RMetS
Royal Meteorological Society

Presented by
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State of the Climate for the UK Energy Sector Report 2024-25

Providing insights into weather and climate's impact on the energy sector, through weather data, modelled electricity system data, and real fault data, to support the energy transition and adaptation of the energy system to climate change

Full report launched on 20 October!

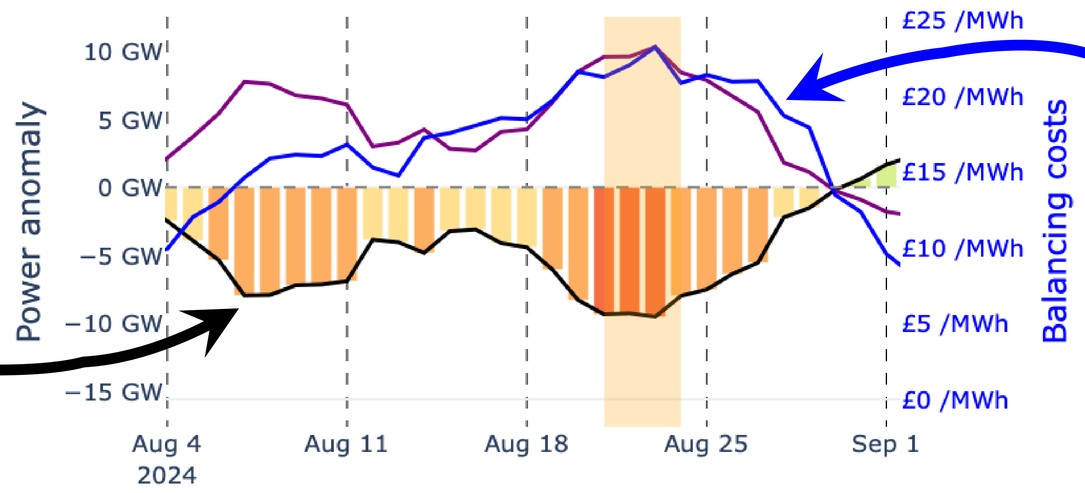
Energy transition: the shift from fossil fuels to an efficient, low-carbon energy system powered by clean electricity and sustainable fuels

1. The impact of 2024-25's weather on electricity demand and renewable supply

Case studies investigating periods when a combination of high weather-driven demand and low renewable energy supply led to high demand-net-renewables, and increased electricity prices

Demand-net-renewables is amount of demand left after subtracting renewable electricity generation. This demand must be met with dispatchable electricity generation, like gas power stations.

August 2024: high wind power increased curtailment and balancing costs



We use data from meteorological reanalysis data (ERA5) to **model weather-driven demand and renewable generation, with human factors removed**

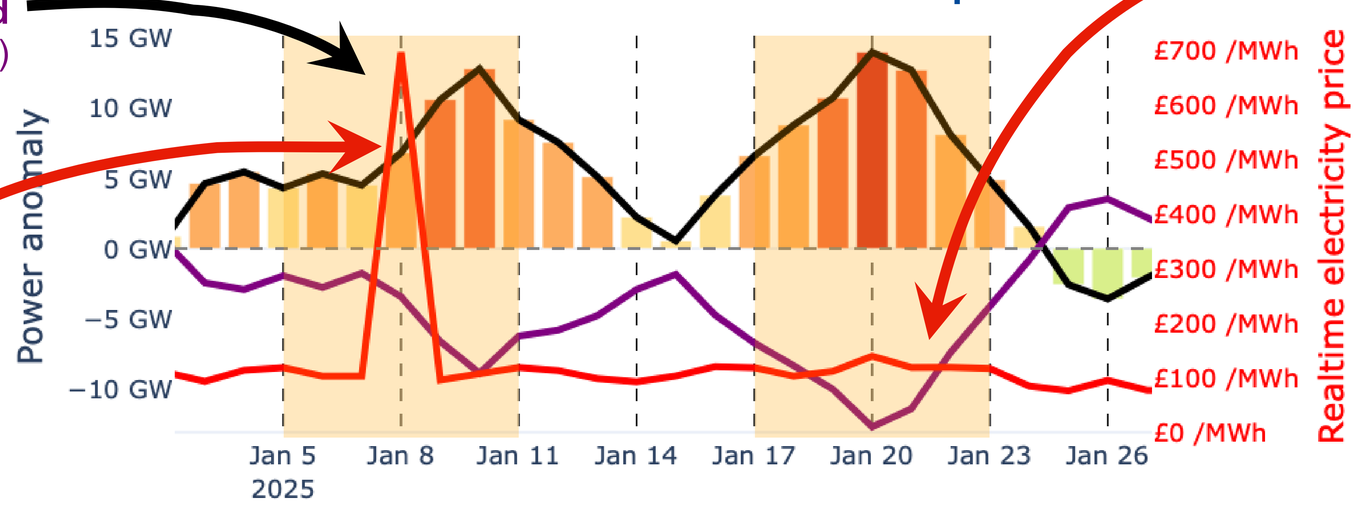
Long period of overgeneration, with high demand-net-renewables (left axis), mostly driven by **higher-than-average wind power** (left axis)

Throughout August, particularly around August 20: high balancing costs due to congestion necessitating **curtailment in the north** of the country**, and dispatchable generation in the south**

Two peaks in demand-net-renewables (left axis), mostly driven by **lower-than-average wind power** (left axis)

January 8: peak in realtime electricity price (right axis) **7 times the winter average** because **wind power** (left axis) **dropped suddenly and unexpectedly**

January 2025: two periods of low wind power increased demand-net-renewables and prices



January 20: much smaller peak in realtime electricity price (right axis) as **low wind power was well forecast**

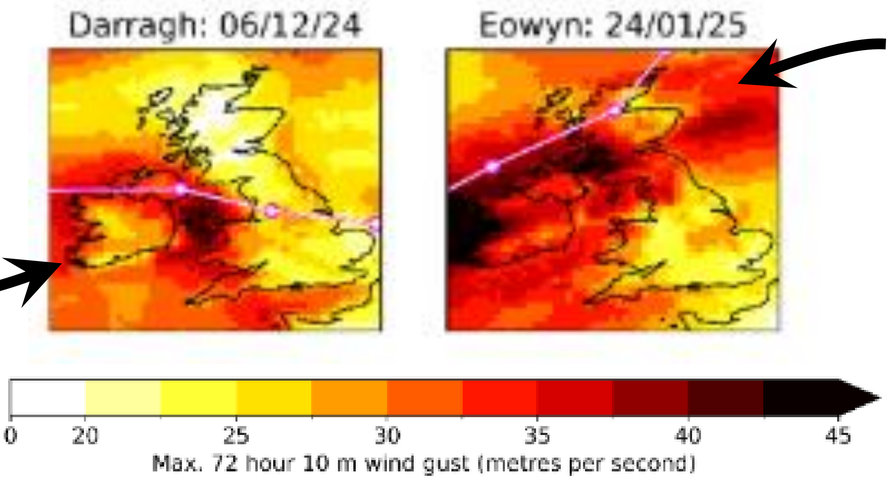
In the report, we also consider how the impact of these events would change in a potential future power system

2. Impacts of 2024-25's weather on electricity transmission and distribution infrastructure

An analysis of the impact of named storms (through wind and flooding), lightning, and extreme heat on the energy sector.

We gathered data from Distribution Network Operators on the number of faults caused by the weather, combining this with meteorological data (ERA5) to correlate customer disconnections with extreme weather events

Darragh and Éowyn disconnected over 3 million customers between them



Éowyn was more powerful than Darragh, but was less damaging to energy infrastructure as it **tracked over north Scotland rather than northern Wales and England,** with a lower population-density

Wind gusts of up to 96 mph

In the report, we also break down faults by region and type, and consider the impacts of flooding caused by heavy rainfall, and lightning-induced faults

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With support from the RMetS Energy Special Interest Group

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