WHEN TRUST MATTERS

UK Energy Transition Outlook 2022

London – 24th May 2023

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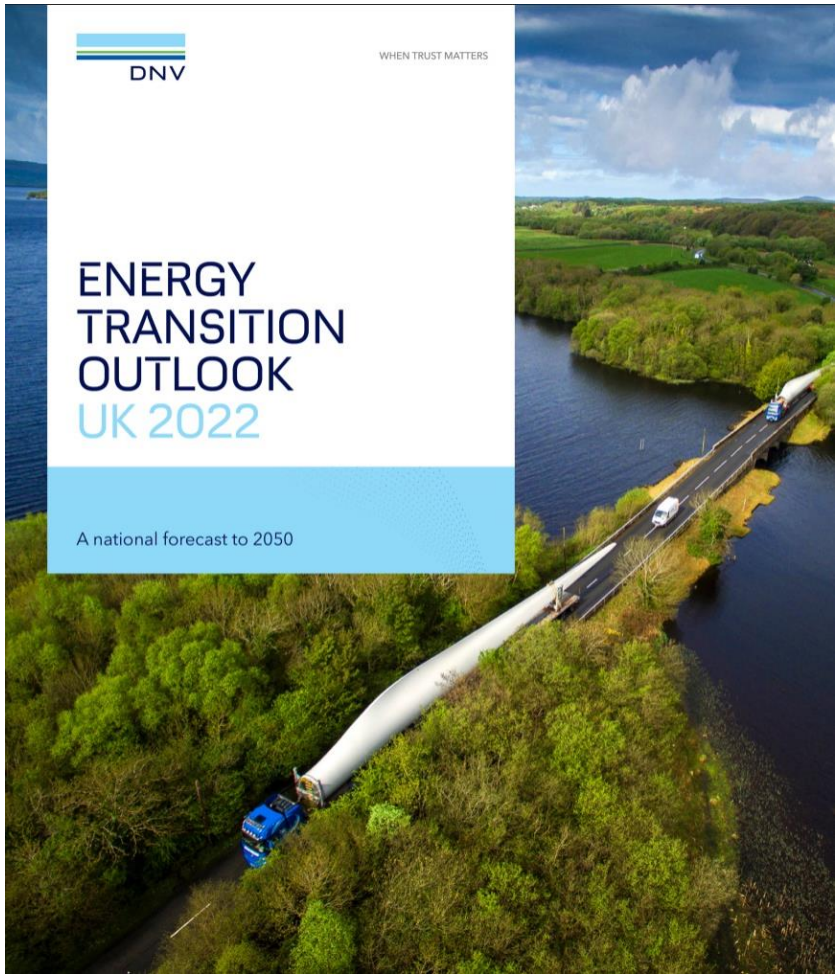
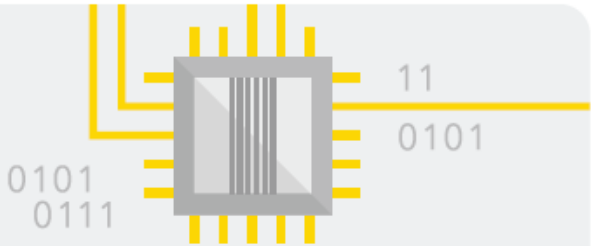
Our forecast



Our **best estimate**, not the future we want
A **single forecast**, not scenarios

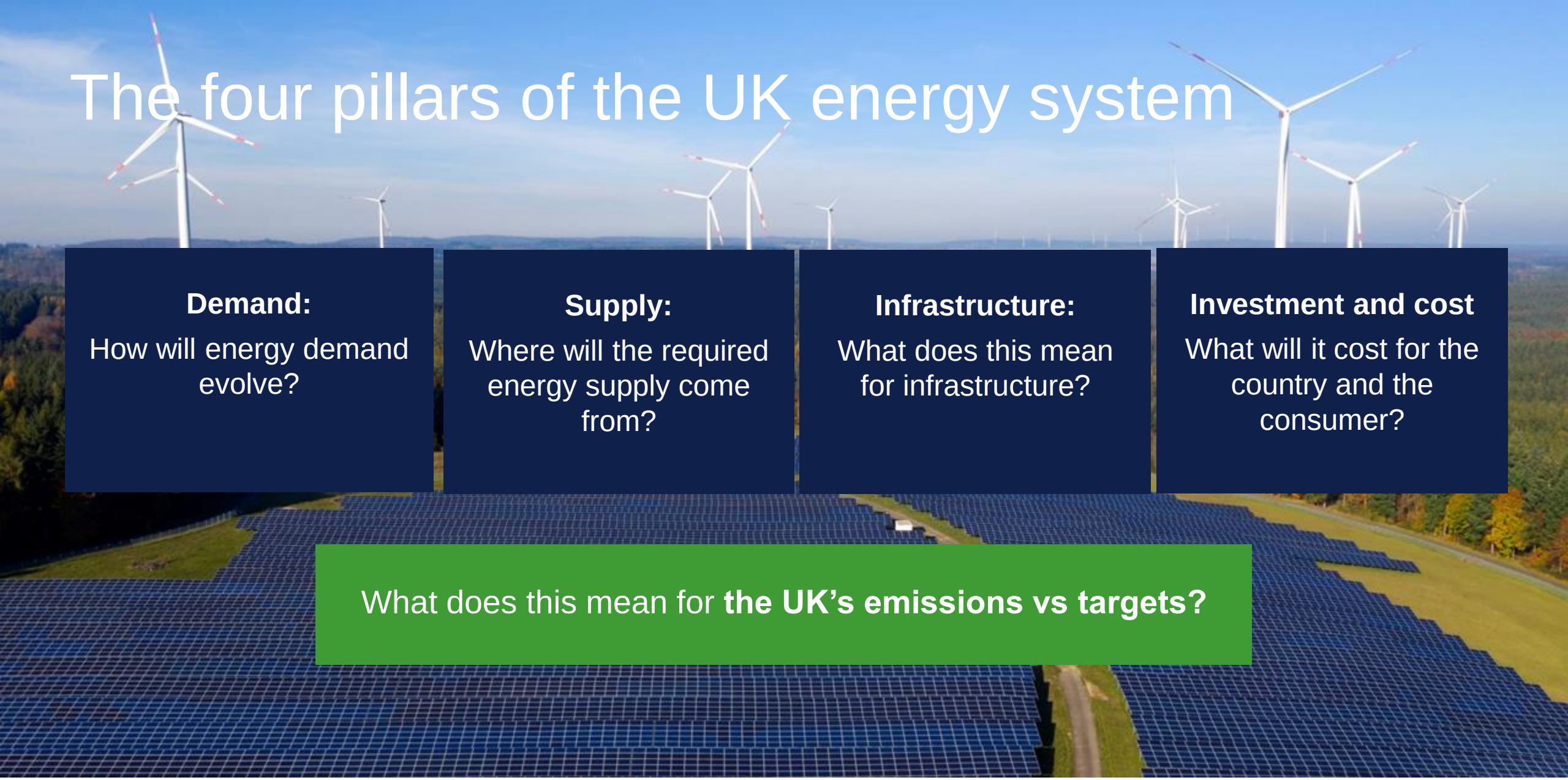
UK as part of the **Global Energy System** – through technology, economy, energy resources



Technology uptake is mainly cost driven - reflecting global trends and learning curves

Key confirmed **policy** trends included: e.g. phase out of ICE, commitment to industrial clusters

The four pillars of the UK energy system



Demand:

How will energy demand evolve?

Supply:

Where will the required energy supply come from?

Infrastructure:

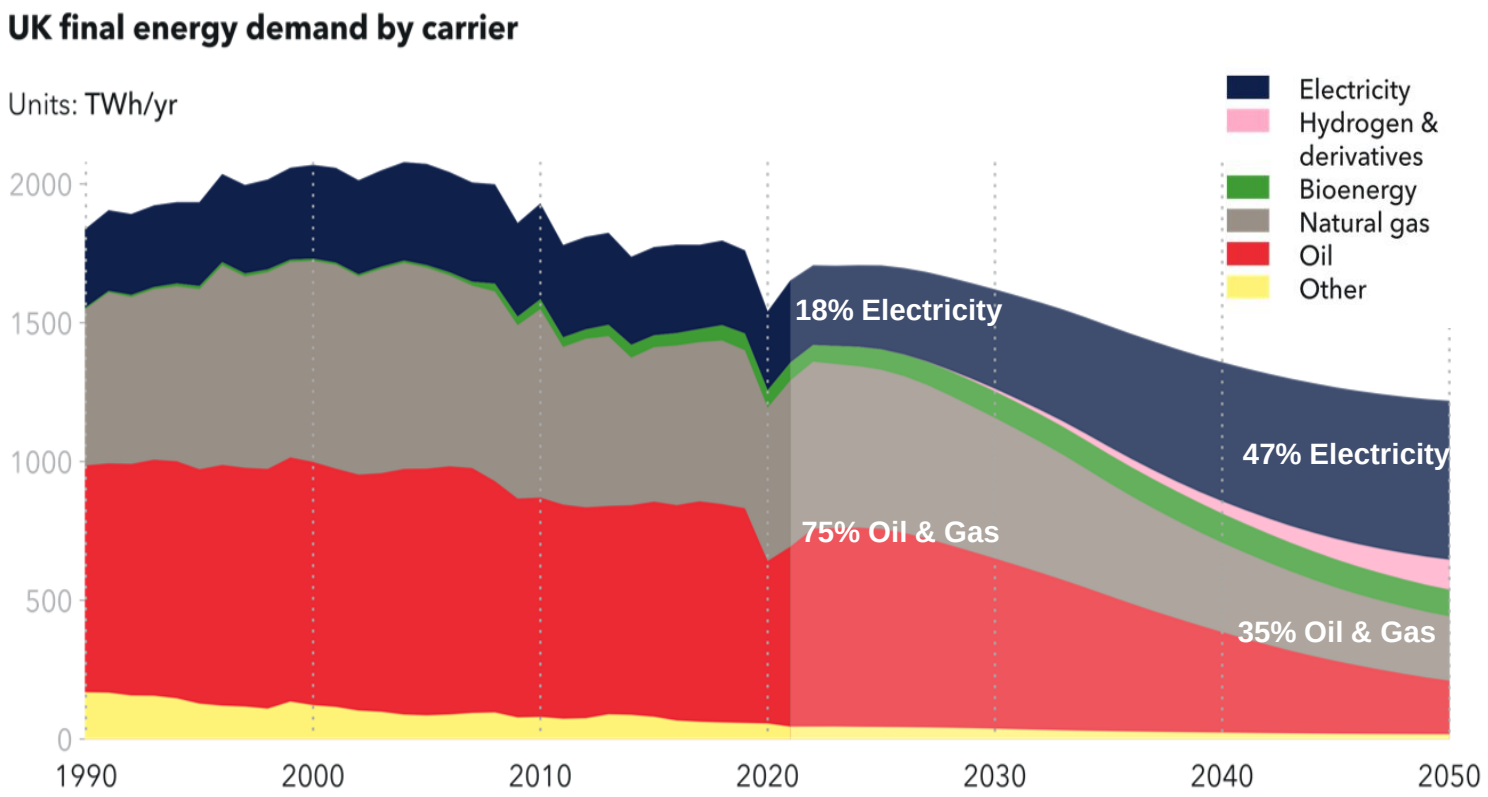
What does this mean for infrastructure?

Investment and cost

What will it cost for the country and the consumer?

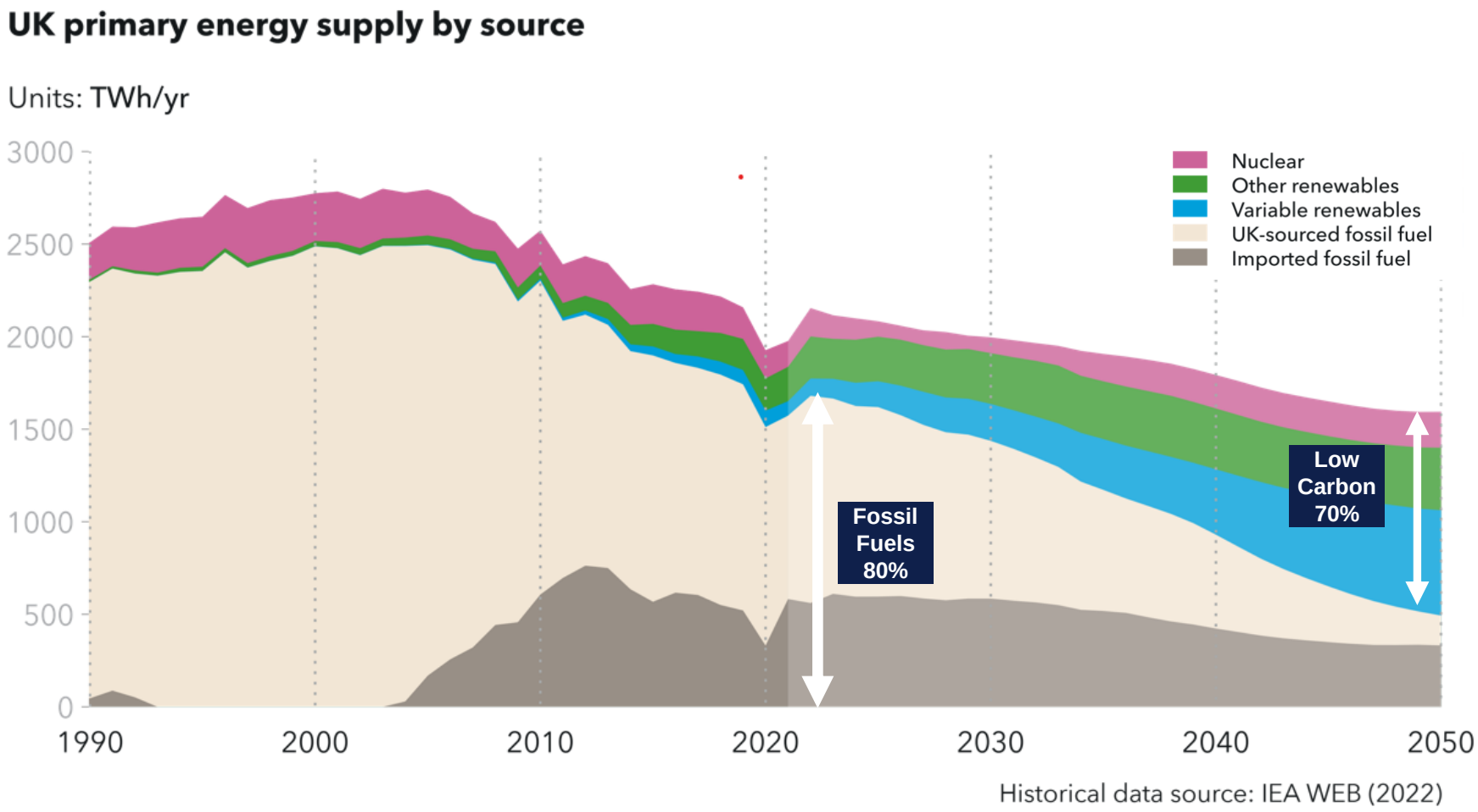
What does this mean for **the UK's emissions vs targets?**

Despite growth in GDP & population, energy demand will reduce by 25% by 2050



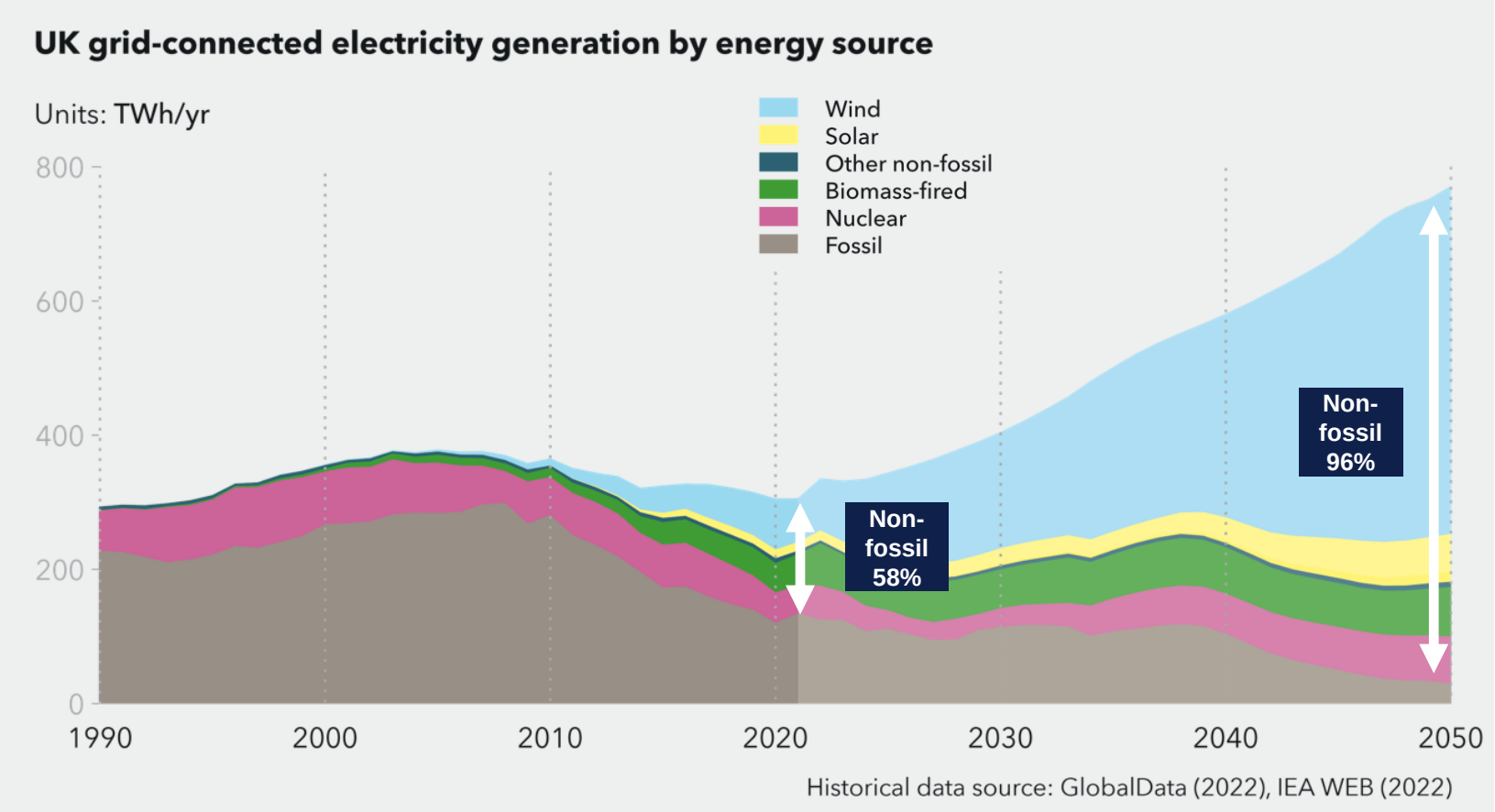
- Demand will drop thanks to large scale electrification across all sectors
- Today three quarters of demand is supplied to customers via fossil fuels
- By 2050 nearly half of demand will be supplied as electricity
- Fossil fuels will still deliver a third mainly for heating, commercial transport and power generation
- Only limited uptake of hydrogen by 2050

UK’s primary energy supply will shift from fossil fuels to low-carbon sources



- Fossil fuels vs low carbon sources shifts from 80/20 today to 30/70 by 2050
- Fossil fuels will dominate energy supply for the next decade
- Domestic fossil fuel production will remain critical to UK security of supply

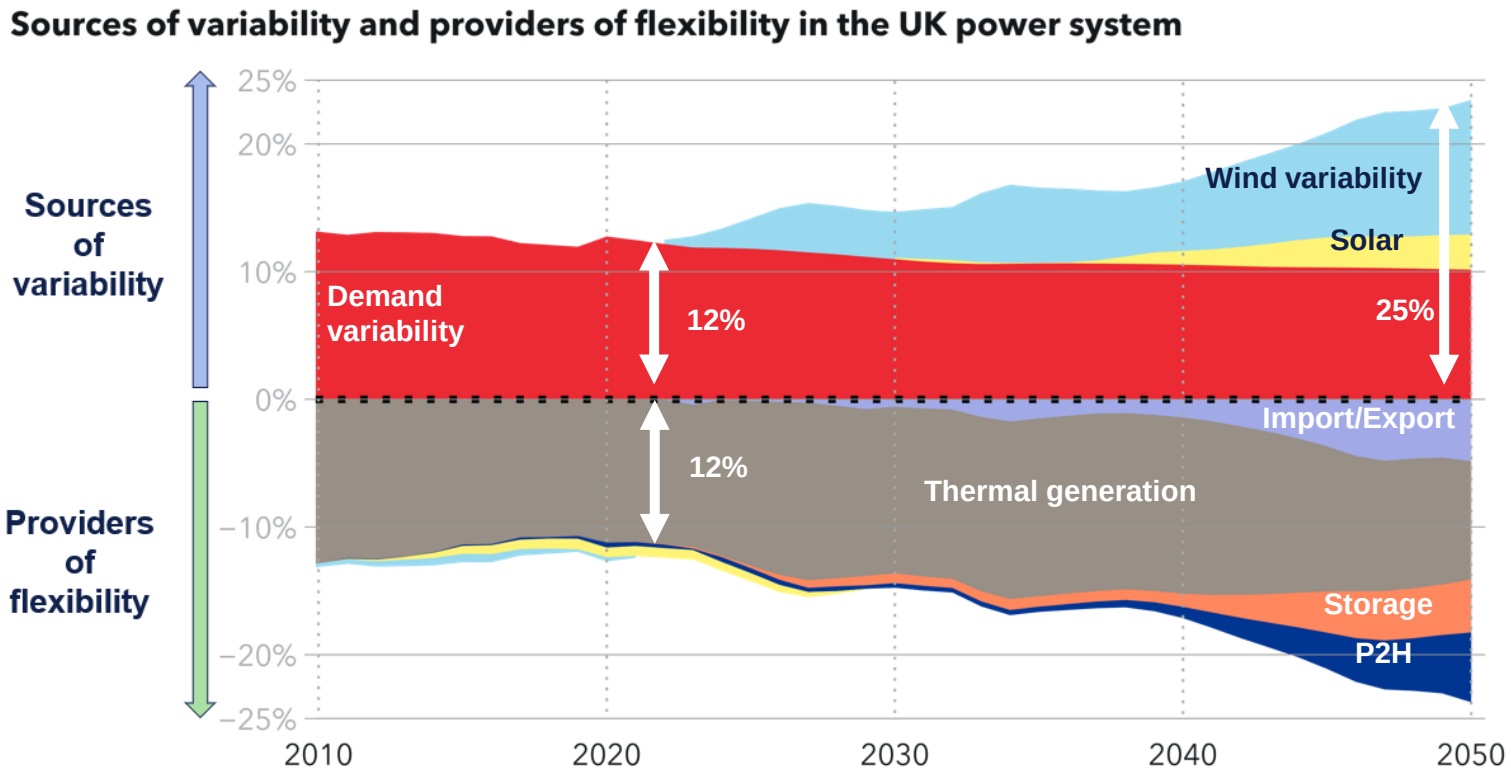
Electricity demand in the UK will increase by a factor of 2.5 by 2050



- Electricity supply is greening – from 58% low carbon sources today to 96% in 2050
- Extraordinary growth of variable renewables
- Stable contributions from nuclear and bioenergy providing base-load
- Gas-fired contribution greatly reduced from 42% today to only 4% in 2050

DNV's ETO 2022

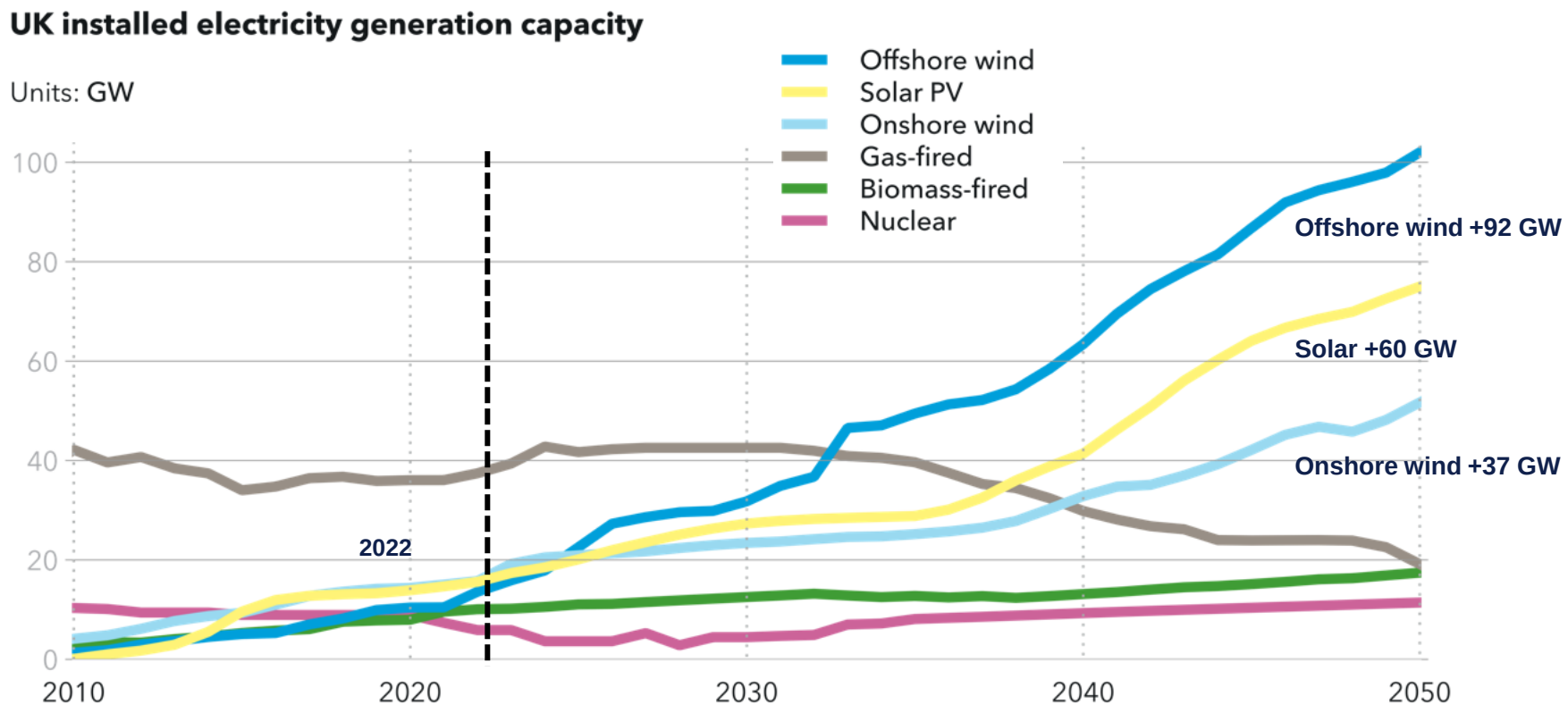
By 2050, variable renewables will supply three quarters of total electricity



- High penetration of renewables will have significant impact on variability of electricity supply
- Variability of demand and supply increases from 12% today to 25% in 2050
- Today majority of flexibility is provided by gas-fired power generation
- Future system flexibility will require combination of dispatchable power, battery storage, import/export connections and off-grid hydrogen production

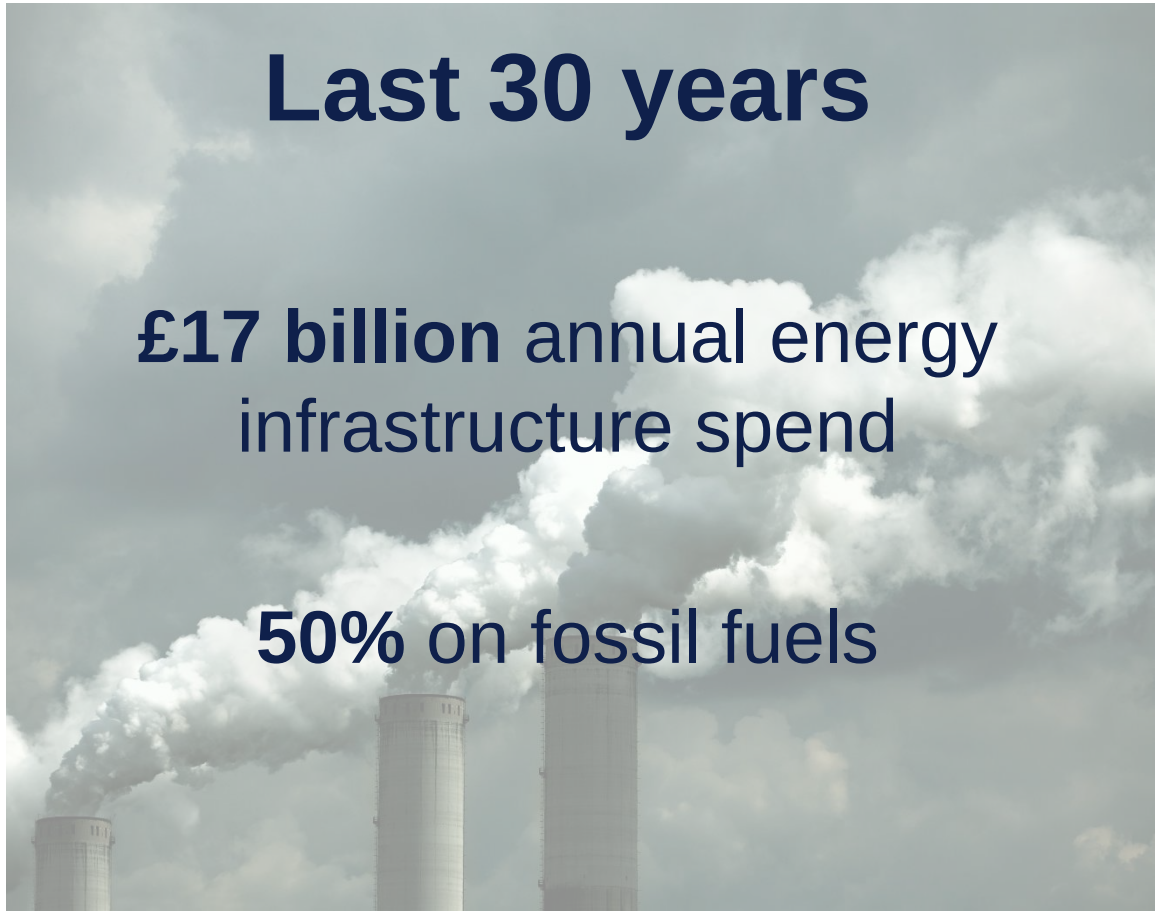
DNV's ETO 2022

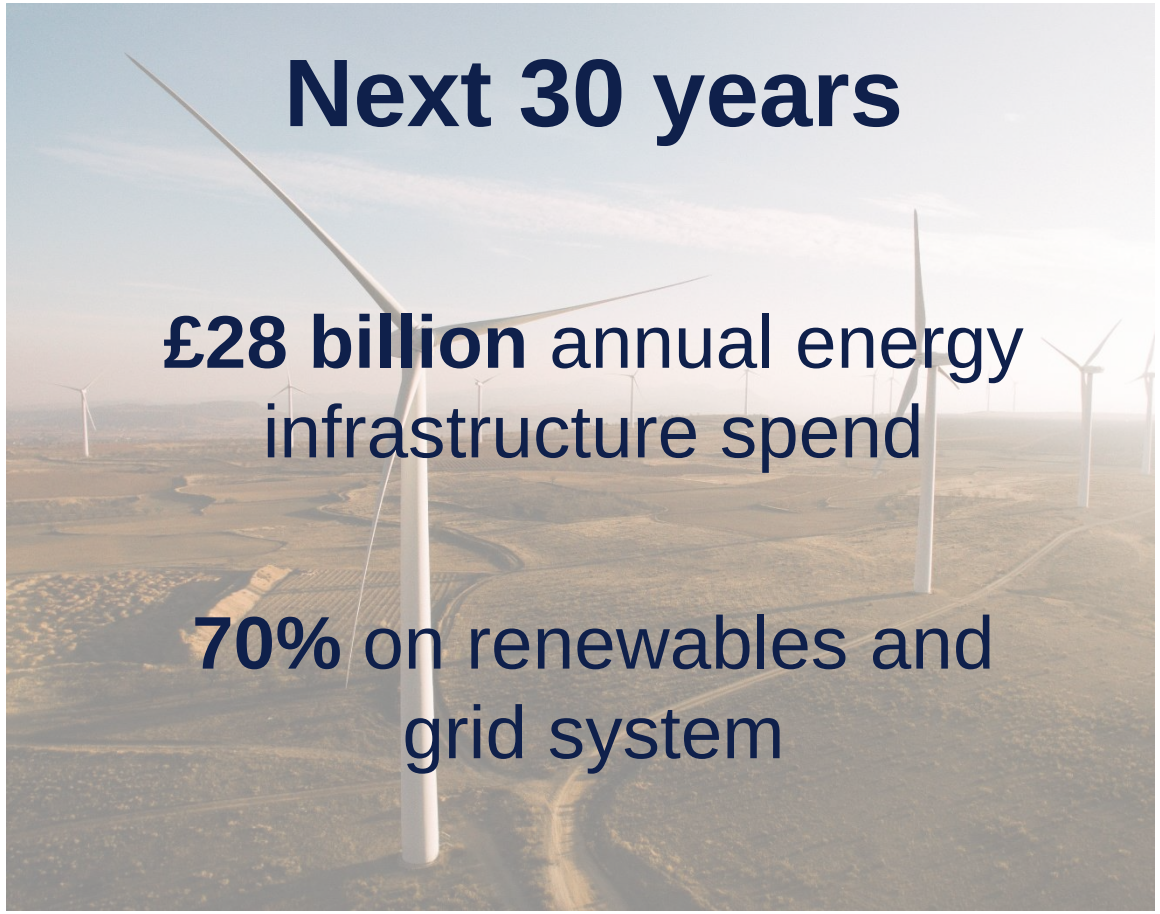
We will require a major expansion of electricity generation & grid infrastructure



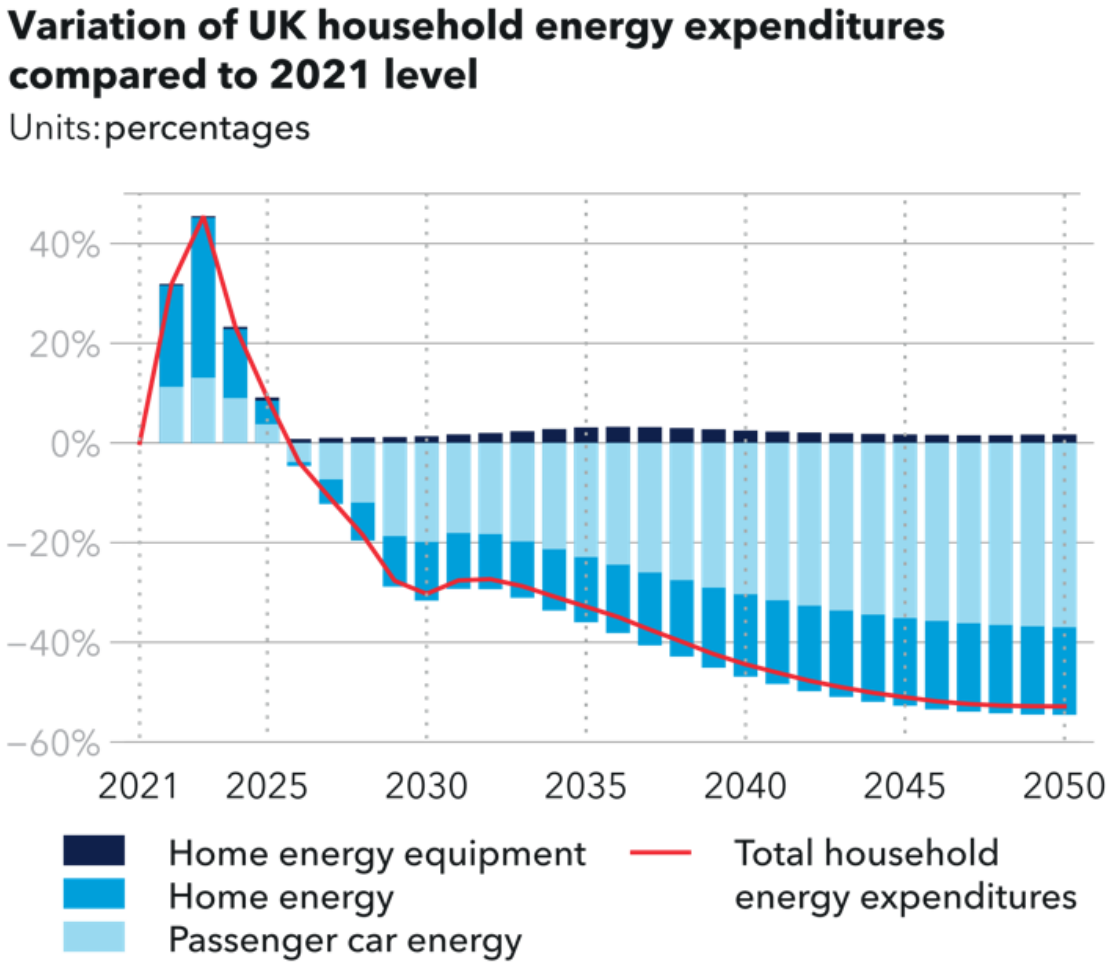
- UK will require 180 GW additional generation capacity by 2050
- 90% of new capacity will be Variable Renewables – dominated by offshore wind – both fixed and floating
- 3-fold increase in electrical grid infrastructure to handle increased throughput
- Additional 190 GWh of utility-scale battery storage

An affordable transition: Investment almost doubles but remains at 1% of GDP





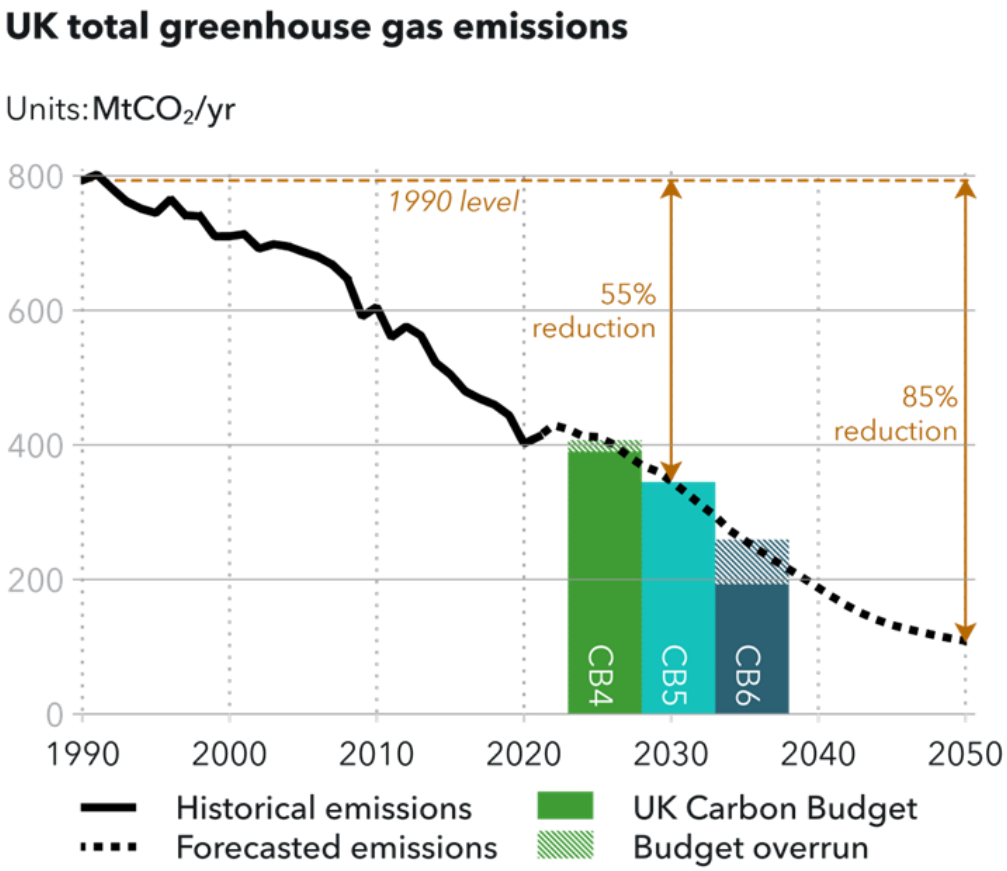
Household energy spend will halve compared to 2021 levels



- Substantial green prize awaits the UK economy in the form of a cleaner, more efficient and less expensive energy system
- Due to current supply crisis household energy spend expected to remain high for next 2-3 years
- Long-term costs will decline by more than 50% by 2045
- Two-thirds of reduction driven by vehicle energy costs remainder by home energy bills

The UK will not meet its ‘Net Zero by 2050’ target

- Progress made to date – reducing emissions levels by 50% vs 1990
- Expected to fall short of UK Nationally Determined Contribution (NDC) commitment for 2030 under the Paris Agreement – 55% forecast vs 68% target
- Achieve 85% reduction by 2050
- 110 $MtCO_2$/yr remaining emissions mainly from building sector and transport



Security ✓

- 95% of electricity generated by domestic low carbon resources in 2050
- Reducing reliance on fossil fuel imports after 2035

Affordability ✓

- 25% energy demand reduction
- Major investments required but remaining stable at 1% of GDP
- Household energy spend halved by 2050

Transition 8/10

- Consumer-led transition will not achieve net zero
- Need for clear roadmap and business models to incentivise urgent uptake of low carbon technologies