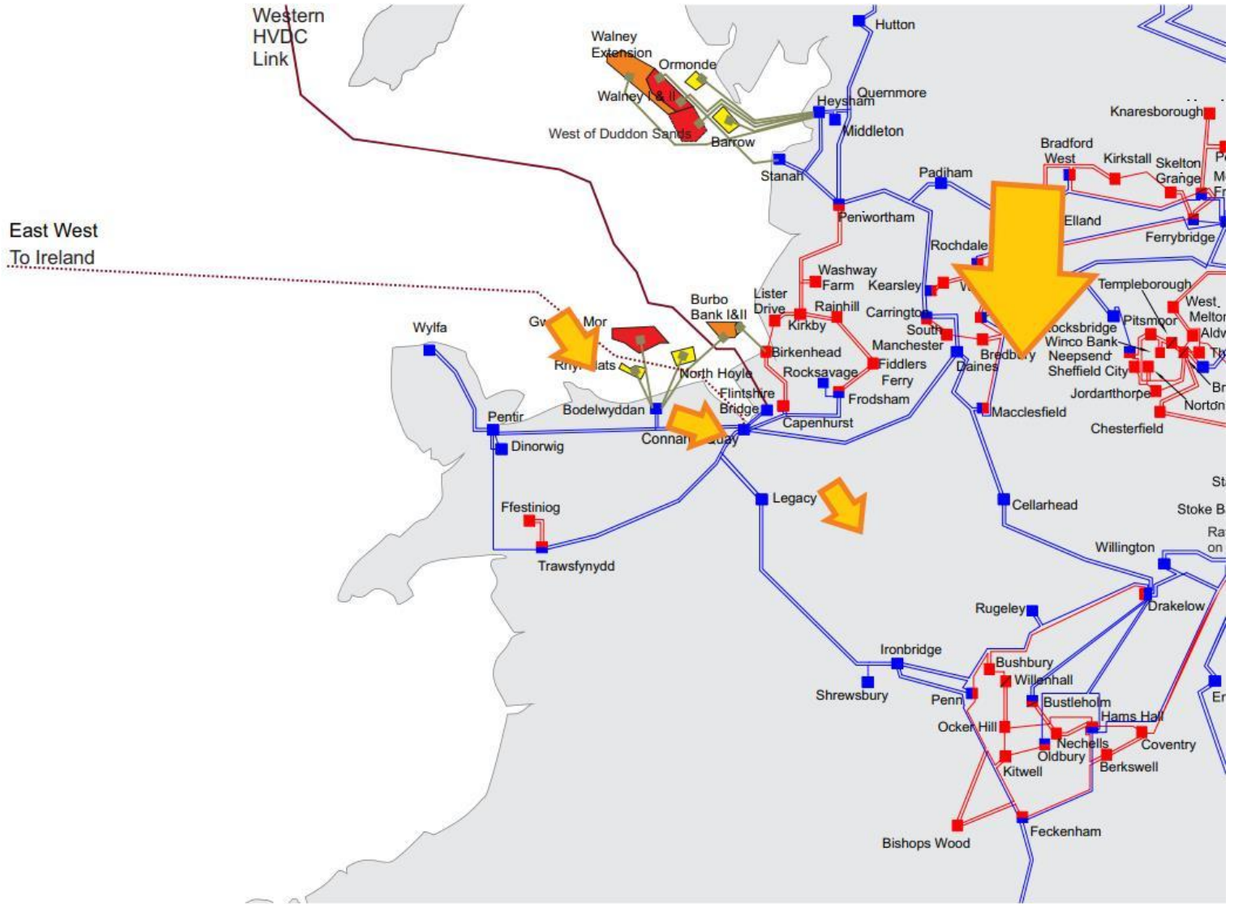
North Wales and the Midlands

The Western transmission region includes boundaries in the Midlands and the north of Wales.

This includes the lower midlands boundary B9 and the north Wales boundaries NW1, NW2 and NW3.

The figure to the right shows the general pattern of power flow directions expected to occur most of the time in the years to come up to 2033, i.e. power will generally flow from north to south. The arrows in the diagram illustrate power flow directions and are approximately scaled relative to the winter peak flows.



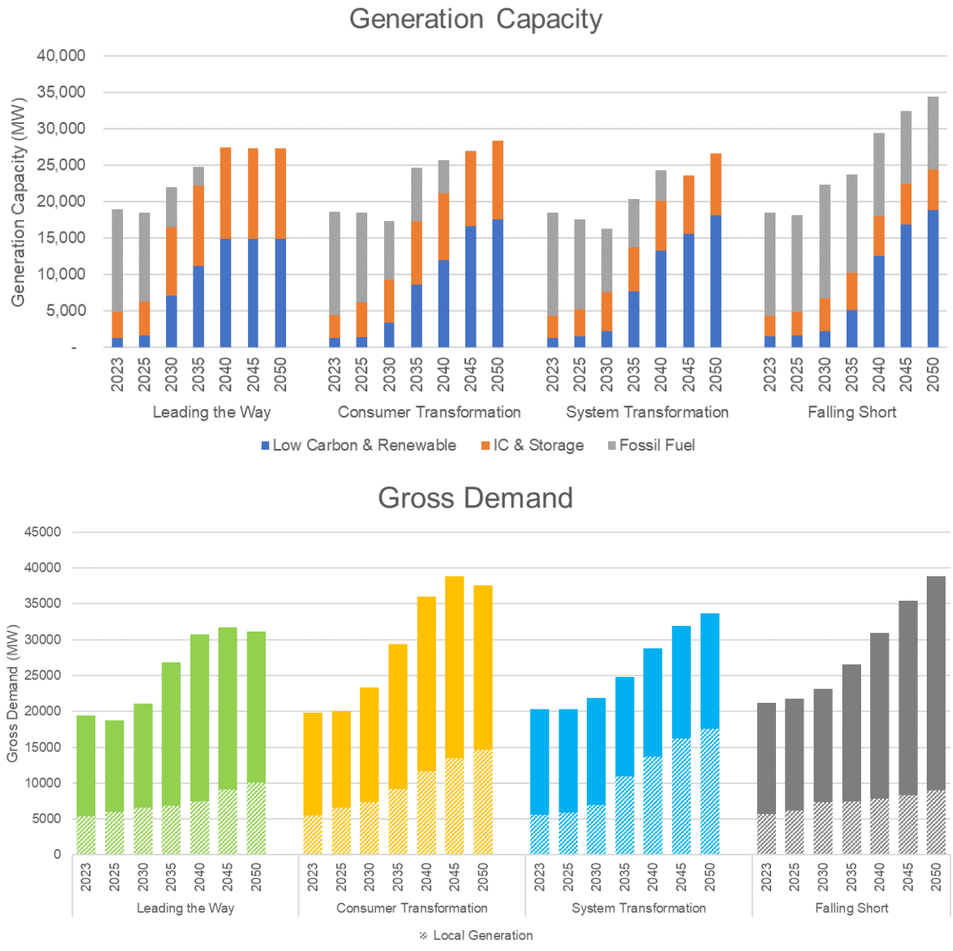
Regional thermal drivers – North Wales and the Midlands

Power plant closures are set to occur in the Midlands with demand set to remain fairly high, driving increased power flows eastwards from future generation connecting to North Wales.

The FES scenarios suggest a total amount of transmission-connected generation capacity to be between 16GW to 23GW by 2030, from the current 18GW. For all scenarios other than Falling Short, fossil fuel generation is not present in the region by 2050.

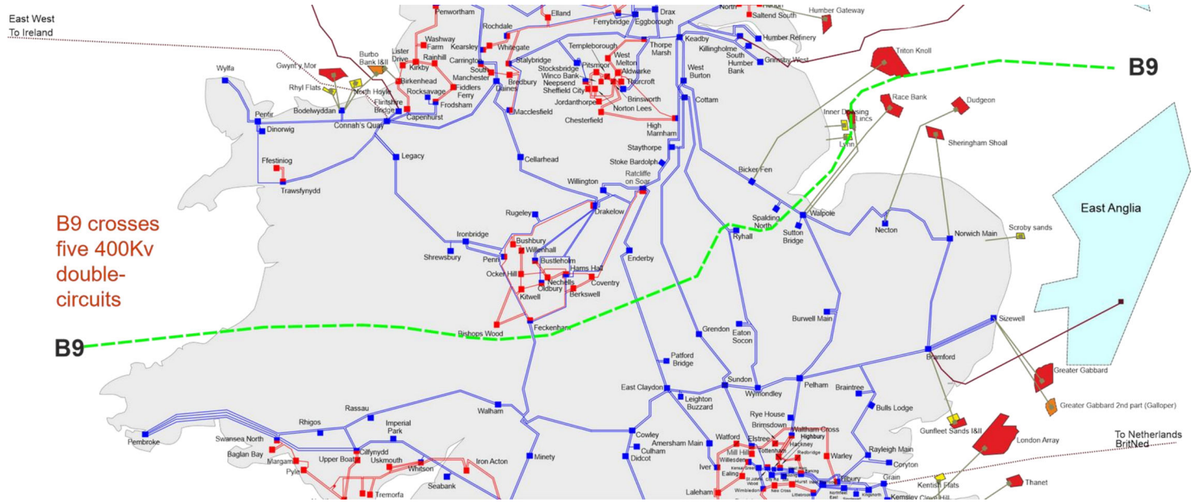
Presently, this region has a significant volume of fossil fuel, however by 2030 all scenarios show a decline in fossil fuel generation capacity with slight growth in interconnectors and storage alongside a significant growth in low-carbon technologies. The gross demand as seen from the transmission network in the region will increase across all scenarios. Across all scenarios, this region maintains a relative balance between its growth in both gross demand and transmission connected generation capacity up to 2030.

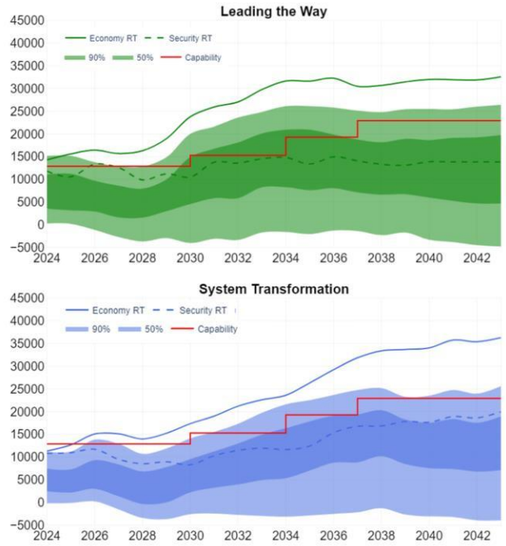
Following 2030, North Wales and the Midlands is expected to generally export power due to the connection of offshore wind projects facilitated by the HND and HNDFUE.

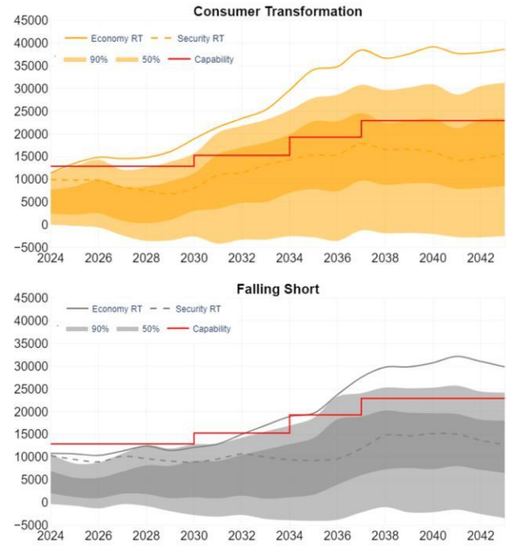


Boundary B9 – Midlands to South of England

Boundary B9 separates the northern generation zones and the southern demand centres.







Developments in the east coast and the East Anglia regions, such as the locations of offshore wind generation connection and the network infrastructure requirements, will affect the transfer requirements and capability of boundary B9.

In all four scenarios, the requirements gradually increase to above the boundary capability for B9. The increase is more than last year showing a need for additional boundary capability in the future for three out of the four scenarios.

The capability line (in red) is based on the recommendations from the Beyond 2030 report which uses the 2023 FES and ETYS data as inputs. The 50%, 90% Economy RT and Security RT lines are based on FES 2023. The ETYS and NOA methodologies for this boundary are different and can result in different transfer capabilities.

The boundary capability is limited to 12.5GW due to a voltage constraint for a fault on the Enderby-Ratcliffe on Soar double-circuit

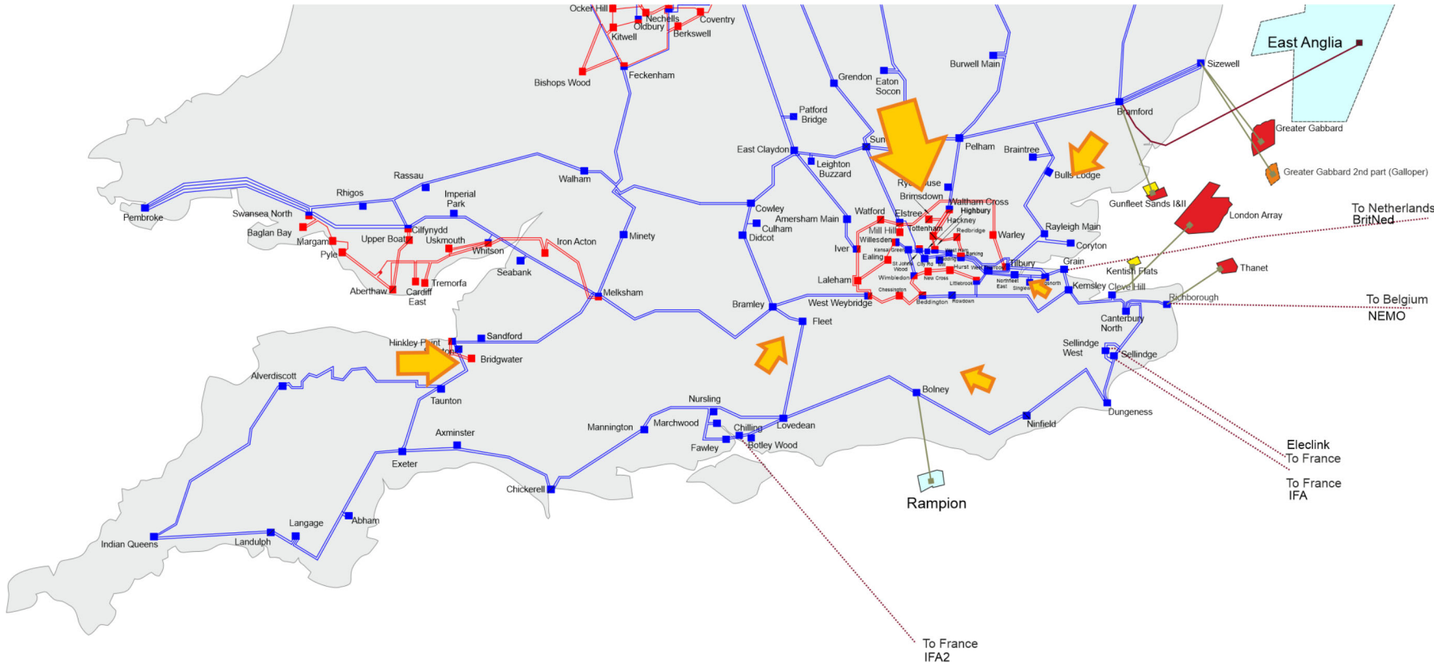
South Wales and South of England

The region includes the high demand area of London, generation around the Thames estuary and the long set of circuits that run around the south coast and South Wales.

Interconnection to Central Europe is connected along the south east coast and this interconnection has significant influence on power flows in the region by being able to both import and export power with Europe.

The South of England transmission region includes boundaries B13, B14, LE1, SC1, SC1.5, SC2, SC3 and SW1.

The figure to the right shows the general pattern of power flow directions expected to occur most of the time in the years to come up to 2033, i.e. power will generally flow from north to south. The arrows in the diagram illustrate power flow directions and are approximately scaled relative to the winter peak flows.



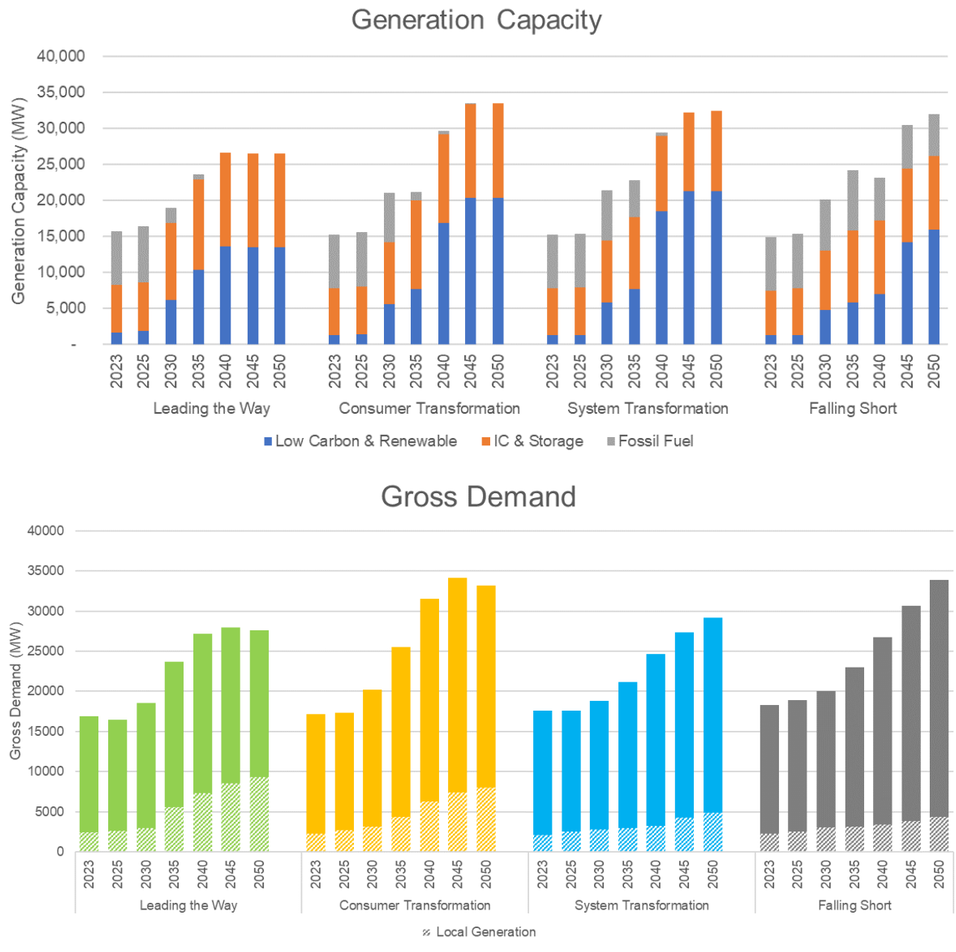
Regional thermal drivers – South Wales & South England

European interconnector developments along the south coast could potentially drive very high circuit flows causing circuit overloads, voltage management and stability issues.

The Leading the Way scenario suggests that a total of over 10GW of interconnectors and energy storage capacity may connect in the south by 2030, up from about 6.5GW to date. Interconnectors and storage are bi-directional, meaning that the south could see their capacity provide almost 10GW power injection or 10GW increased demand, placing a very heavy burden on the transmission network.

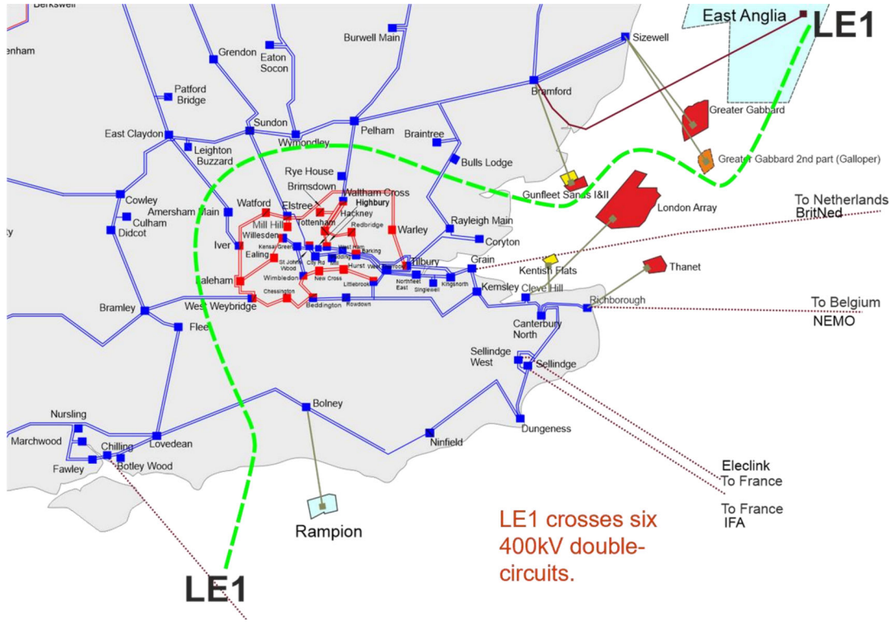
Most interconnectors will be connected south of boundary SC1 so the impact will be discussed later in the chapter in the SC1, SC1.5 and SC2 requirements. With future additional interconnector connections, in the south region it will be challenging to support all interconnectors importing or exporting simultaneously without network reinforcement. With new interconnector and generation connections, boundaries SC1, SC1.5, SC2, SC3, LE1 and B13 will need to be able to support large power flows in both directions.

The South is expected to fulfil a smaller portion of its demand from local embedded generation than other regions are. The transmission network in the south is heavily meshed in and around the London boundary B14 and the Thames estuary, but below there and towards the west the network becomes more radial with relatively long distances between substations.



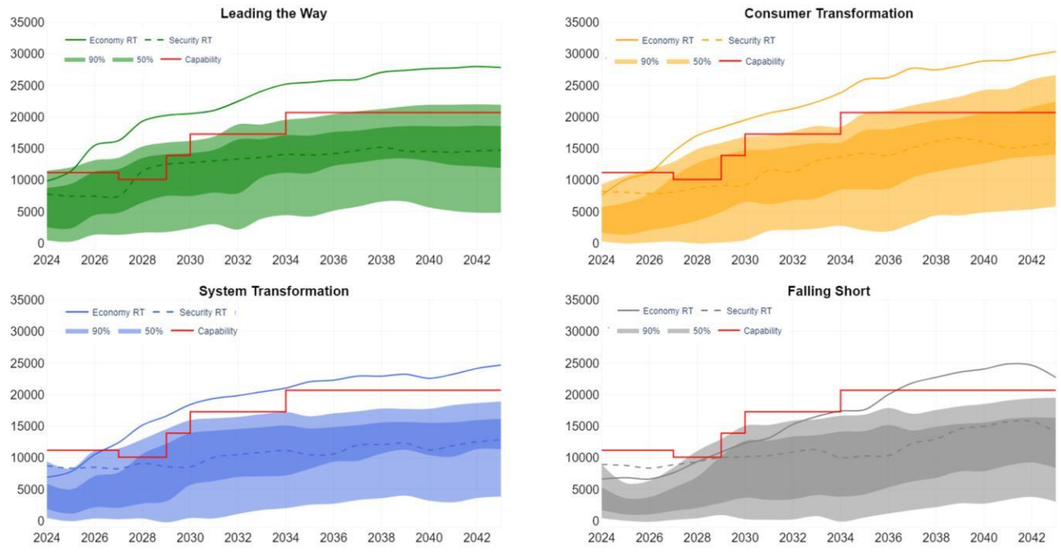
Boundary LE1 – South East

Boundary LE1 encompasses the south-east of the UK, incorporating London and the areas to the south east of it.



LE1 is characterised by two distinct areas. Within London, there is high local demand and little generation. The remainder of the area contains both high demand and high levels of generation.

LE1 almost exclusively imports power from the north and west into the south-east, and the purpose of the boundary is to monitor flows in this direction. With the existing and proposed interconnectors importing power from the continent, power flows enter London from all directions, to the extent that flows across LE1 reduce and limited constraints are seen.



However, with an increased number of interconnectors, and (in some scenarios) increased likelihood of them exporting power in future years, LE1 can become a higher demand area, with any locally generated power feeding straight into the interconnectors. As such, the circuits entering LE1 from the north can become overloaded as power is drawn into and through London toward the south and east.

Across all four scenarios in the FES, the SQSS economy required transfer grows beyond existing boundary capability from 2023 and the expected power flows are less than the required transfer and the uncertainty of interconnector activity can be seen in the wide range of the boundary flows.

The boundary capability is limited to 9.6GW due to a thermal constraint on the Elstree – Sundon 400kV circuit