Global energy scenarios affecting the context and deliverability of UK Net Zero

Westminster Energy Forum, September 2024

MATT BROWN

AFRY

Leading advisor for the transition of the energy and bioindustry sectors

Presence	5 continents
Revenue	€140m in 2023
Projects	>100 countries
People	800 consultants
Backed by	19,000 experts at AFRY

FT FINANCIAL TIMES
statista
UK'S LEADING MANAGEMENT CONSULTANTS 2024

WORLD'S BEST MANAGEMENT CONSULTING FIRMS
Forbes 2024
POWERED BY STATISTA

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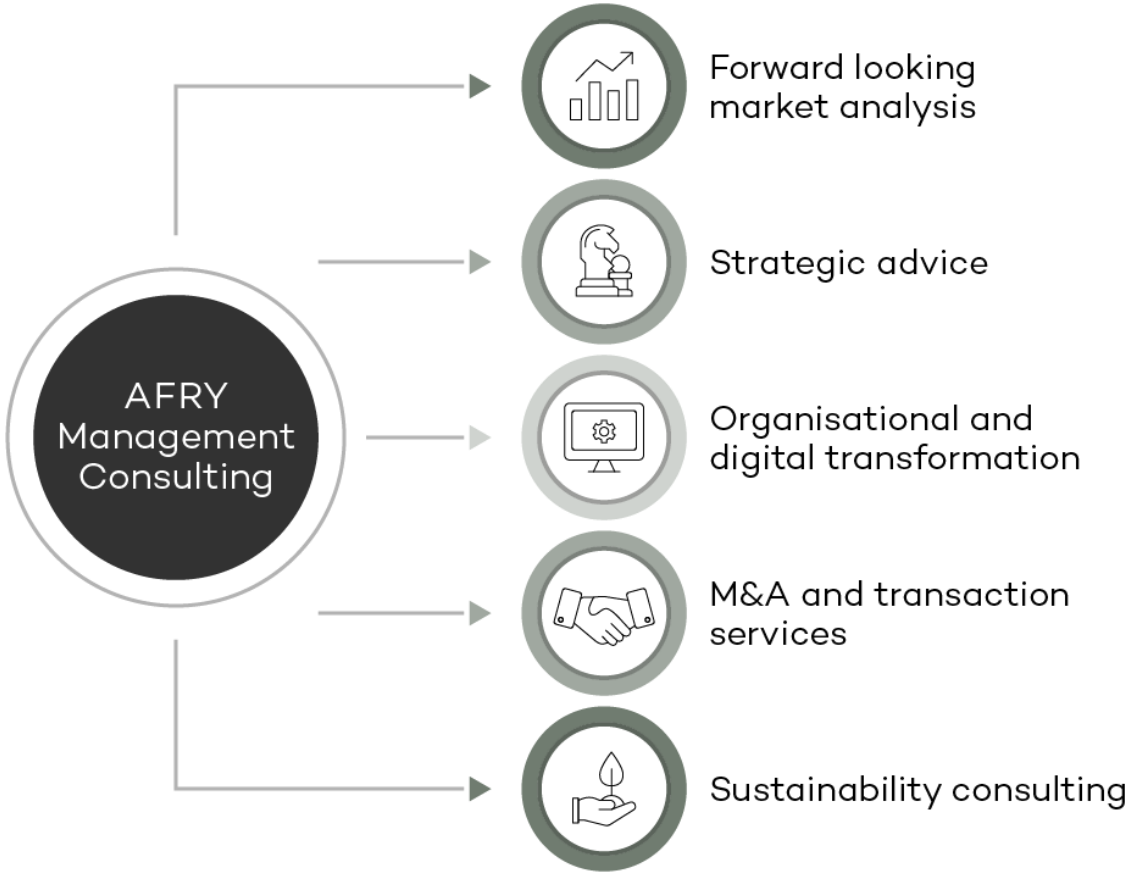
2024
Heft 28
Beste Unternehmens-berater



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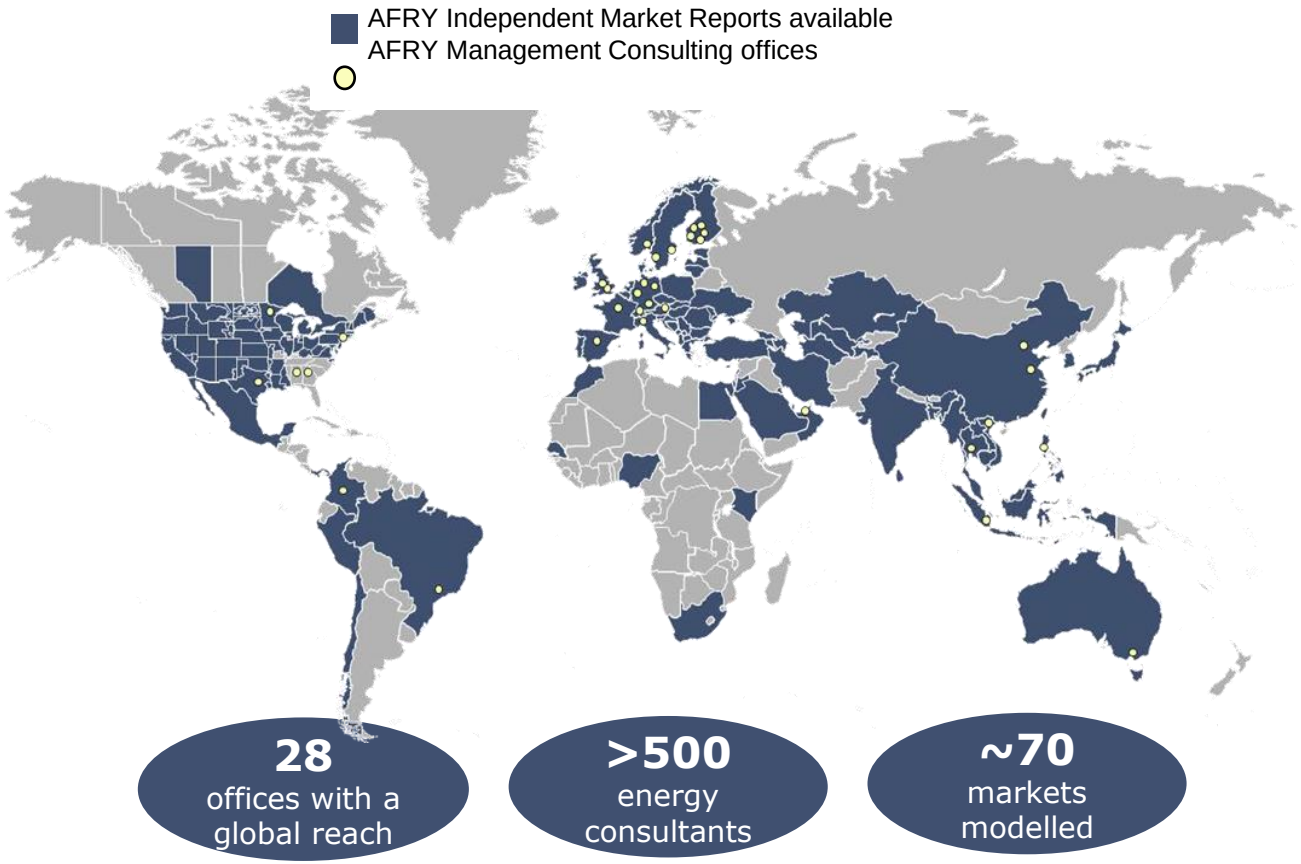
AIM REPORT

AFRY Independent Market Reports are the definitive guide to the future of energy markets

OVERVIEW

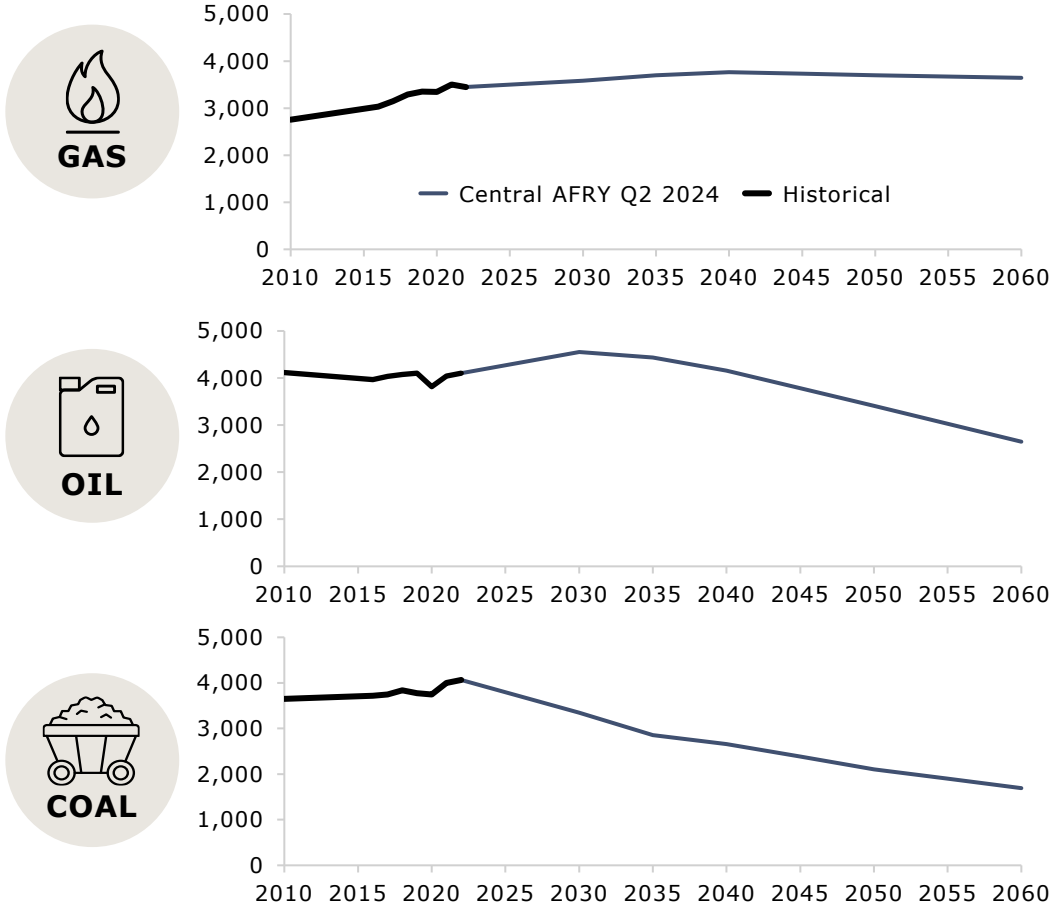
- We are the leading supplier of independent long-term price projections for energy markets, and consistently testified by our clients to be an independent, trusted and bankable viewpoint
- World-leading modelling approach
  - Based on multiple weather patterns (typically 5)
  - Consistency between prices and return on capital
  - Detailed modelling of all complex technologies, such as hydrogen, hydro, EVs and flexible heat
- Each AIM Report includes a full description of:
  - Wholesale price projections for out to 2050-2060, with accompanying discussion of price formation and underlying drivers
  - Background covering market structure and regulations, key players and government policies
  - Transparent description of the scenario framework, modelling methodology and tables of key input assumptions

AIM REPORTS COVERAGE

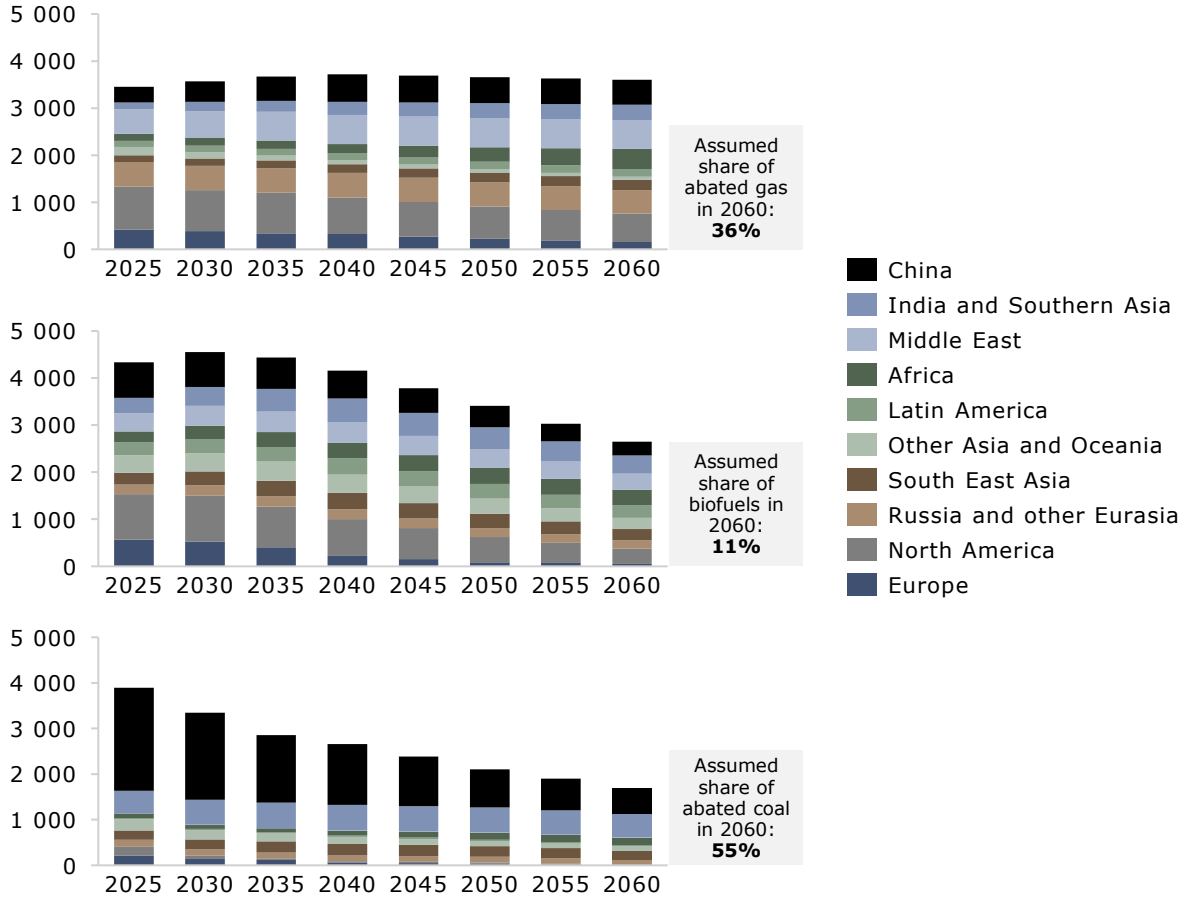


We expect strong gas demand to continue (although with growing CCUS)

GLOBAL FOSSIL FUEL DEMAND (MTOE)



GLOBAL FOSSIL FUEL DEMAND BY REGION - AFRY CENTRAL (MTOE)



Source: AFRY Global Energy Demand Model 2024

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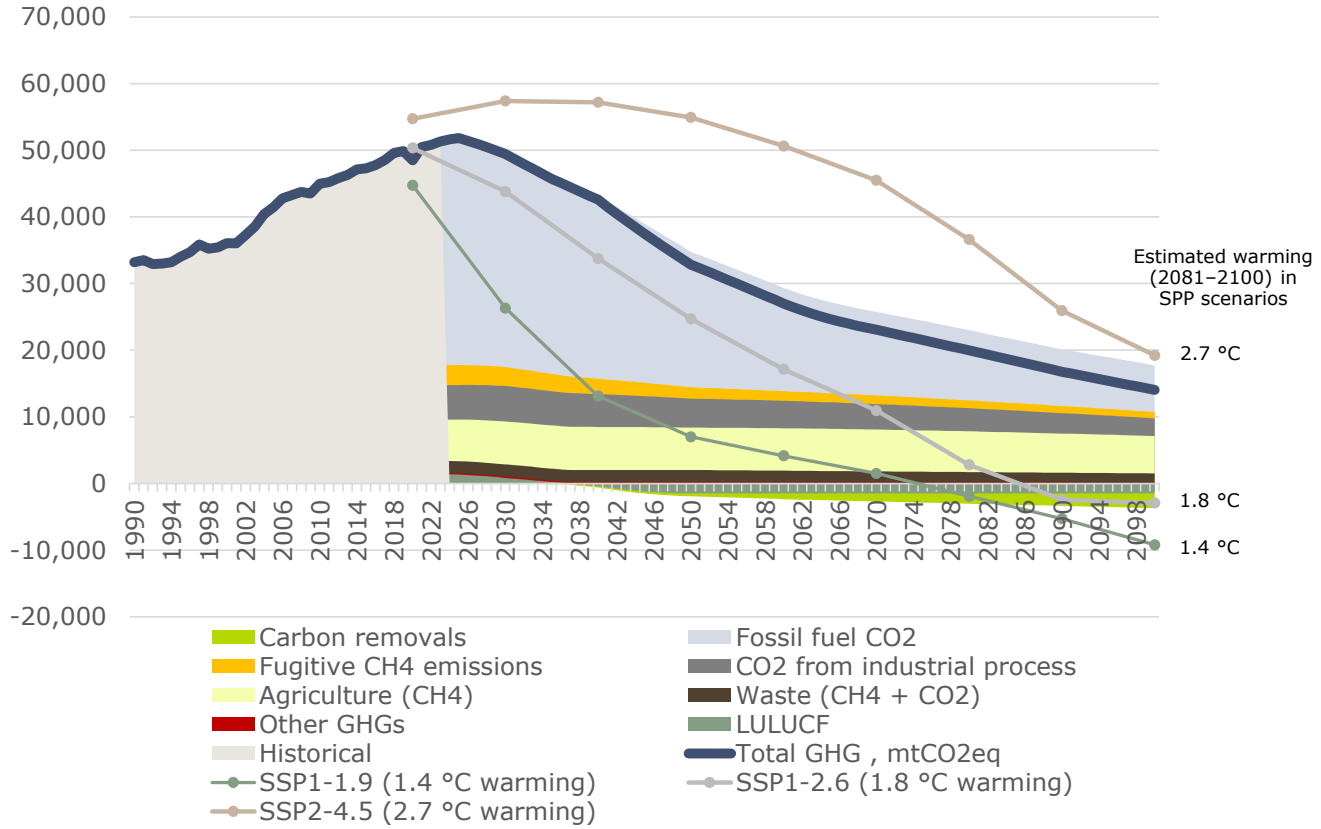
GHG TRAJECTORIES

Resulting in warming of 2.2°C globally in our Central projection

- Estimated warming by the end of the century depends on the cumulative greenhouse gas emissions. Net greenhouse gas emissions are driven by the rate of decarbonisation of various sectors and by the potential for carbon removals
- The resulting net emissions and global warming by 2100 span a wide range of outcomes
- AFRY develops greenhouse gas emissions assumptions:
  - at a regional level for CO2 emissions from fossil fuel use based on detailed electricity market modelling
  - at a global level for other types of emissions
- The right-hand chart provides an indication to where AFRY Central sits compared to Shared Socioeconomic Pathways (SSPs)[1]
- AFRY global demand scenarios are informed from all major markets modelled by AFRY, extrapolated beyond their current modelled horizons (e.g. 2060 in Europe) to infer 2100 emissions

INDICATIVE TOTAL ANTHROPOGENIC GHG EMISSIONS – AFRY CENTRAL ($MTCO2_{EQ}$)



1. Shared Socioeconomic Pathways are reference climate change scenarios of as defined in the IPCC Sixth Assessment. They are used to derive climate change and greenhouse gas emissions scenarios with different climate policies. Source: AFRY Global Energy Demand Model 2024

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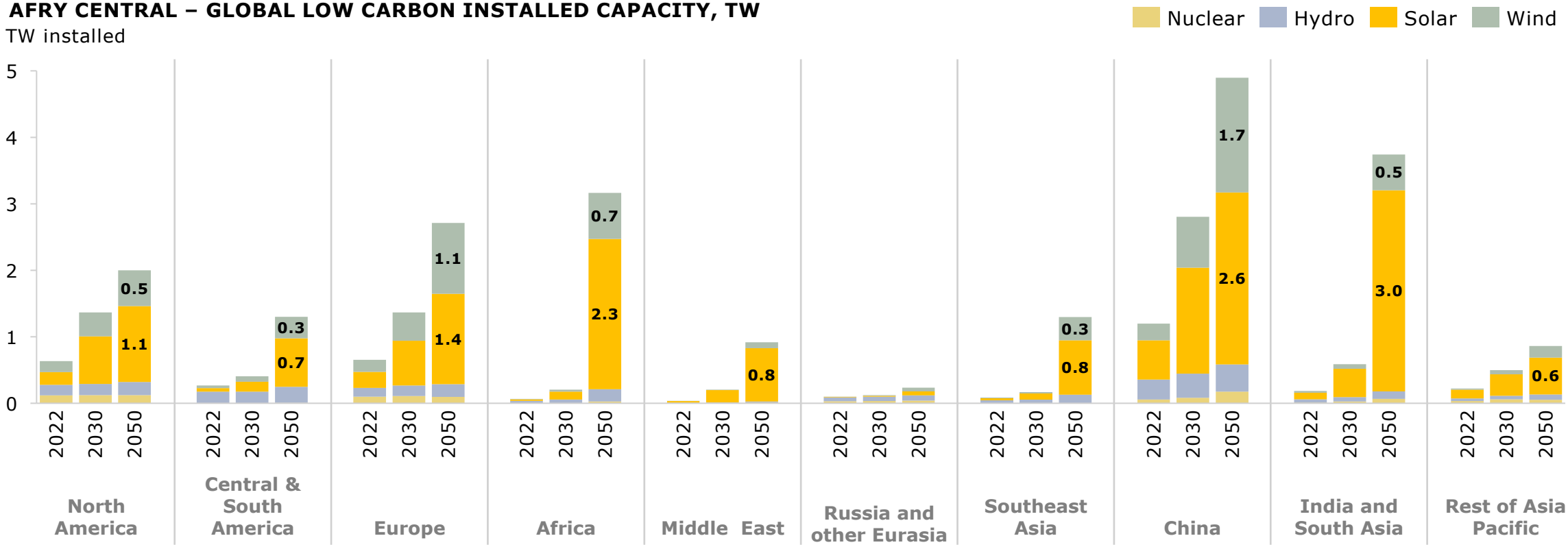
RENEWABLES DEPLOYMENT

We project clean energy additions of 4,000 GW by 2030 and a further 13,000 GW by 2050

AFRY CENTRAL – GLOBAL LOW CARBON INSTALLED CAPACITY, TW

TW installed



Source: AFRY Global Energy Demand Model 2024

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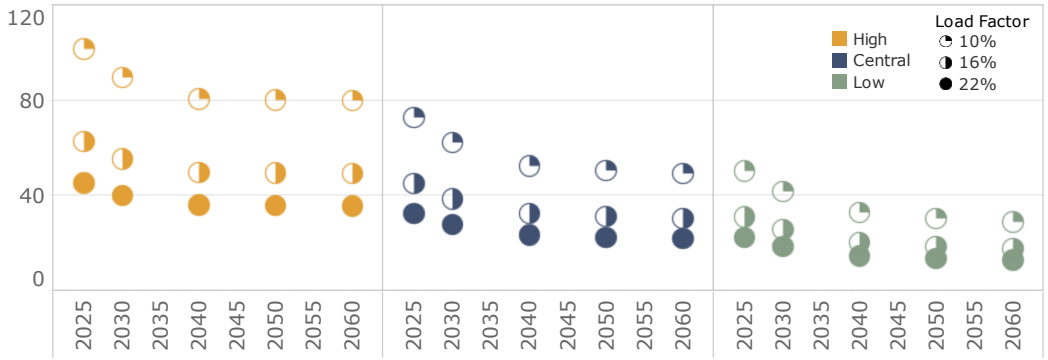
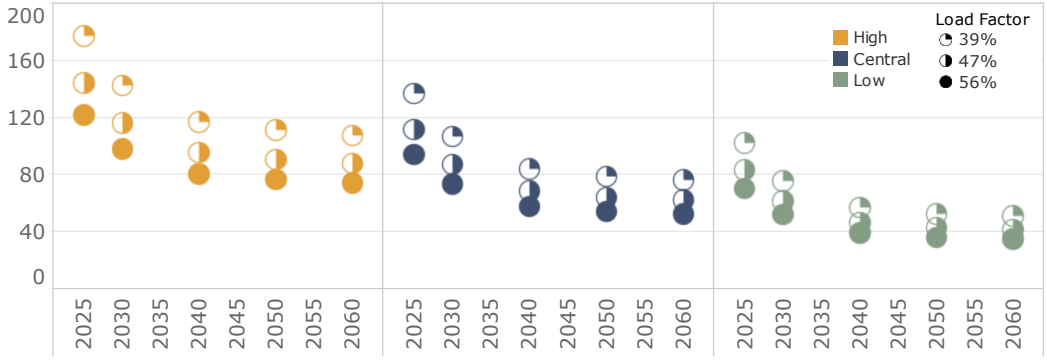
TECHNOLOGY COSTS

Nonetheless, or due to this, we expect technology costs to continue to fall

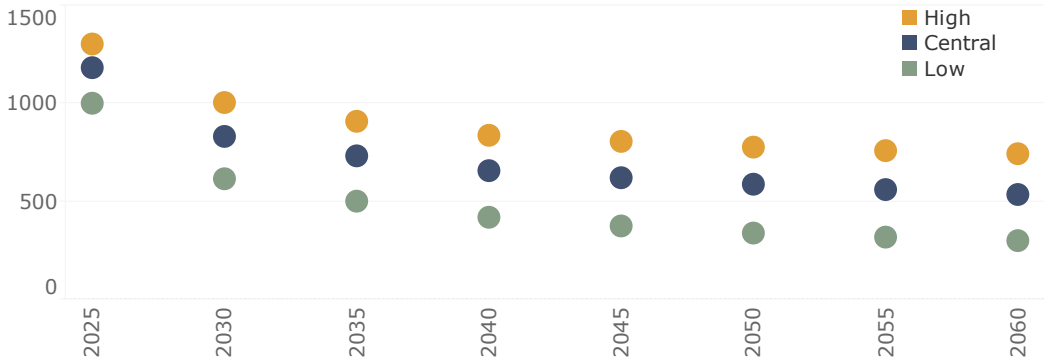
LCOE PROJECTIONS
Fixed-tilt solar PV (€/MWh, Real 2023)



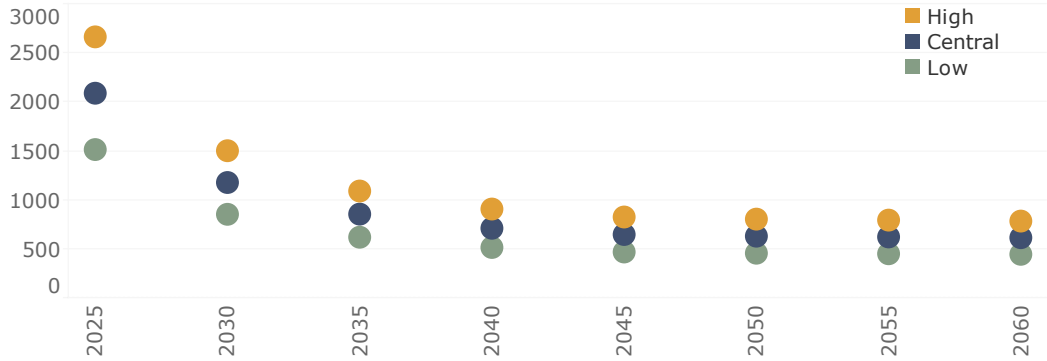
LCOE Projections
Offshore wind – fixed bottom (€/MWh, Real 2023)



CAPEX PROJECTIONS
4-hr Batteries (€/kW, Real 2023)



CAPEX PROJECTIONS
electrolysis system (€/kW h_2 HHV, Real 2023)



Source: AFRY Management Consulting

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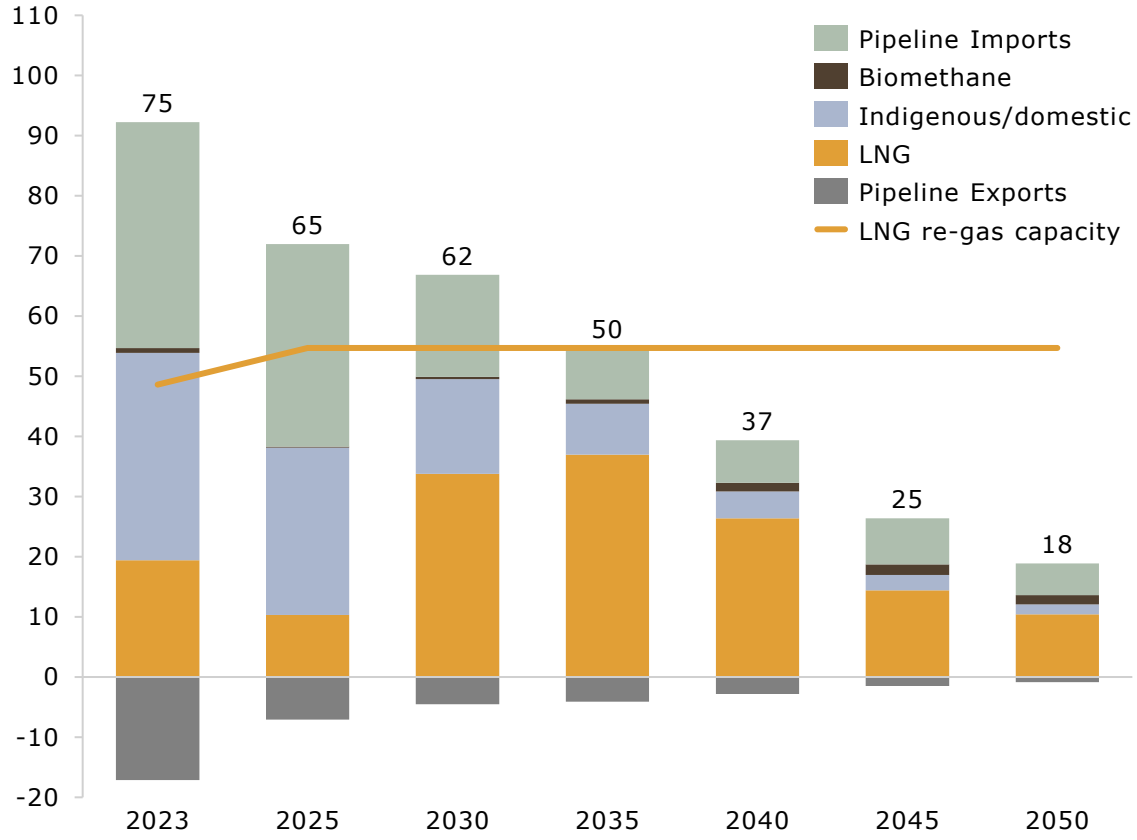
UK LNG imports are set to remain robust to 2045, due to the depletion of UK Continental Shelf and North Sea reserves, enhancing the reliance on LNG

UK SUPPLY MIX, AFRY Q3 2024 CENTRAL SCENARIO (BCM)



MAIN TRENDS IN LNG IMPORTS

Now - 2025

Increased regasification capacity in Europe leads to less pipeline exports to the continent and consequently a decrease in UK LNG imports

2025 - 2035

Declining domestic and Norwegian production results in higher LNG imports

2035 - 2050

Decarbonisation accelerates transition away from gas; LNG maintains significant share of supply mix

Sources: Energy Institute 2024, ENTSOG Transparency platform, AFRY analysis

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Challenges for UK net zero, net zero power

Trend	Implication
Volatile clean technology costs albeit with downward trend in cost over time	Securing supply chains is growing in importance, including wires, localise as far as possible. Re-skilling, training and education.
Volatile fossil fuel prices as pressure builds on energy transition	Post-Ukraine a period of calm but bumpy path expected for commodities, manage these risks contractually and physically (bunker and storage)
Globalisation of gas markets and UK increasing reliance on LNG	There looks to be plenty of LNG in future, but the risk position is changed, fewer spot cargoes and more long-term contracts
Growing concerns on grid stability as more RES enters the grid	Although this challenge is being addressed by system operators, a brownout could be a political hot potato, so needs increased attention
Increasing reliance on interconnectedness	Strengthen relationships with our European partners as we become more reliant on electricity interconnectors for our security and stability
Continuing cost of living concerns	Communication is key as this will not be a cheap transition in the short-term despite a payoff long-term

Import dependence

Grid instability

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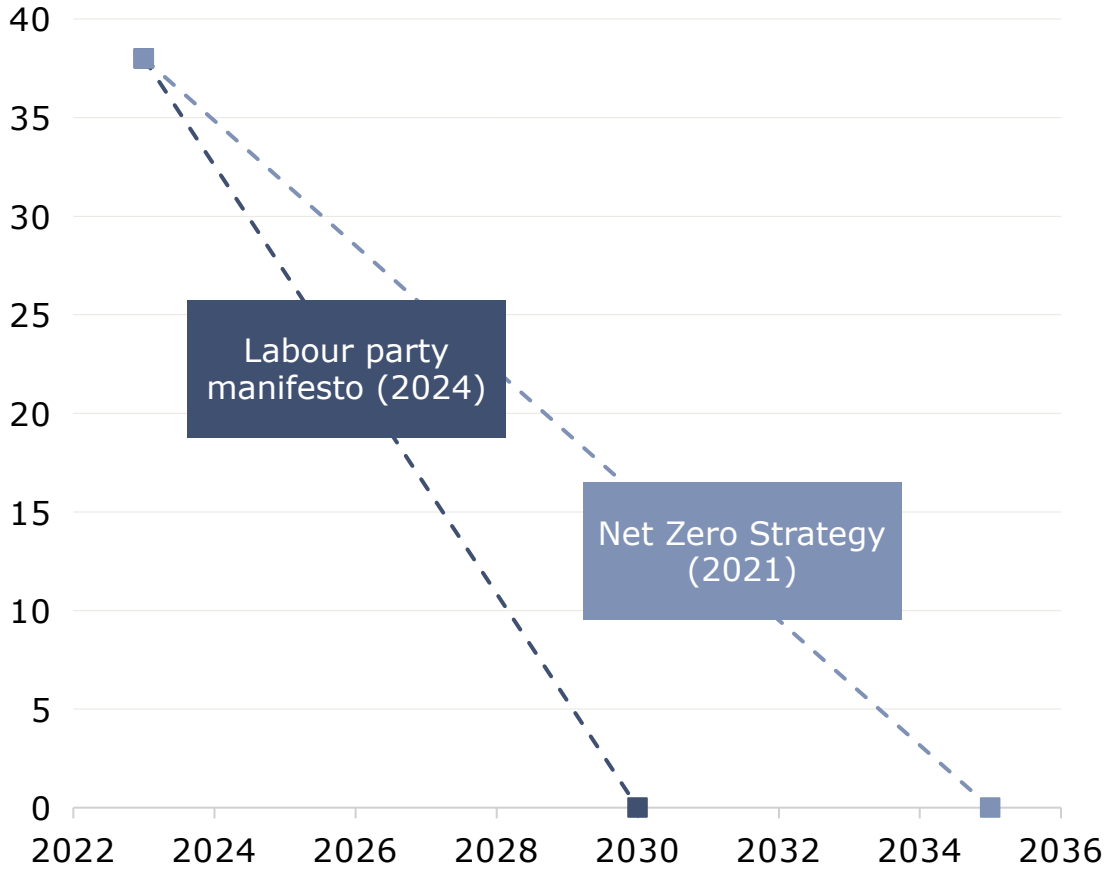
Feasibility of achieving a net zero power grid in Great Britain by 2030

AFRY Management Consulting & Offshore Energies UK

SEPTEMBER 2024

OEUK commissioned AFRY to carry-out a feasibility analysis of what would be required to deliver a net zero carbon power sector in Great Britain by 2030

NET ZERO POWER AMBITIONS ($MTCO2_E$)



Source of 2023 emissions: Progress in reducing emissions: 2024 Report to Parliament; July 2024; Climate Change Committee

FEASIBILITY REPORT

What would be **required** to achieve a **net zero carbon power grid** in Great Britain by **2030**?

'What if' analysis

Required **rates of technology deployment**

Planning consents

Award of **Government support contracts**

Grid connections

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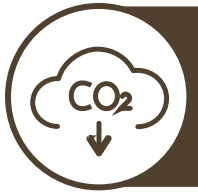
CONCLUSIONS

Achieving net zero power in Great Britain by 2030 is possible but very challenging



MAJOR EFFORT NEEDED IN MANY AREAS

Delivering net zero power in 2030 will require **fast, effective** and **co-ordinated effort** in several areas, with **little contingency available**

DEPLOYMENT MUST BE ACCELERATED

Deployment rates for mature techs would need to **match or (greatly) exceed historical annual peaks every year until 2030** and **new technologies would need to be deployed at scale**

POLICY ACTION IS REQUIRED

Planning processes will need to be streamlined to ensure a sufficient pipeline of projects, and **support schemes will need to be scaled up or implemented**

Report found at https://oeuk.org.uk/wp-content/uploads/2024/07/AFRY_OEUK_2030NetZeroPowerReport_v500.pdf

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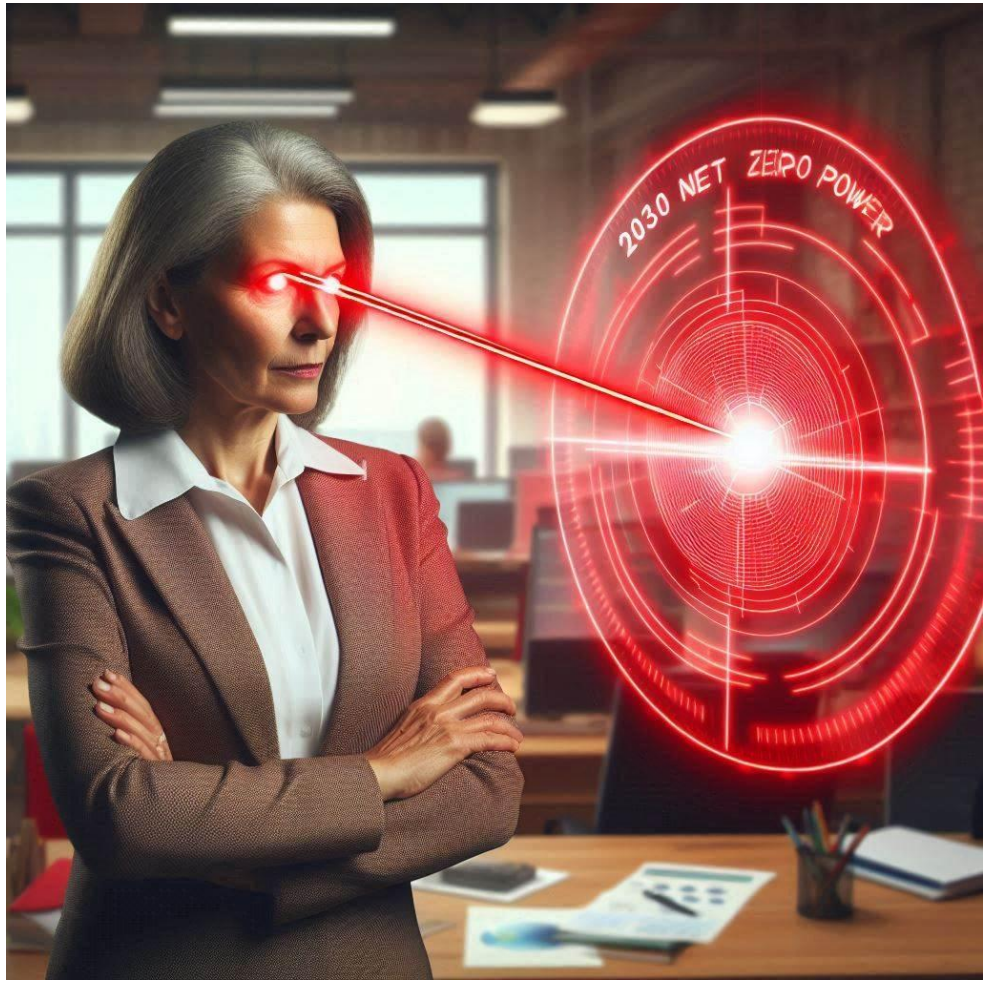
MISSION CONTROL

Mission Possible?



Source DALL E3

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