Strategic Infrastructure

Delivering the UK's Electricity Needs for Future Decades

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21st October 2025

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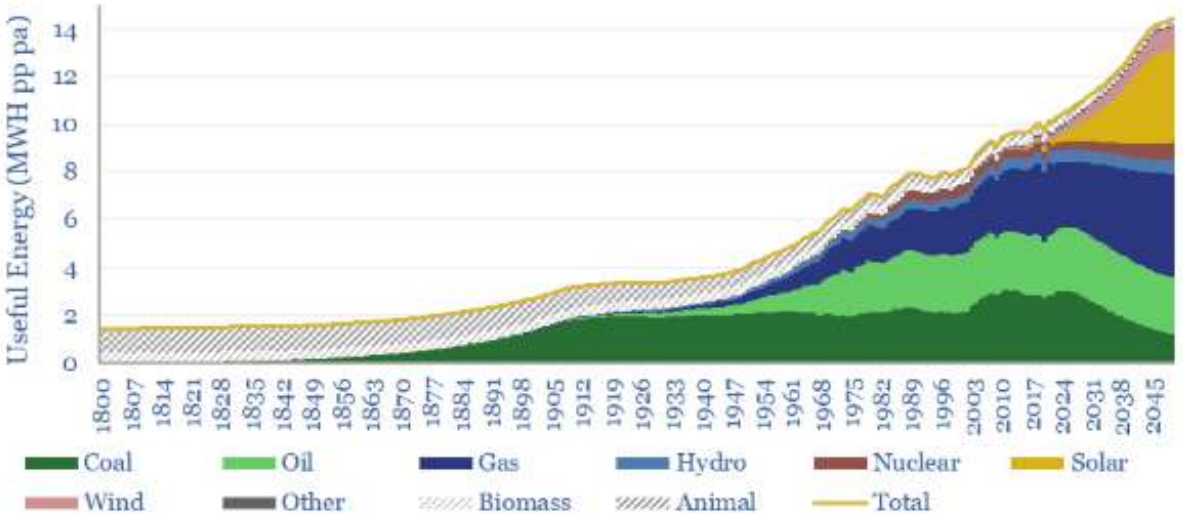
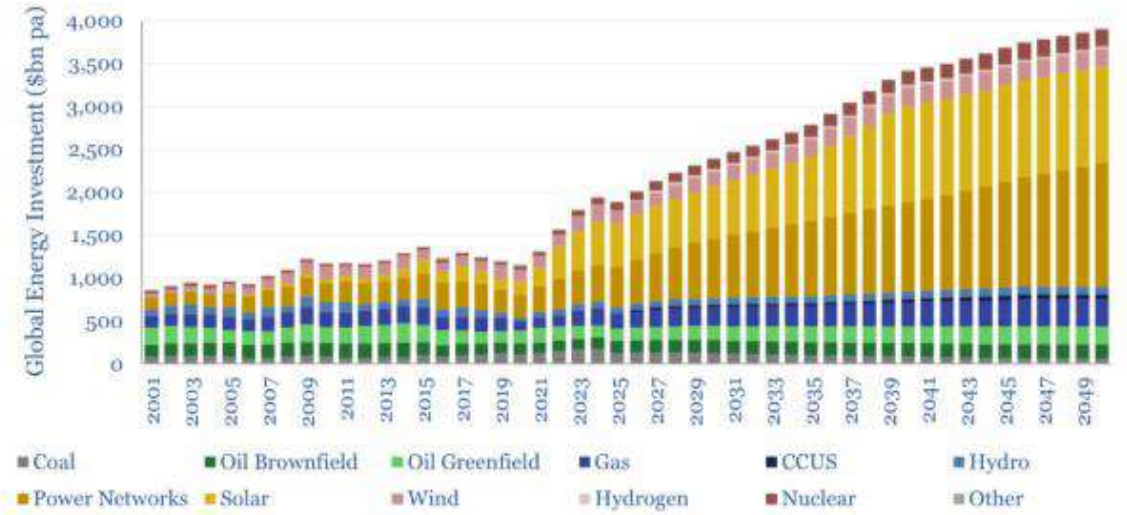
Energy use is projected to keep rising





Source: Global energy market model to 2050 - Thunder Said Energy

Risks and Opportunities for the Electricity Gid

Electricity Transmission

The current network is over 70 years old…

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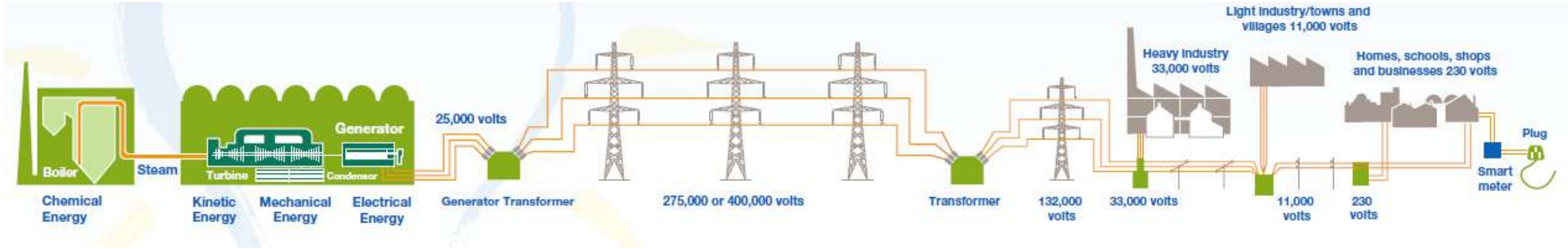
The Electricity Transmission network today

- Today the Electricity Transmission network in England and Wales consists of 4,500 miles of overhead lines, supported by over 20,000 pylons
- It is based on the foundations of the ‘Supergrid’ that was designed and built as part of a 12-year programme in the 1950s and 1960s
- This was an ambitious project that was largely designed to take power from power stations built near coalfields in the north to regional networks, industry and population centres in the south
- There is limited transmission capacity between Scotland and central England or from coastal areas to the central region
- Changes in the energy mix means that this network will need major additions / changes in the next 10 -15 years (and beyond)

How the UK electricity system works



Generators

Produce electricity at their power plants.

Historically this was primarily through burning some form of fuel to heat water, produce steam and spin a turbine – converting chemical energy into electrical energy.

Increasing amounts of renewable energy on the system has changed this.

Transmission

The high voltage network, firstly requires transformers to ‘step-up’ the voltage to minimise the energy lost during transportation over long distances.

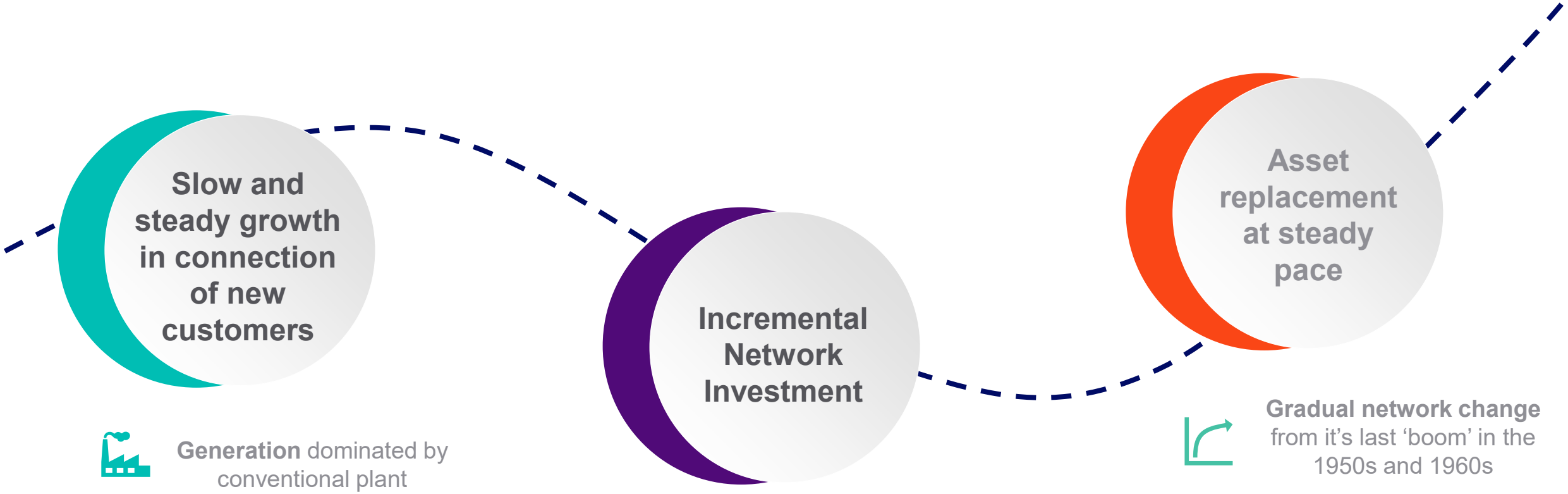
Additional transformers then ‘step-down’ the voltage so that the electricity can join the local distribution networks.

Distribution

Manage the final stages of transporting the electricity to consumers (domestic and industrial / commercial).

Includes many smaller transformers to further ‘step-down’ the voltage.

Historically the growth of our network was incremental and steady



Electricity Transmission

The network of the future is going to be very different…

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We are living a new context now

Generation

Generation dominated by renewable sources, particularly offshore wind and solar (+ batteries)

Not just traditional large combustion plants anymore!

Demand

Expected growth to meet decarbonisation needs of sectors such as transport and heating

Not necessarily yet manifesting

Network Capacity

Delivery of significant upgrades and extensions to National Grid Electricity Transmission's networks

5 times more transmission lines than we have built in the last 30 years. And 4 times more for marine cables

Aging Assets

The scale of new transmission infrastructure required, as well as the need to replace and upgrade a significant proportion of the built network over the coming decades

~1200km of reconductor need

Industry Process change

National Energy System Operator: Its role is to provide a view of the whole energy system and facilitate net zero, whilst maintaining the system's resilience and affordability.

Focus will be in network planning

Interim Processes

Transitional Centralized Strategic network Planning: Refresh of the onshore works of the selected offshore options, combining onshore and offshore network needs.

This is still an incremental approach, therefore sub-optimal

National Context – Delivering for 2035

We must systematically upgrade the E&W Transmission network to provide a sustainable 'platform' to service future electricity needs

Offshore wind
4.5 to 6 times growth in capacity

Solar
2.5 to 5 times growth in capacity

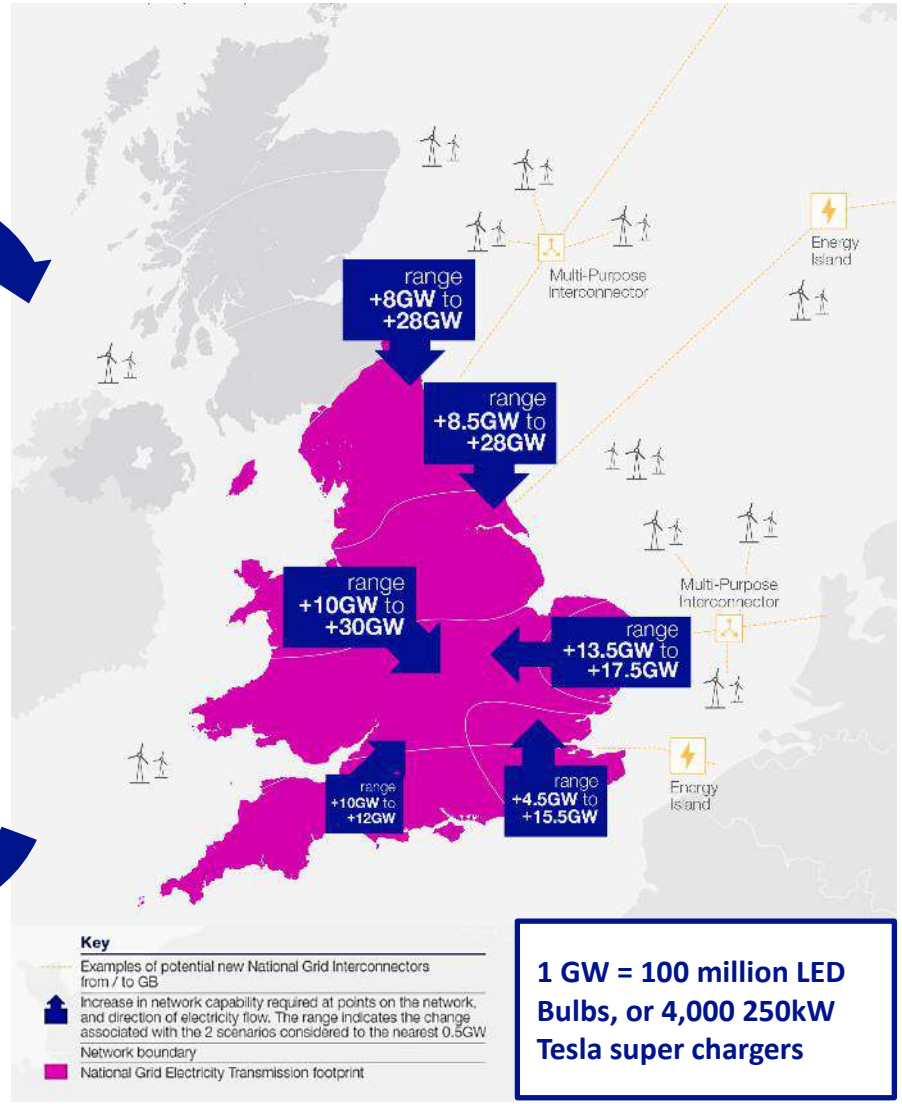
Interconnectors
2.5 to 3 times growth in capacity

Battery storage
4.5 to 10 times growth in capacity

At the same time cross sector electrification is expected to increase total electricity demand by around 50%.[5]

Building over
5 times more
transmission overhead or underground lines than we have built in the last 30 years.

Building around
4 times more
transmission marine cables than our current offshore network.



1 GW = 100 million LED Bulbs, or 4,000 250kW Tesla super chargers

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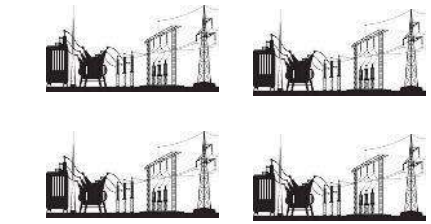
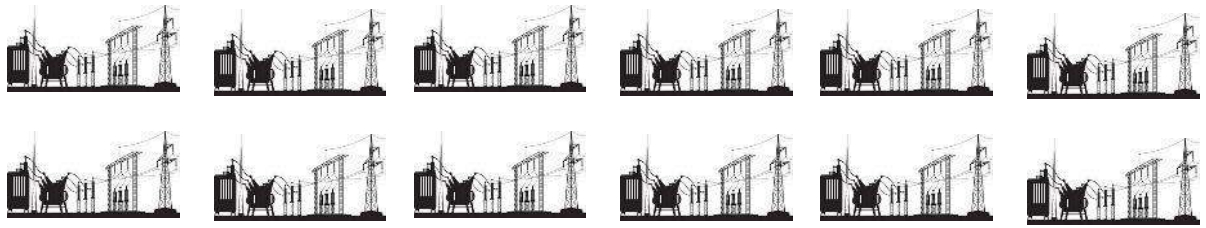
Scale of the challenge

	Commissioned in the last 5 years	Currently planned in T3
New substations or major site extensions	14	57
Average cct km of OHL work per year	Highest ever completed in 1 year: 488	Currently planned in T3: 1100-1400





Strategic Infrastructure

Delivering for the future

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The Great Grid Upgrade

Investment:

Up to **£35 billion** over five years (April 2026 to March 2031).

Planned Upgrades:

Over £11 billion dedicated to maintaining and upgrading existing transmission networks.

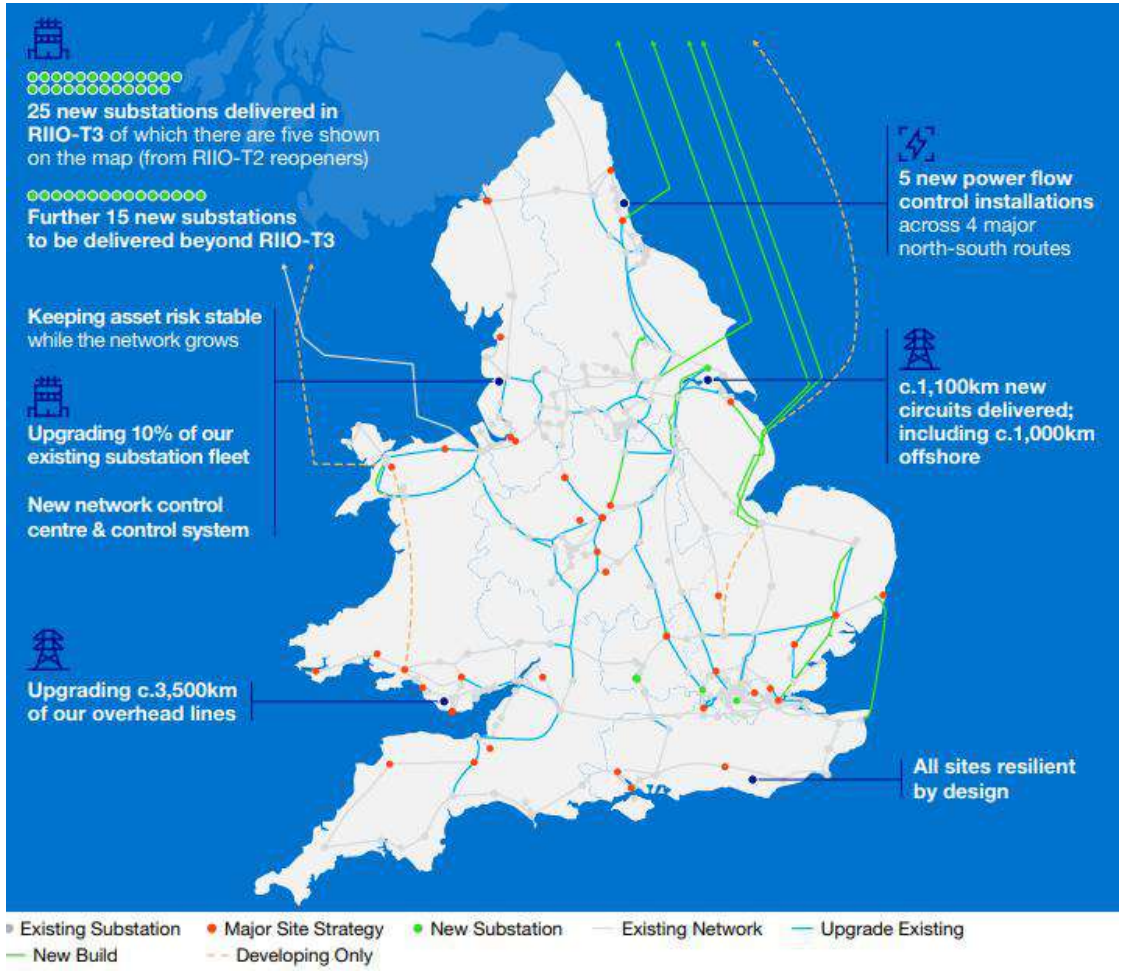
Construction of three Accelerated Strategic Transmission Investment (ASTI) projects to support the UK's renewable energy goals.

Impact:

Facilitates the connection of 50 GW of offshore wind by 2030.

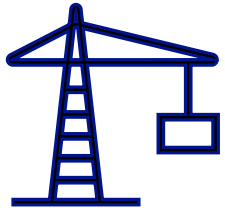
Supports the UK's target to decarbonise its power sector predominantly by 2030.

Enhances energy security and contributes to the reduction of greenhouse gas emissions.

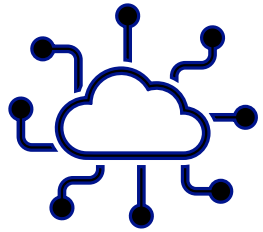


Decarbonisation and Resilience Efforts

Policy and Initiatives

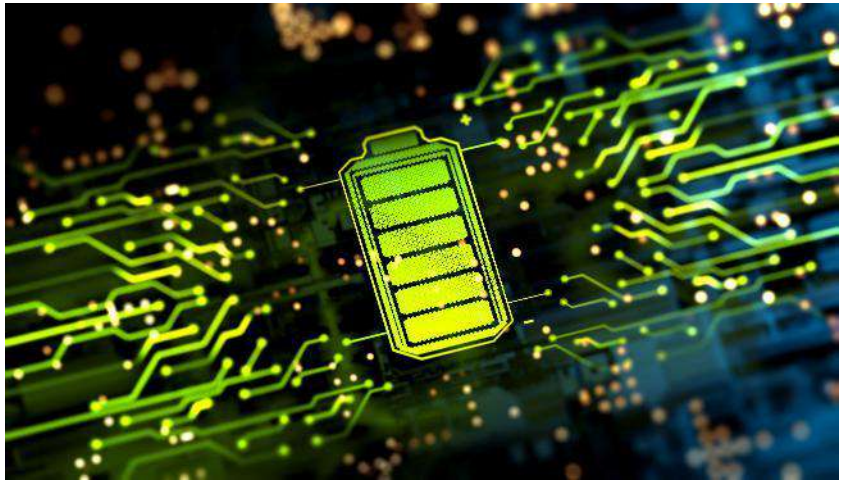


Material Innovations



Technological Innovations

Building Resilience



Electricity Transmission

Q&A

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