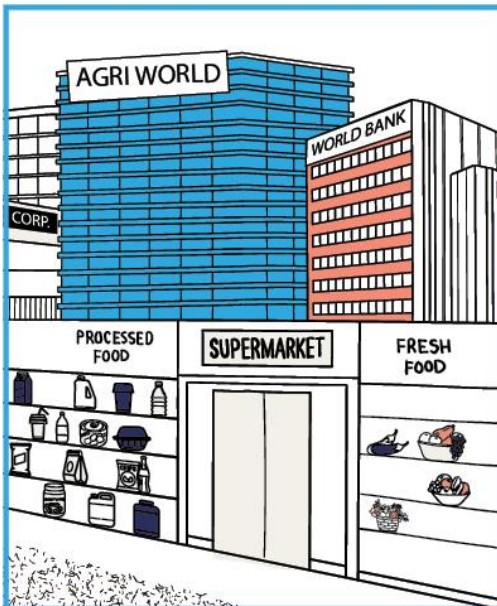


Developing plausible scenarios



- 3 workshops in spring 2023
- UK universities and research institutes; central government departments and agencies; international development agencies; security and diplomatic services; financial services; agri-food commercial bodies; etc.
- Critical uncertainties around: geopolitics and stability; economics; the nature of demand (consumption-based or sustainable?)

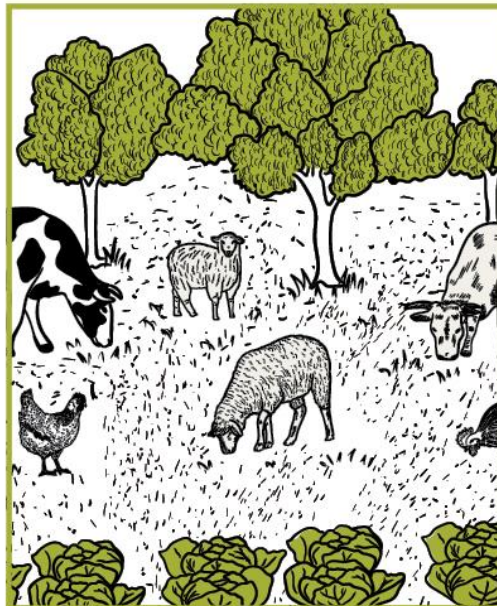




SCENARIO A

'BUILD BACK FAST AGAIN'

An unstable and globalised world, where economic growth is key (essentially business as usual)



SCENARIO B

'CIRCULAR WORLDS'

Geopolitically stable and globalised, underpinned by circular sustainable systems and values



SCENARIO C

'SELF-SUFFICIENCY'

An unstable, regionalised world, where a circular economy is driven by the need to save resources

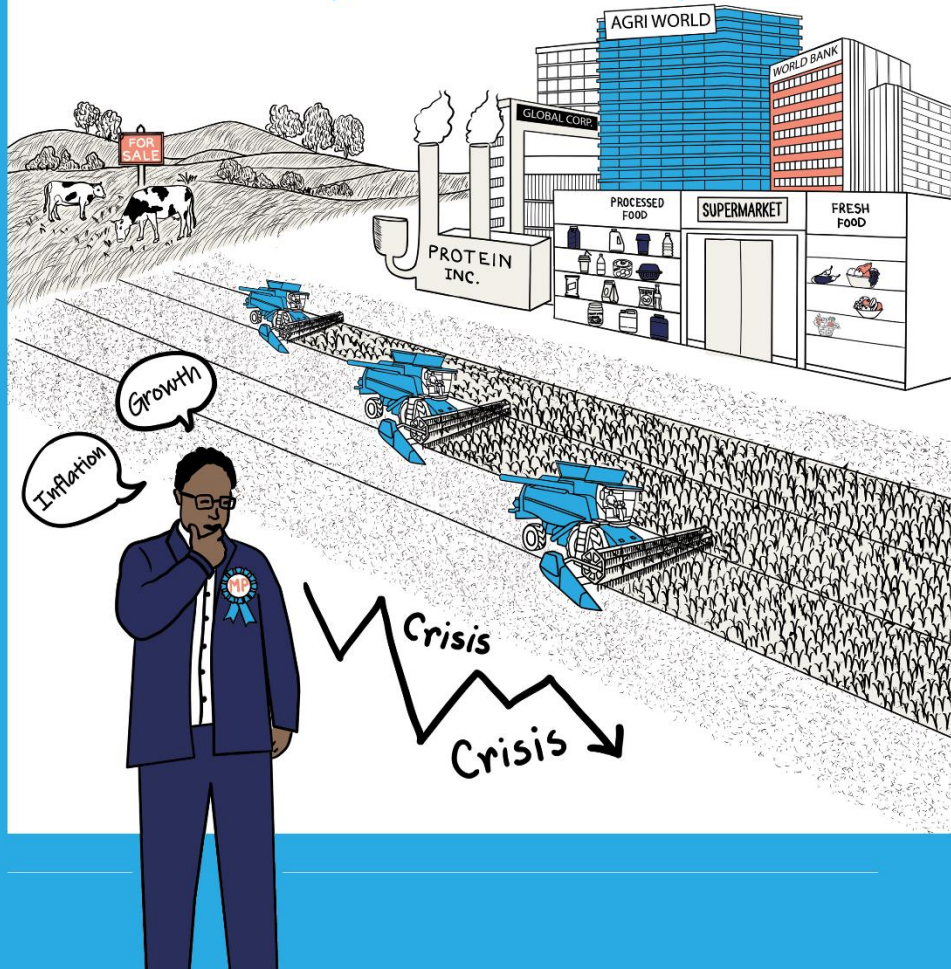


SCENARIO D

'THE RIGHT TO FOOD'

A geopolitically stable world, with a globalised economy built on 'green growth'.

SCENARIO A 'BUILD BACK FAST (AGAIN)'



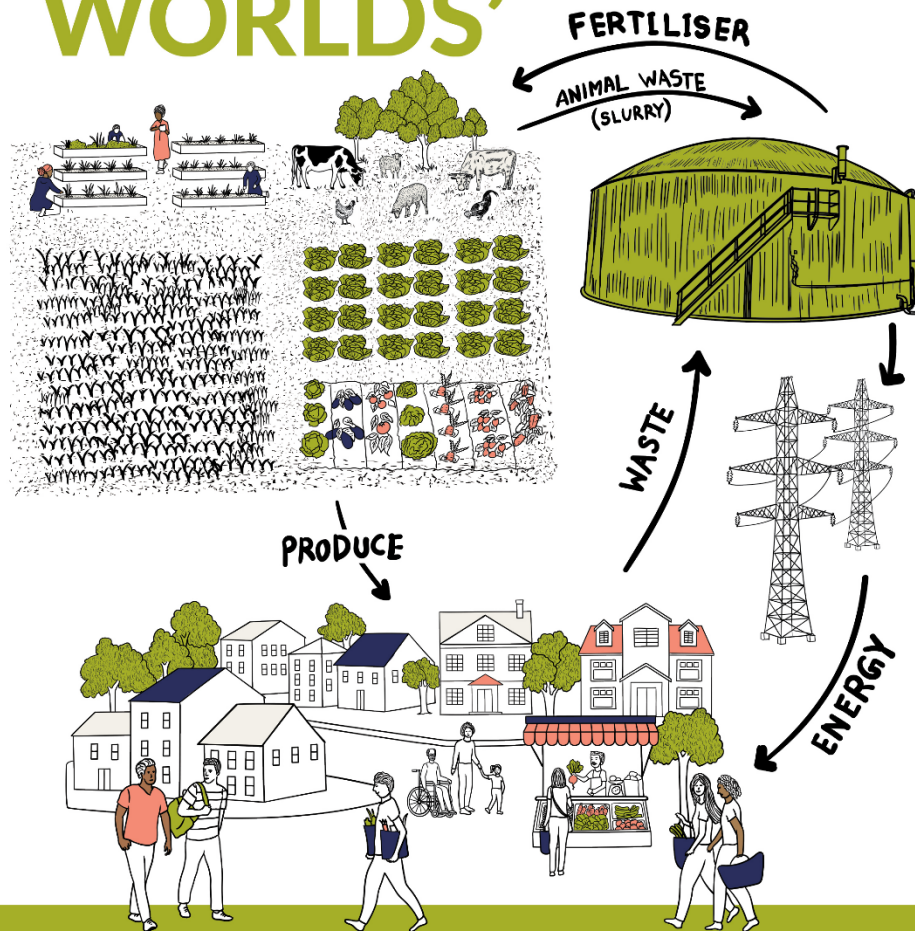
Key features



- › World view: individualistic, transactional, short-termist and market-driven
- › Geopolitically unstable and crisis ridden (an extension of current trends)
- › Globalisation is volatile, as are global supply chains (trade wars, climate). UK food supply is uncertain & nation state allies secure production and militarise trade routes
- › Political focus is on economic growth (rebuilding fast after crises, not rebuilding better)
- › Global corporations have more power and nation states are restricted by trade treaties
- › Food production is intensive and centralised - mostly ultra-processed, with a focus on industrial protein and other foods from a few commodities for calories. Fresh food is often unavailable
- › Big retailers still dominate, vertical farming is prospering
- › 'Net zero' route is through technology and 'sustainable intensification'
- › Large withdrawal of farmers from the land - areas abandoned to 'rewilding'

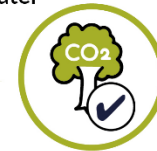
SCENARIO B

'CIRCULAR WORLDS'

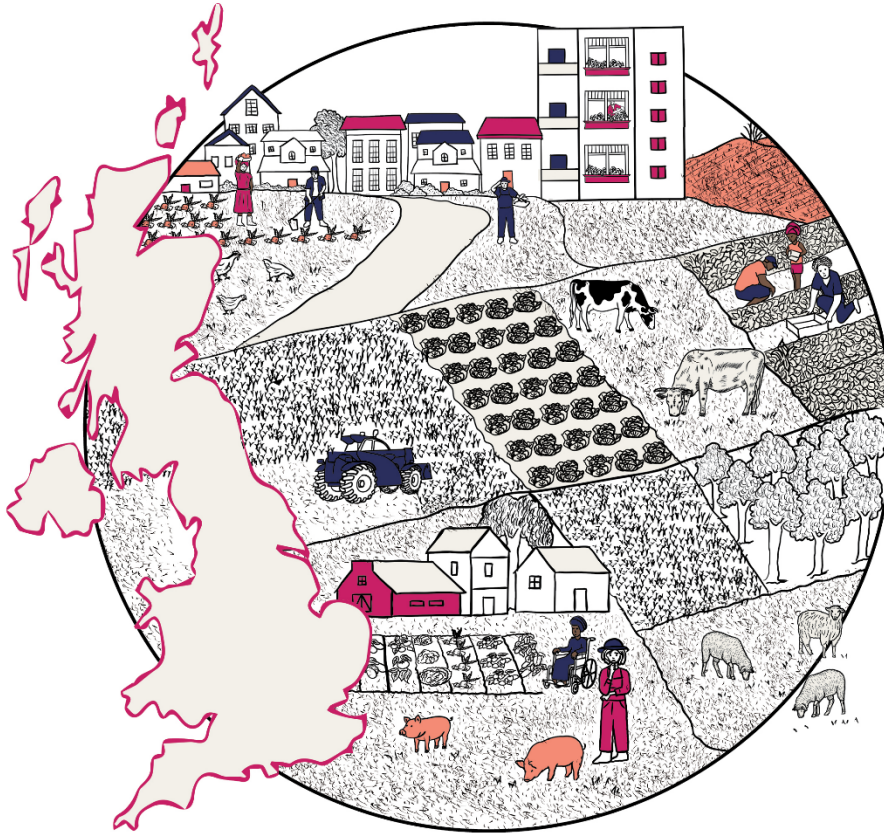


Key features

- › World view: Shared, systemic, well-being-oriented, intergenerational fairness
- › Millennial and GenZ new global order based on sustainability, climate action, circular economies, co-operation and well-being
- › Agriculture produces less, is more diverse, mixed, circular, low input, with improved carbon storage. Horticulture is common in peri-urban/ urban areas
- › Food and farmers are more highly valued. Farmers' focus on producing 'less but better' and margins are higher
- › Sustainable diets are new normal, meat is occasional. Food is more expensive. People cook more, eat greater variety, consume less, waste less, buy from variety of suppliers
- › Far fewer livestock frees up land for nature and carbon storage. Carbon credits and nature credits internalise externalities. Renewables mean energy is cheap
- › Cooperative trade buffers climate related regional/ national impacts. Carbon taxes on food imports increases costs



'SELF-SUFFICIENCY FOR SECURITY'



- World view: security-focussed, self-reliant, and about 'making do'

- Fractured, multi-polar world, full of conflict. Security of supply is key. Countries increase self sufficiency of food and trade with nearby allies
- Poorer world: People buy less, source more locally, consume less, grow at home. There are unofficial markets, and lower food safety standards
- Circular economy born out of need to save resources/not rely on imports
- Security of nutrition is core government food/agricultural policy: Farmers incentivised to grow crops for public health needs, rather than market demand. More focus on fruit, vegetables, high yielding traditional crops, plus some new ones adapted to new climate
- Food consumption is more regional and seasonal. Less meat consumption as ensuring enough food to feed the human population has risen in importance
- Trade decline means fertilisers are less available/ more expensive. More green fertilisers and mixed farming systems with rotations as a result. More small-scale farming systems. Some grazing land abandoned, afforestation increased
- Focus increasingly on adaptation rather than mitigation



SCENARIO D 'THE RIGHT TO FOOD'



Key features

- › World view: Innovation, inclusiveness and social purpose
- › Globalised, cooperative, multilateral. Sustainable 'green growth' is political goal
- › The 'right to food' is part of the social contract - ultra-processed (but healthy and sustainable) food supplied as part of Universal Basic Income. Food is cheap, people eat less, more healthily, waste less
- › Technological development is significant. A well-developed alternative protein market has changed consumer tastes
- › Small-scale, alternative, producers of new foods flourish. Global companies are broken up, more B-Corps and social enterprises exist
- › Mixed economy of food production. Decline in livestock production (carbon taxes, emissions issues), but more focus on fruit and vegetable production, local production (greenhouses, vertical farming, closed, hydroponic systems)
- › Agriculture is primarily 'sustainably intensive' – composts, bio-pesticides, regenerative, agro-ecological systems. Land spared for rewilding/carbon storage.



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

- Techno-fix v social and system change
- Role of government and other shaping forces
- Future scenarios to break out of 'business-as-usual thinking

Some key sources

National Farmers' Union (2019a) *Achieving Net Zero: Farming's 2040 Goal*. London: NFU.

<https://www.nfuonline.com/archive?treeid=138313>

Climate Change Committee (2020a) *Land Use: Policies for a Net Zero UK*. London: Climate Change Committee. <https://www.theccc.org.uk/publication/land-use-policies-for-a-net-zero-uk/>

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

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

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

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

Net Zero, Food and Farming

Climate Change and the UK Agri-Food System

Neil Ward



Prof. Neil Ward,
University of East Anglia, Norwich

Tweets @neilward586

Linked In

Happy to connect ...