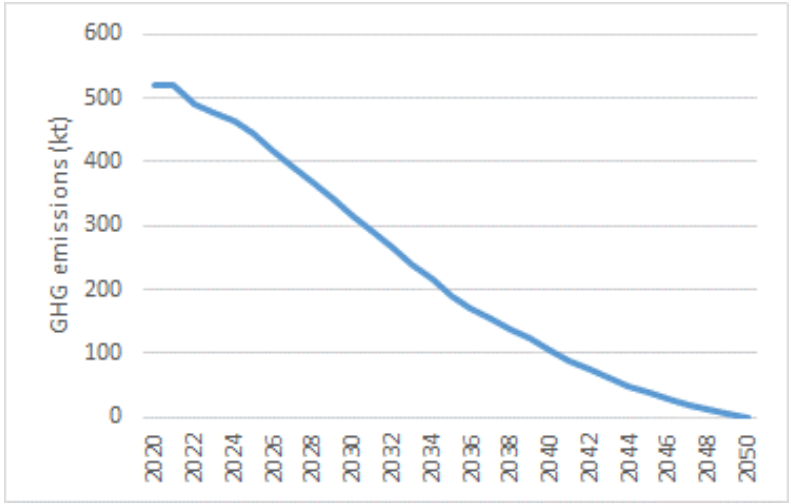
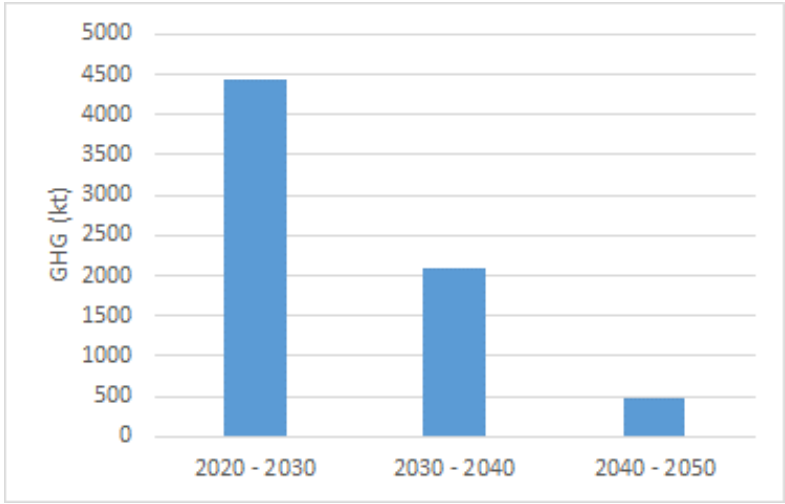
CENTRE FOR RESEARCH INTO
ENERGY DEMAND SOLUTIONS

The role of energy demand reduction in achieving net-zero in the UK

John Barrett

UK Climate Ambitions





Source: CCC, 2020

Roles of decarbonisation, removal and energy demand reduction

2020

2030

2040

2050

Our approach to modelling energy demand

1 Development of a scenario narrative provided to the modelling teams

2 Sector level modelling relaying on the most appropriate modelling structure for each sector

- Materials & products — UK MRIO
- Mobility — TEAM UK
- Non-domestic — Bespoke Energy Model
- Nutrition — UK MRIO
- Shelter — National Household Model

3 Identification of inter-linkages

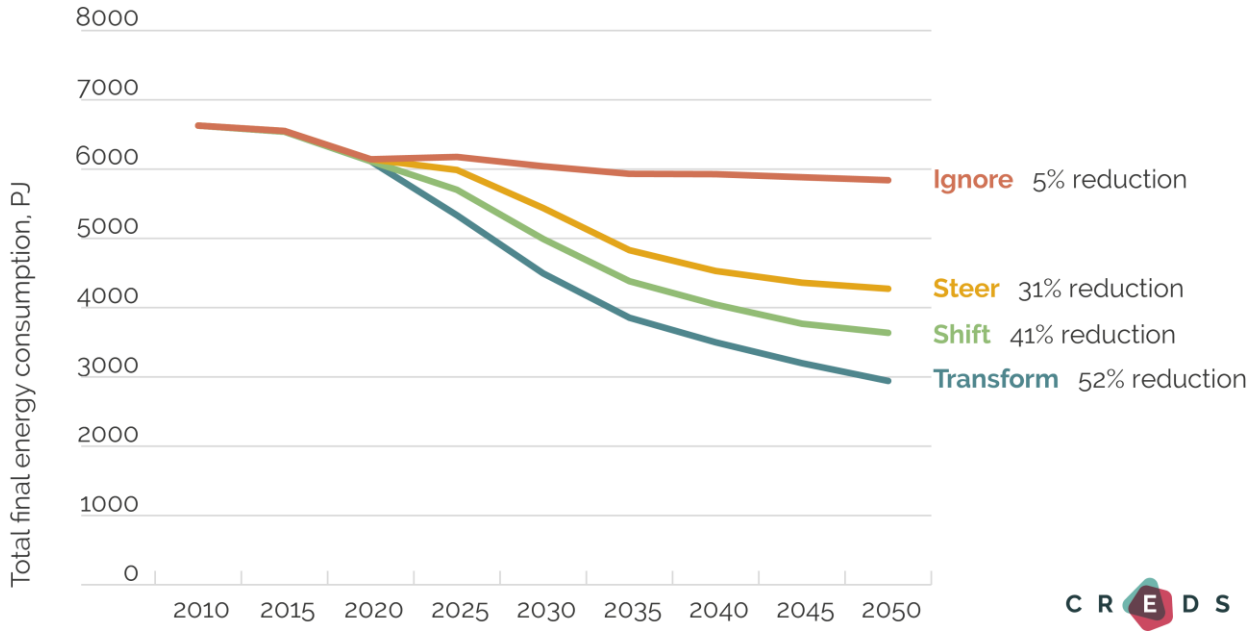
4 Integration into a central modelling system

5 Coherent scenarios

Four scenarios that are internally consistent and have a clear and common narrative

- Ignore
- Steer
- Shift
- Transform

Reducing the UK's energy demand

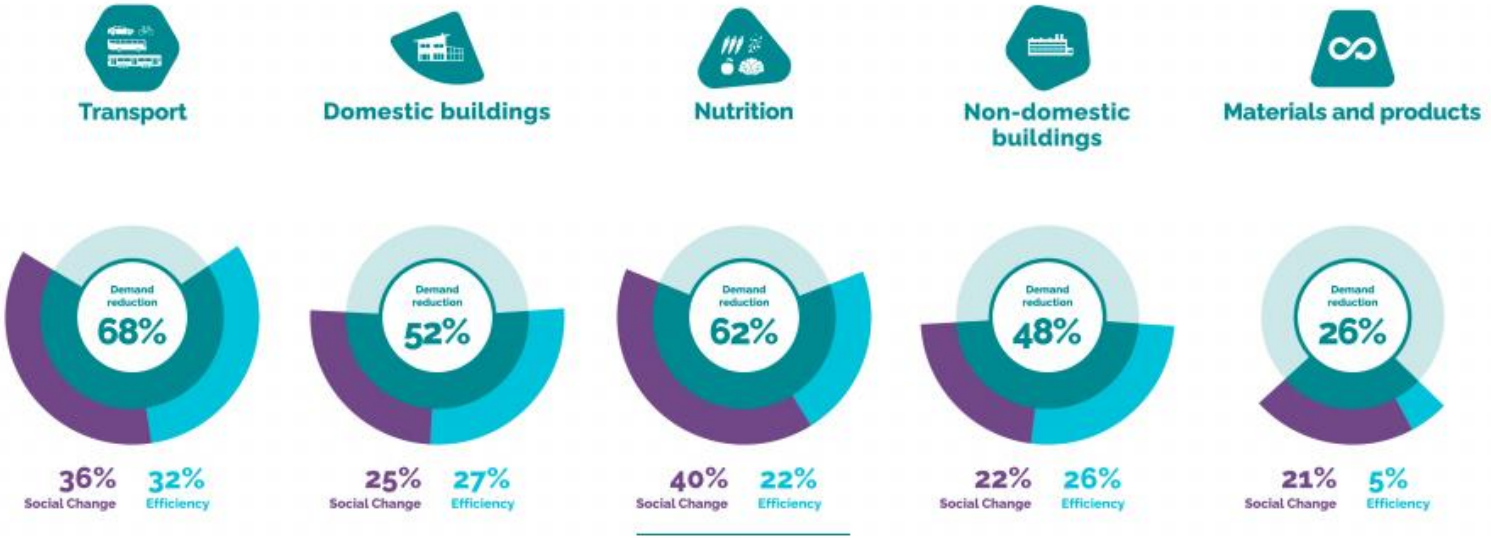


Where do savings come from?

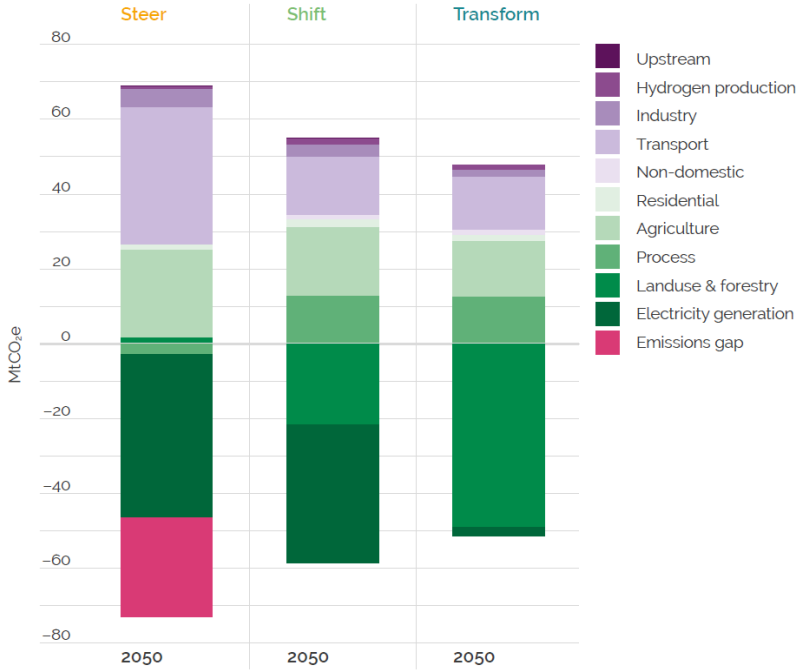
Four broad categories change:

- Efficiency improvements – insulation, products, processes etc;
- Efficiencies from energy system change – notably electrification of vehicles and heating;
- Systemic change in other sectors, notably to:
  - public and active transport,
  - circular economy for energy-intensive materials,
  - low meat food systems.
- Reduced consumption, especially by high consumers.

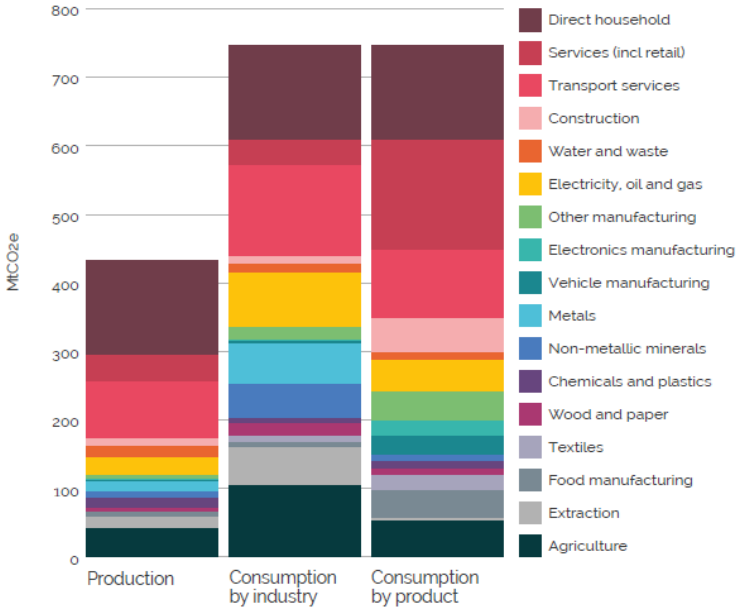
Reductions are possible and required in every sector

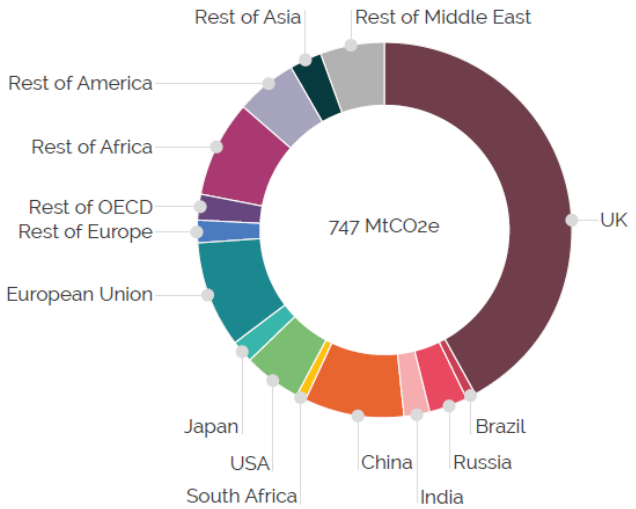


Securing net-zero emissions will require ambitious energy demand reductions

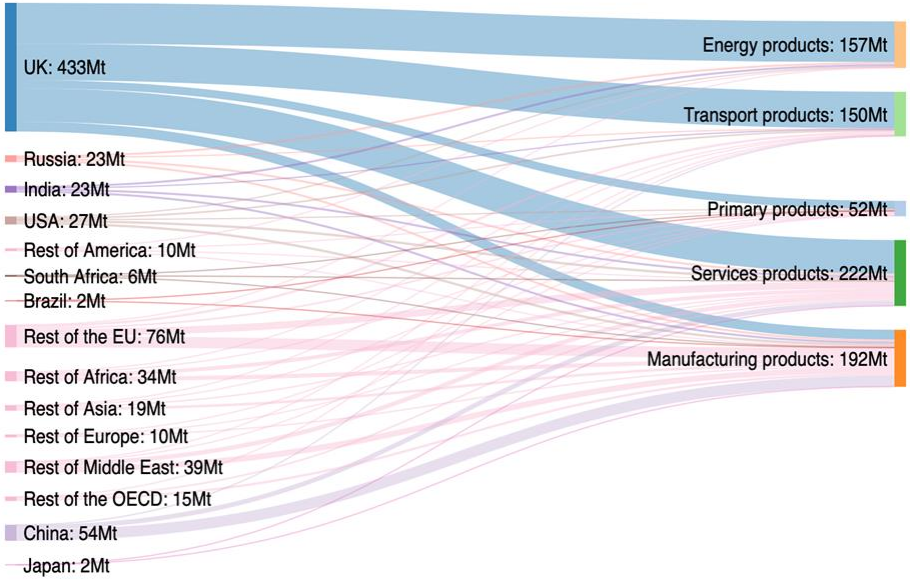


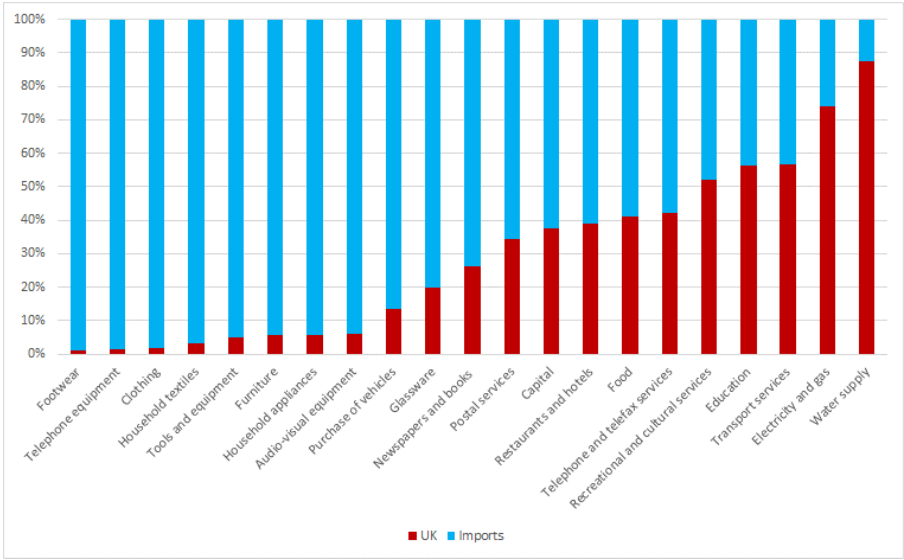
Industry, materials and product scenarios



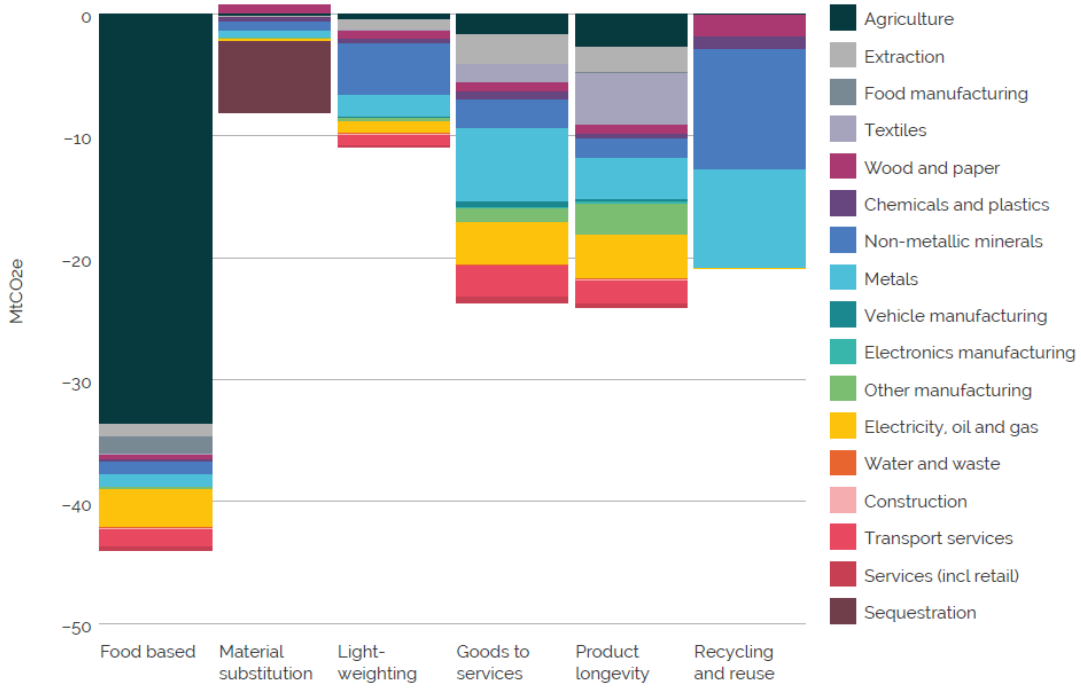


International supply chains





Industry, materials and product scenarios



Number of trips and distance travelled per person stay roughly the same … but we become more multi-modal

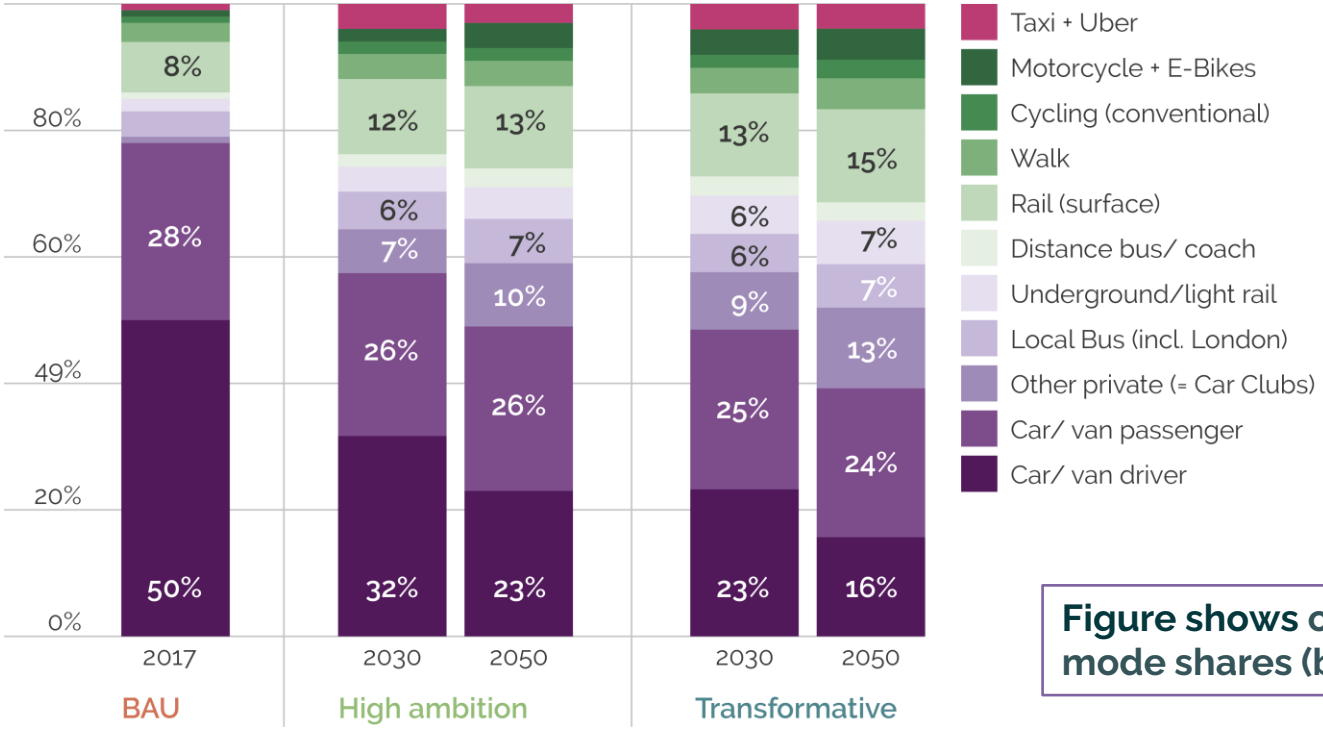
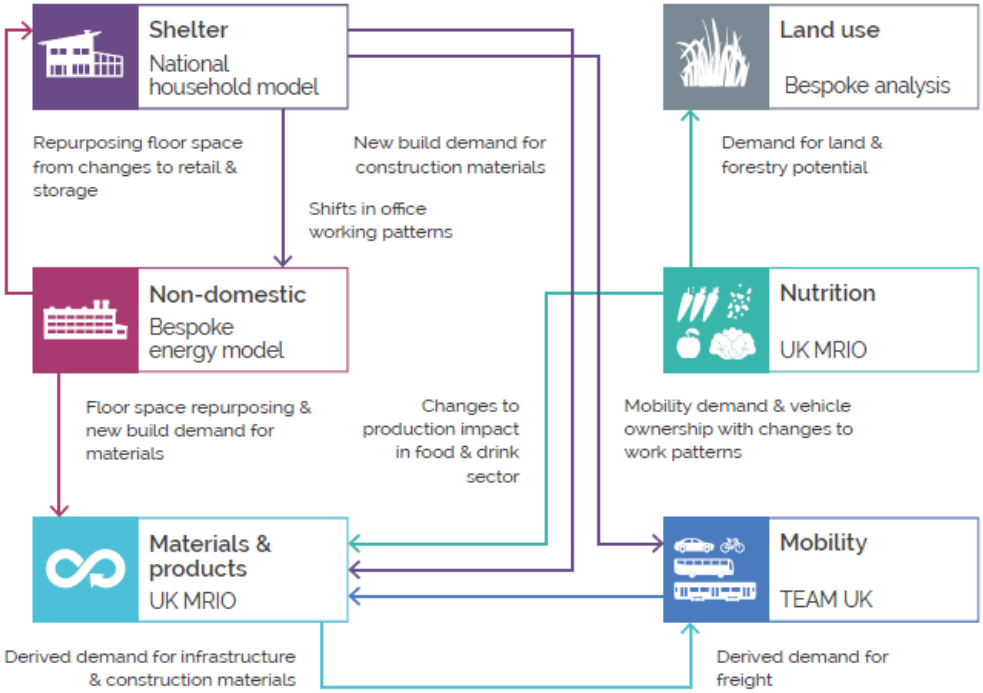
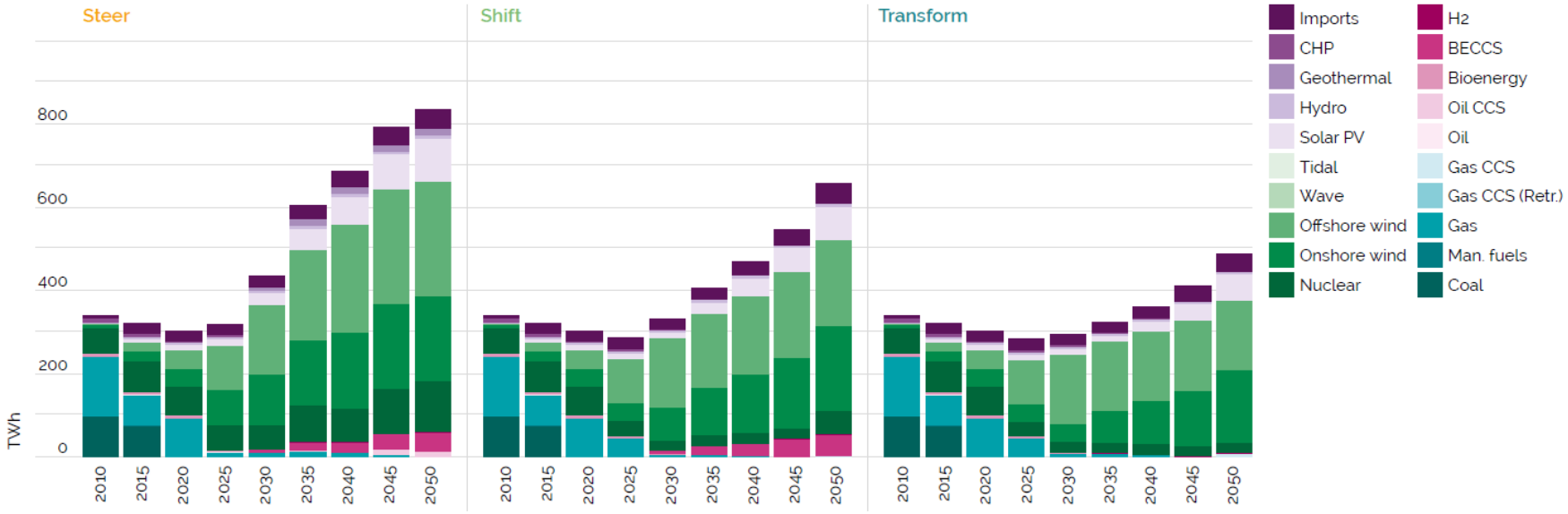


Figure shows change in trip mode shares (by trip distance)

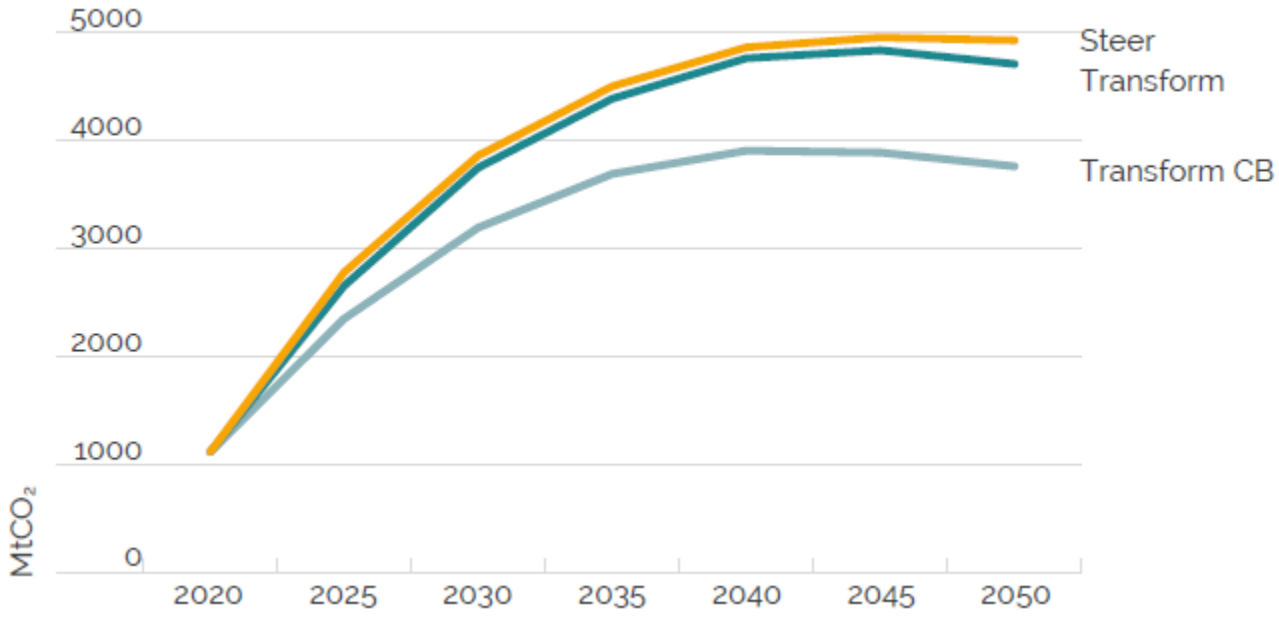
Modelling the interrelationships between sectors



We can reduce the scale of change needed in the electricity system



Lowering energy demand makes increase climate ambition possible

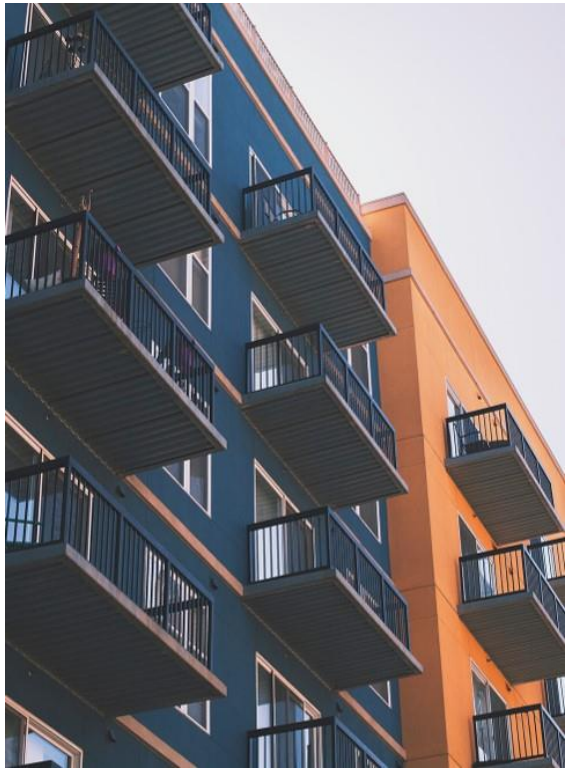


Implications for policy

- Policy needs to focus on delivering energy efficiency improvement **and** shifts to less energy-intensive practices.

- It's a systems transformation problem and therefore
  - The conventional "static, linear economics" wisdom about the efficiency of a uniform carbon price is not correct.
  - Focus on 'future fuels', notably the new uses of electricity.

- There is no 'silver bullet' policy – packages remain key.
  - New technology roll-out
  - Standards critical for products, buildings and vehicles;
  - Financial incentives will play an important role;



Source: Eyre et al, 2022

Thinking about system transformation

- Change whole systems, towards electrification of energy, public transport, low-energy materials;
- Incentivise the new and disincentive the old;
- Drive investment in sustainable infrastructure;
- Support skills for new jobs and working practices;
- Include policies to reduce consumption;
- Energy policy will include what have been seen as economic, land use, agricultural, transport, housing, industrial and employment policies

Source: Eyre et al, 2022

Need for a comprehensive energy demand plan

Why?

- Essential to meet climate targets
- Increases resilience against global markets and conflict
- Lower costs for households and businesses

How?

- Cross-departmental response with comprehensive modelling supported through GO-Science and CREDS
- Broader public debate on the need to reduce energy demand
- Short-term, medium and long term plan
- Target for energy demand reduction

Research agenda

- Inequality and low energy futures
- Comparative analysis of low energy future
- Lived experience of low energy living
- Marco-economic implications and structural change
- Emergency response to the climate crisis – social tipping points
- Structural decomposition of drivers
- Investment requirements

More available from:

https://low-energy.creds.ac.uk