

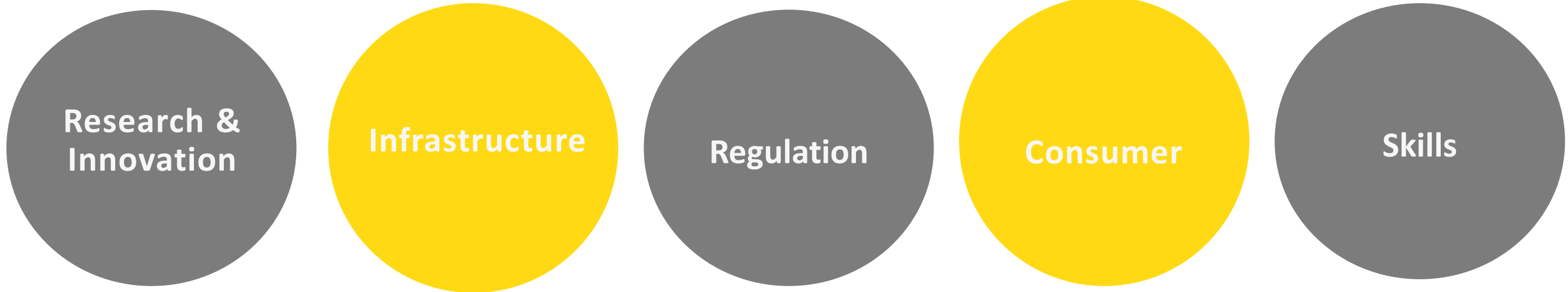


Renewable Nation: Pathways to a Zero Carbon Britain

Juliet Davenport, Founder, Good Energy. 8th June 2021

The urgency of net zero

At Good Energy, we approach the challenge of cutting emissions in the energy sector by focussing on five pillars.



What is it?

A comprehensive report with Energy Systems Catapult on how the UK's net zero target can be achieved with a renewables-led approach.

Our research intended to address some of the common errors found in energy modelling, such as:

1. Bias in selecting the inputs and assumptions, which can favour current dominant technologies.
2. Lack of granularity in modelling techniques underestimates the difficulties of combining technologies, for example wind and nuclear power.



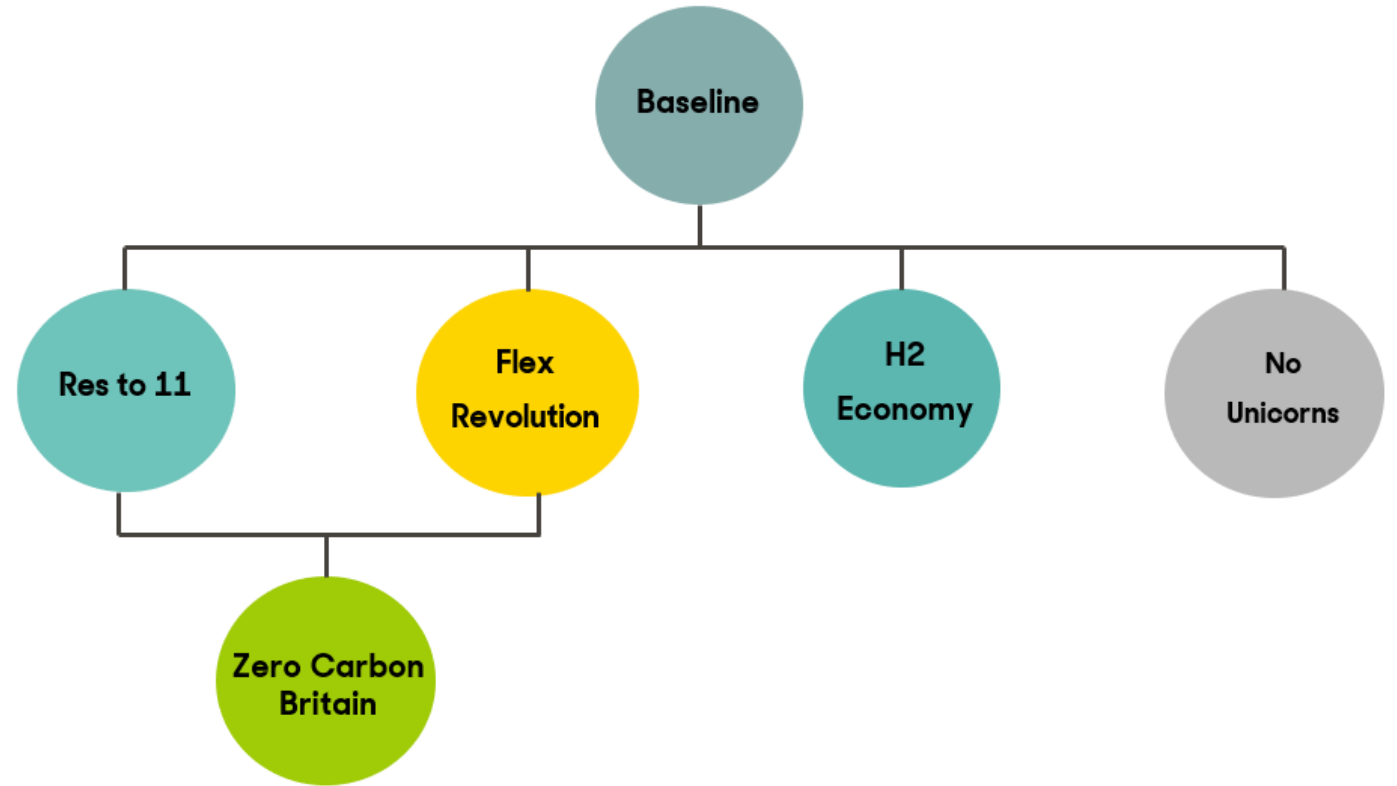
Our Approach

There are many possible ways to achieving net zero.

We started with a reference scenario – Baseline.

We experimented with different options, such as Hydrogen Economy.

Our final scenario – Zero Carbon Britain – is led by consumers, with very high levels of renewables and storage.

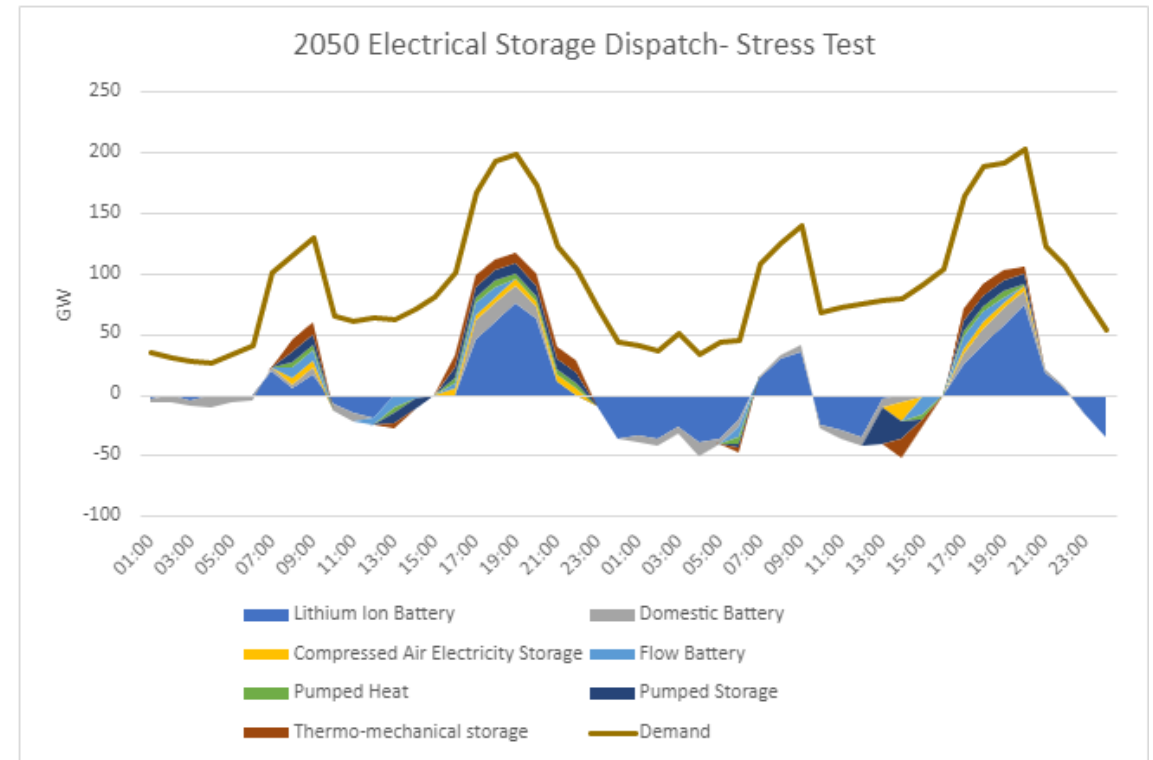


Key Findings

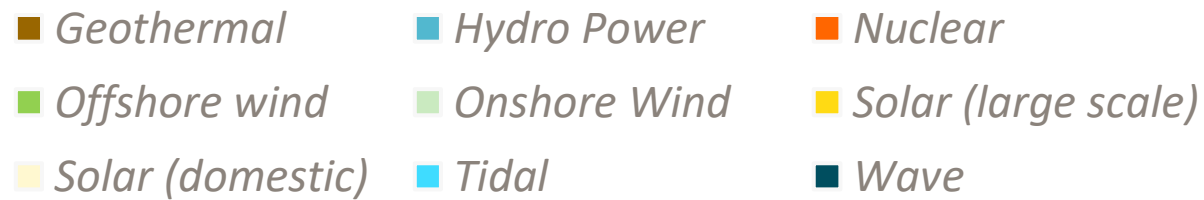
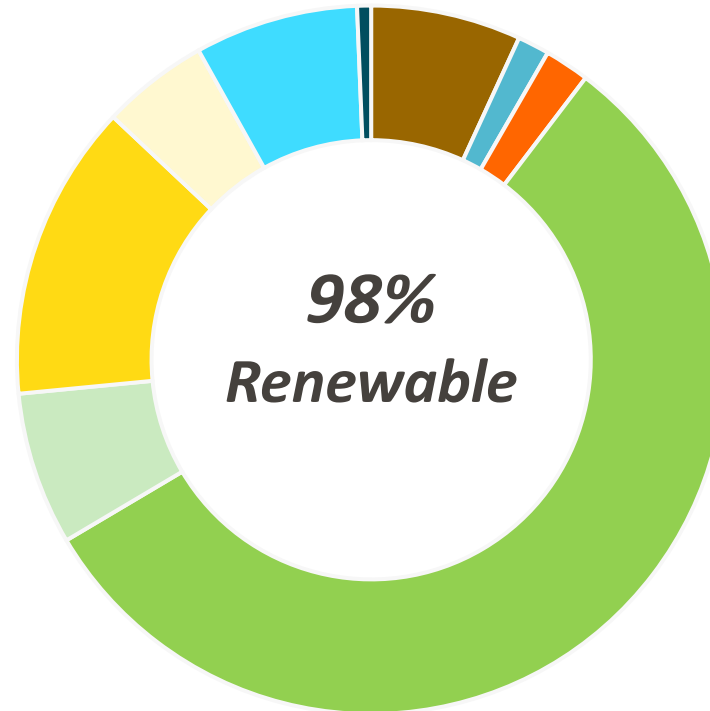
- ✓ By 2050, the energy system is fully decarbonised with renewables providing 98% of electricity.
- ✓ The vast majority of heat demand is electrified (81%), supplemented by hydrogen (9%) and geothermal and solar thermal (10%).
- ✓ Significant investment in energy efficiency and heat storage to manage increased demand.
- ✓ 90% of transport is electrified. Smart EV charging is essential and 60% of EV charging load considered flexible.
- ✓ Net costs of decarbonisation are a minimum of £9 billion per year.

A net zero power sector by 2032?

- >98% of electricity system could be renewable by 2050, with high deployment of offshore wind and solar
- Roles for tidal (stream and range/lagoons), geothermal and wave generation.
- Nuclear power beyond Hinkley C isn't necessary.
- Huge deployment of both grid scale storage and domestic batteries and solar panels
- >13m homes and businesses with solar panels, ~10 million home batteries.

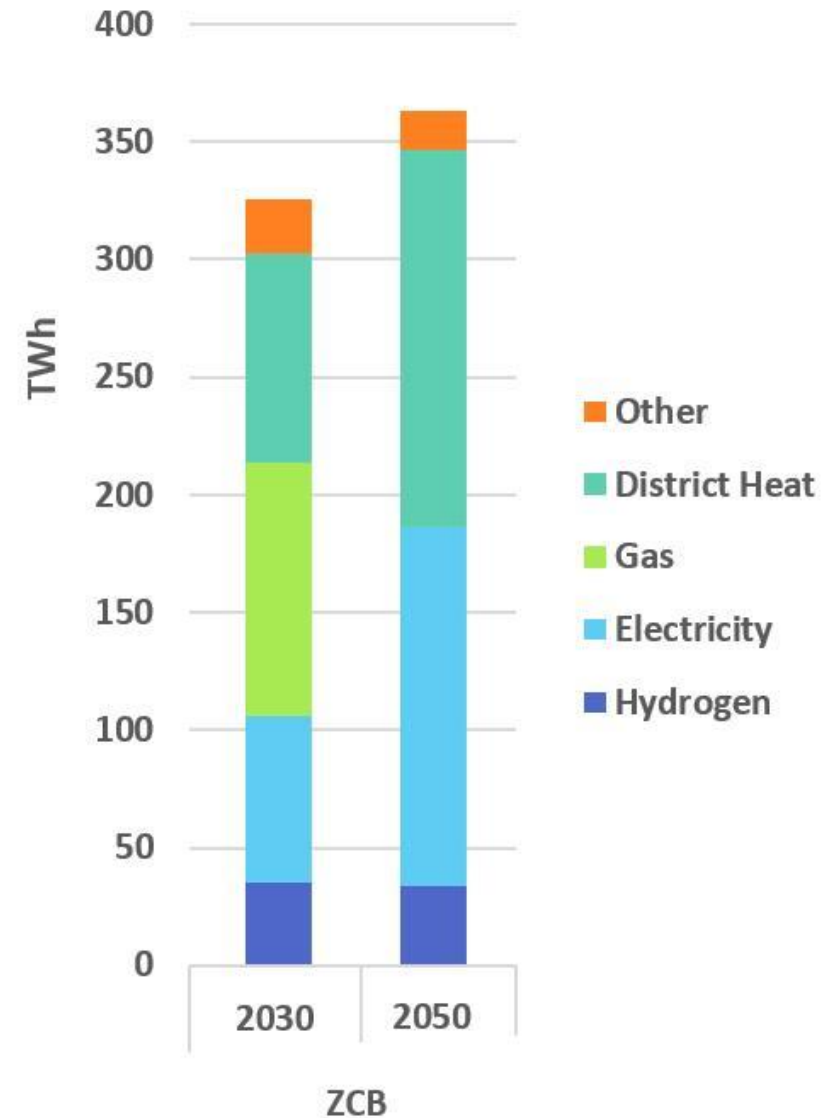


Fuel mix of the future: 2050 Zero Carbon Britain



Zero carbon heat

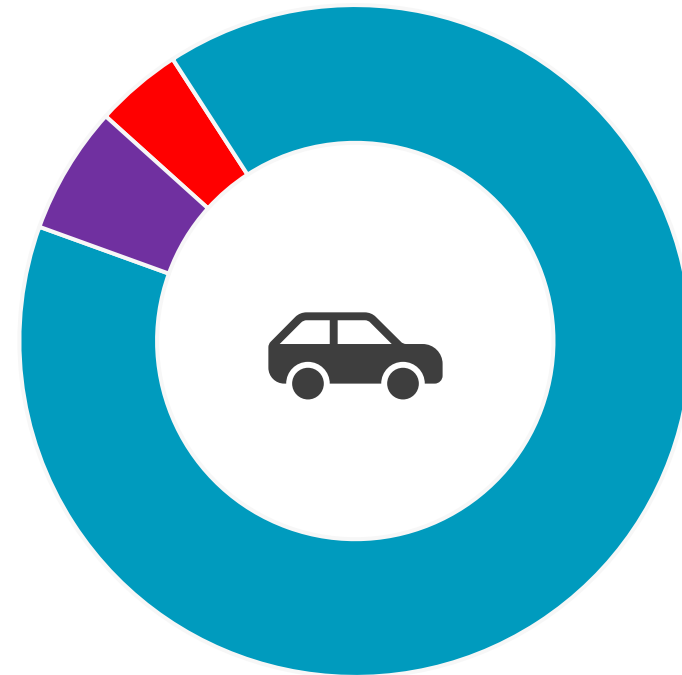
- ZCB chooses electrification as the cheapest and most efficient method of decarbonising.
- By 2030, 46% of heat demand is provided by electricity.
- This is enabled by the rapid uptake in heat pumps, both domestic and larger heat pumps connected to district heat networks.
- ZCB chooses to install a greater degree of retrofit measures. This leads to a reduction in winter peak heat demand compared to Baseline scenario.



Drive electric... obviously

- By 2050, there will be 45 million battery electric vehicles on the road.
- Electricity supplies 90% of the required energy, which reaches 151 terrawatt hours. This is equivalent to half of all electricity demand today.
- Smart EV charging will be essential to prevent severe stress on the electricity system, and absorb excess renewable power.

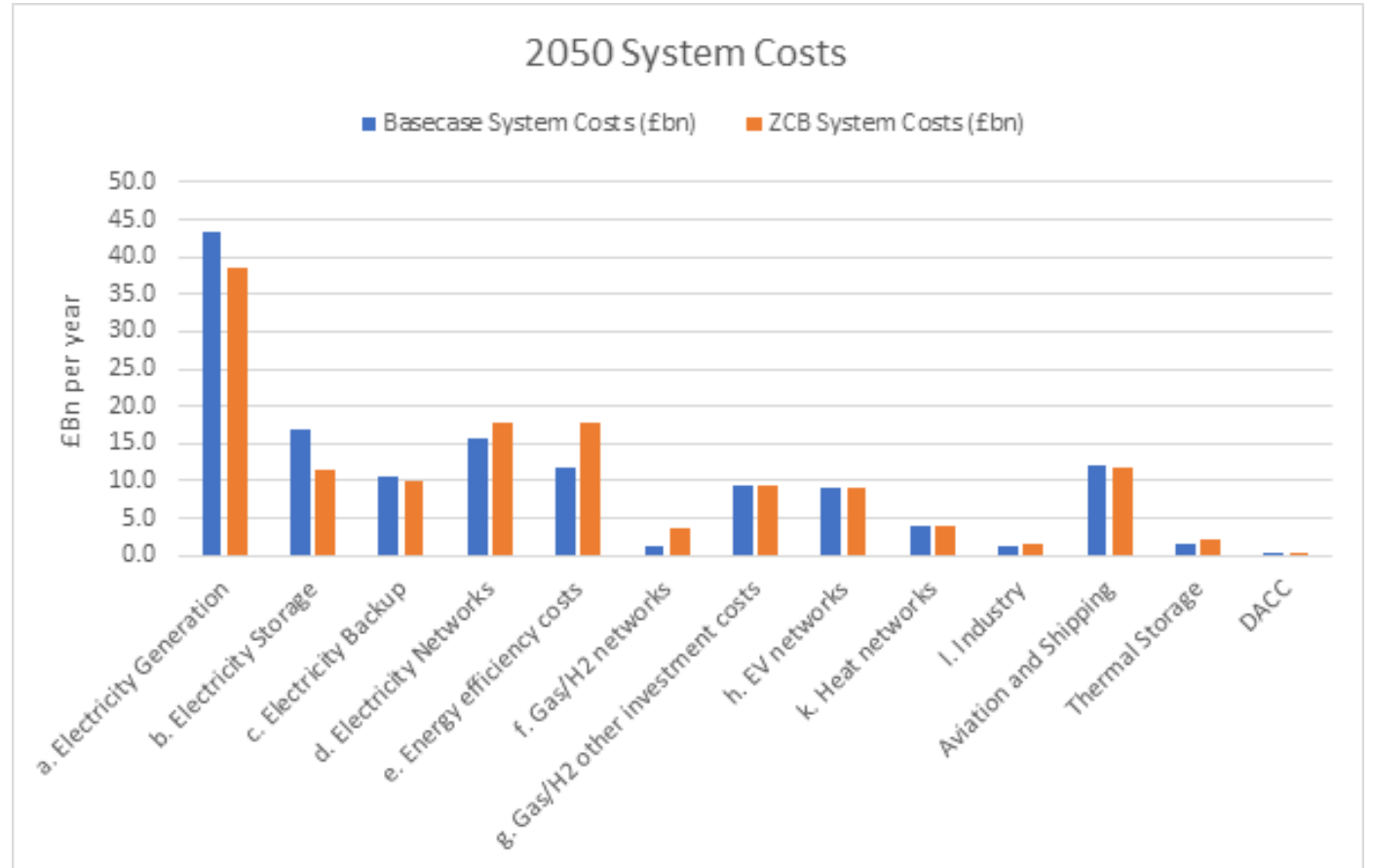
2050 Road Transport Consumption by Fuel



■ Liquid Fuel ■ Electricity ■ Hydrogen

Costs are manageable

- The 2050 annual total system costs for Baseline and ZCB scenarios are virtually the same at £126bn and £126.4bn per year. This is around 1.5% of GDP.
- Decarbonisation will add £9bn to current costs.
- The ZCB scenario: an increase in energy efficiency costs is offset by a reduction in energy generation and storage costs.



Five Principles for Net Zero

