The Great Grid Upgrade

NSIPs Centre of Excellence Conference

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nationalgrid

National Grid sits at the heart of Britain's energy system

nationalgrid
Group PLC

National Grid Electricity Transmission

Owns and manages the high voltage electricity transmission system in England and Wales.

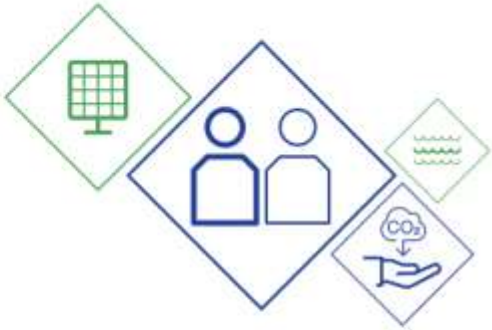
National Grid Electricity Distribution

Own and operate the electricity distribution networks for the Midlands, the South West of England and South Wales, with 8m customer connections serving a population of over 18m people.

ESO Electricity System Operator

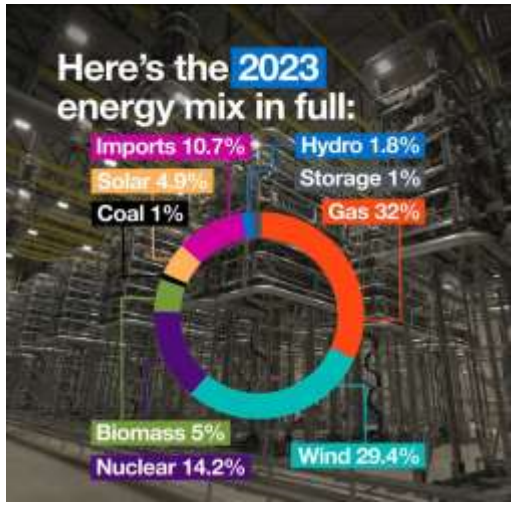
The ESO is legally separate from the rest of National Grid and ensures that Great Britain has the essential energy it needs by making sure supply meets demand every second of every day.

National Grid Ventures



Operates a mix of energy assets and businesses to help accelerate the development of our clean energy future (such as undersea interconnectors that allow the UK to share energy with other European countries).

The way we generate electricity is changing rapidly



Journey towards net zero - UK to deliver 50GW of offshore wind by 2030

UK government net zero and energy security strategies are setting the ambition

- **50GW** of offshore wind by 2030
- **70GW** of solar by 2035
- **24GW** of nuclear by 2050
- Net zero power system decarbonisation by 2035
- Increased electrification of transport and heat, demand is set to significantly increase (by around 50%)

Driving an increase in scale, pace, and complexity of transmission infrastructure needed

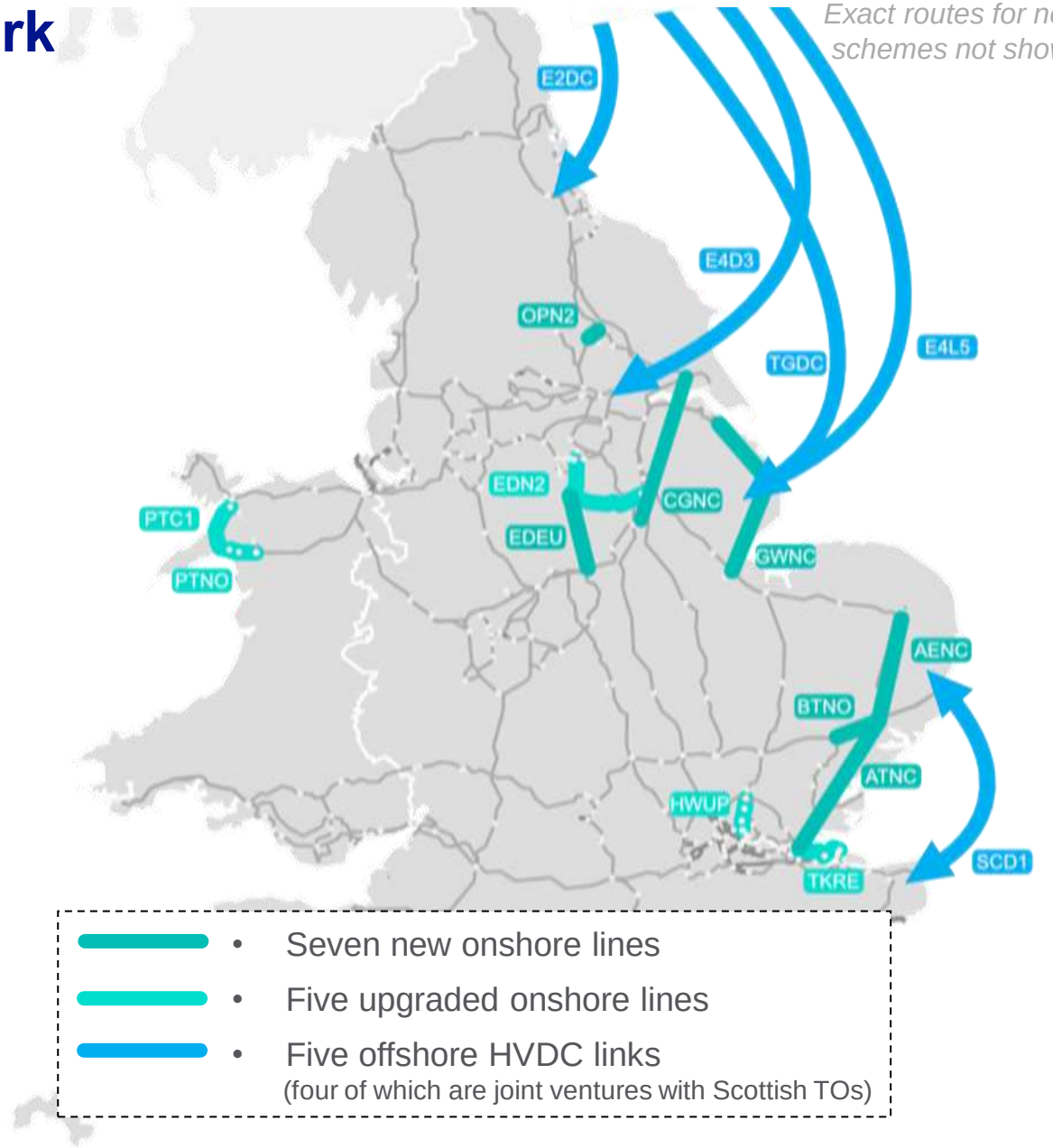
Britain’s electricity transmission network

The existing network

- Largely built to take power from power stations built on coalfields in the north to regional networks, cities and industry.
- Limited transmission capacity between Scotland and central England or from coastal areas to the central region.

The future network

- Needs to take more power from windfarms off the coast and connect it to the same population centres.
- More lines will be required to connect the coast to the central region.



National context – delivering a net zero power system for 2035

We must systematically upgrade the England and Wales transmission network to service future electricity needs

Offshore wind
4.5 to 6 times
growth in capacity

Solar
2.5 to 5 times
growth in capacity

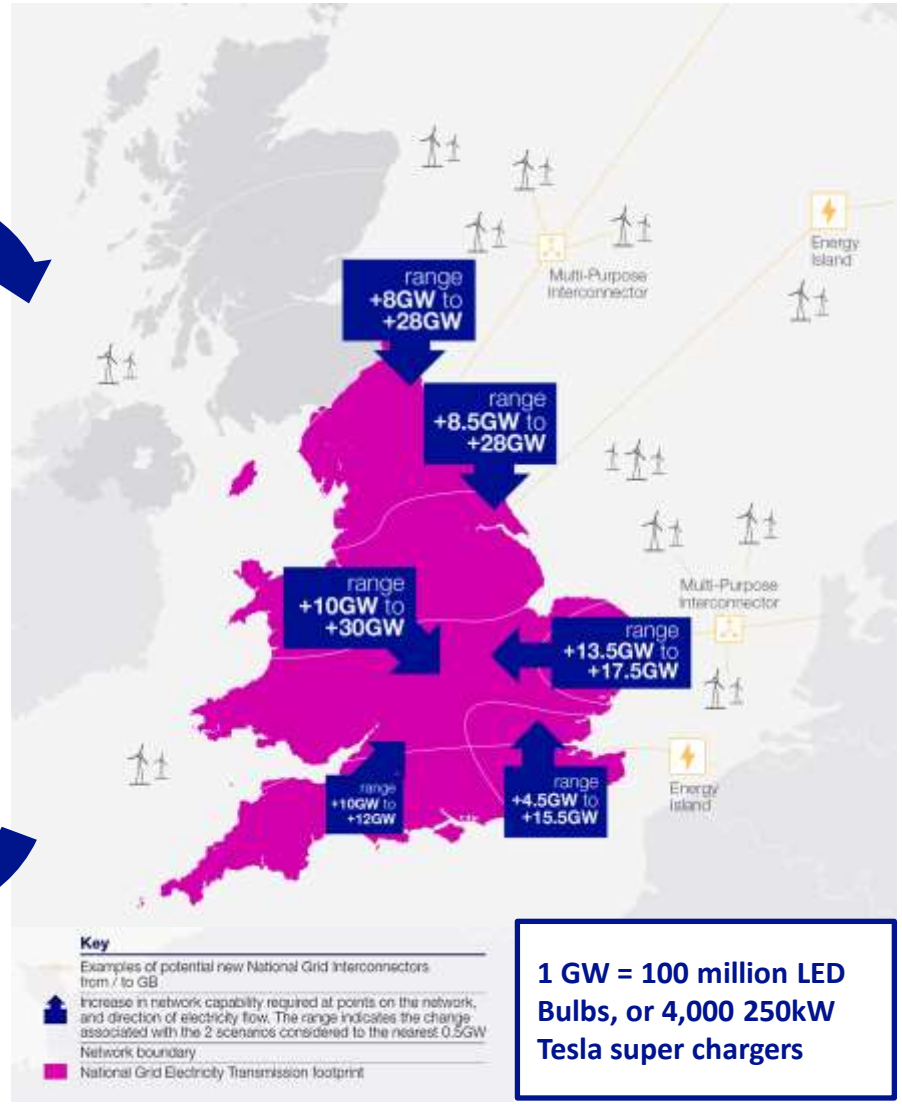
Interconnectors
2.5 to 3 times
growth in capacity

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

The Great Grid Upgrade

The Great Grid Upgrade is the largest overhaul of the electricity grid in generations.

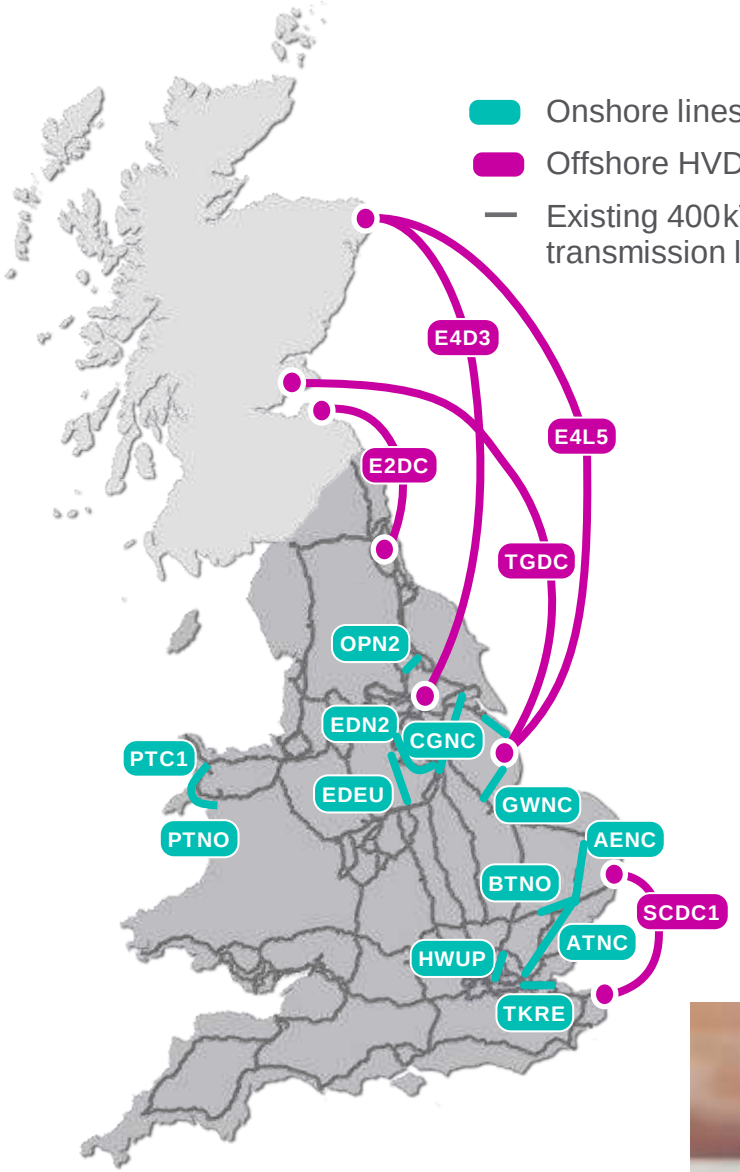
There are 17 network reinforcements identified as ‘essential’ to meet the Government’s net zero targets.

Drivers:

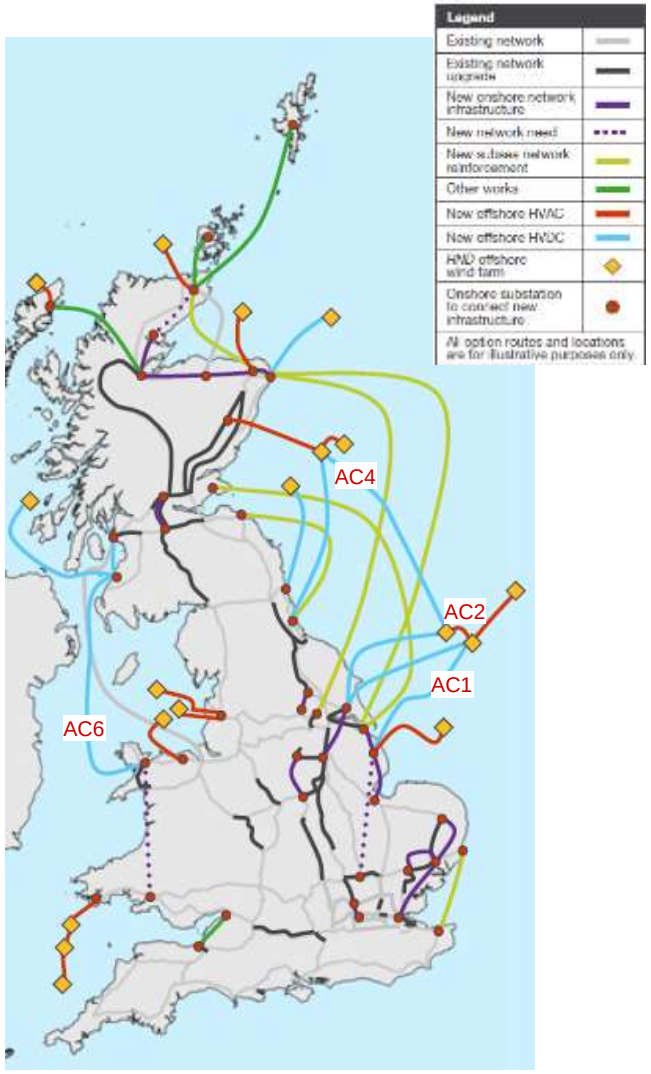
- 50GW of offshore wind by 2030 (also increases in solar + nuclear)
- Net zero power system decarbonisation by 2035
- Increased electrification of transport and heat, demand is set to significantly increase.
- Need to connect more offshore renewable energy

Requires a combination of upgrades to get the most out of the existing network and new lines.

Our programme of network reinforcements will support the UK’s net zero target by adding capacity to accommodate increasing power flows of energy generated mostly from offshore wind, which is expected to double within the next ten years, to areas of demand.



Scale of challenge to deliver 50GW of offshore wind by 2030



Scale of the challenge is large, both in terms of scale and extent of consenting, and supply chain delivery, all at pace to achieve 50GW by 2030

Optioneering and consenting

Over 500km of new Overhead Line	1,330 new towers	8,370km of Overhead Line conductor
6 times more in next 7.5 years than built in the last 30 years	35,000 tonnes of tower steelwork - equivalent to more than 4 Eiffel towers	New and uprated lines totals enough to stretch from London to Los Angeles

~4000km High Voltage Direct Current (HVDC) conductor	+ Other Electricity System Operator projects + customer connections + Asset health (~2000km of new or works to existing lines)
+ 5 HVDC offshore link projects of c.£9bn - more than the total cable length of BritNed, Western Link, NSL Nemo and IFA 2 built in the last 35 years	

The regulatory parameters

We are bound by Government policy, legislation, regulation and industry rules, which inform the balance we need to strike when developing proposals and ultimately will determine whether individual proposals should proceed:

- **Technology**
- **Environment**
- **Socioeconomic**
- **Cost**
- **System Benefits**
- **Community Feedback**

EN-5 Electricity Networks National Policy Statement

2.11.13

Although it is the government's position that overhead lines should be the strong starting presumption for electricity networks developments in general, this presumption is reversed when proposed developments will cross part of a nationally designated landscape (i.e. National Park, Broads, or Area of Outstanding Natural Beauty)

The Great Grid Upgrade in the East of England

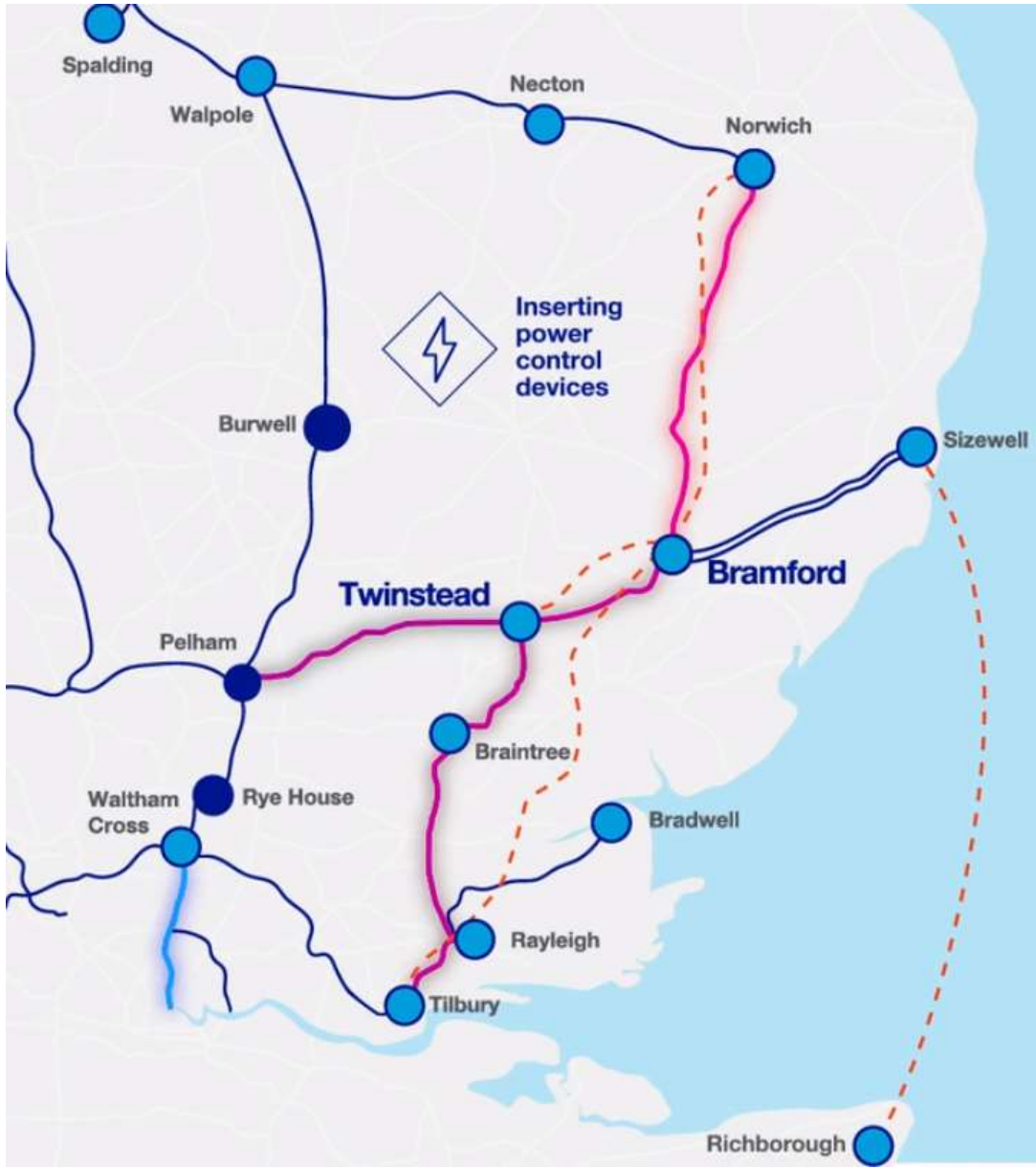
Bramford to Twinstead – Network reinforcement between Bramford Substation in Suffolk and Twinstead Tee in Essex.

Norwich to Tilbury – Network reinforcement between the existing substations at Norwich Main in Norfolk, Bramford in Suffolk, and Tilbury in Essex, as well as connect new offshore wind generation.

Grain to Tilbury – Construction of a new cable under the Thames between Kent and Essex to reinforce the local network.

Sealink - Reinforcing the electricity transmission network between Suffolk and Kent through building a new, primarily offshore, 2GW high voltage direct current link.

LionLink: National Grid Ventures - connecting Dutch offshore wind to Dutch and British markets via subsea electricity cables called interconnectors.



Communications and Community

Engaging communities with our proposals

We are committed to engaging stakeholders and communities as we develop our proposals.

We work with relevant authorities as we develop our engagement plans, to ensure they are tailored and meet the needs of local communities.

We conduct ongoing engagement and undertake consultation exercises, utilising different methods of communication to ensure we're hearing a wide range of views.

Delivering benefits to host communities

We work with local communities and stakeholders to understand what is important to them and endeavour to deliver initiatives to support those priorities.

Our approach will be subject to the forthcoming government guidance, but we are working to understand local priorities as we work to develop our plans in the following areas:

Communities

Support **local projects** that make a **positive impact on local communities.**

Environment

Go beyond our **biodiversity net gain commitments**, to deliver **environmental enhancements in host communities and regions** (for example, through strategic partnerships).

Education, skills and employment

Develop **socioeconomic interventions,** such as **skills investment, employment initiatives** and **local supply chain opportunities.**

Face to Face engagement

Digital engagement

Broadening the narrative

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