HVDC Operators Forum

A **holistic network design** to support offshore wind deployment for net zero

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Background

In July 2020, the Department for Business, Energy & Industrial Strategy launched the **Offshore Transmission Network Review** (OTNR).

The OTNR was created to ensure transmission connections for offshore wind generation are delivered in the most appropriate way, taking into consideration **cost to consumers, deliverability and operability and the impact on the environment and local communities.**

The holistic network design helps get Great Britain towards achieving the ambition of **50 GW of offshore wind by 2030.**

Offshore Transmission Network Review

Ensure that the transmission connections for offshore wind generation are delivered in the most appropriate way, considering the contribution offshore wind is expected to make towards net-zero by 2050. This will be done with a view to finding the appropriate balance between environmental, social and economic costs.

Early Opportunities
Connecting mid-late 2020s

- Capitalise on early opportunities for coordination through identifying inflight projects that have the potential to coordinate and identify and progress enabling regulatory changes

Pathway to 2030
Connecting by 2030

- Enabling achievement of 2030 targets by increasing central coordination and accelerating delivery of the required onshore and offshore grid infrastructure

Enduring Regime
Connecting post 2030

- Design and implement the changes necessary for more efficient and strategic connection of future offshore wind projects

Multi-Purpose Interconnectors

- Deliver near-term changes to facilitate the development of MPIs before 2030 and develop an enduring regime for the longer term.

Multi-purpose interconnectors

Within each workstream we will consider the validity of options' design and associated regulatory change to support MPI projects

Pathway to 2030 Holistic Network Design

Connects offshore wind and **transports** the electricity generated to where it will be used.

Helps to **unlock 50 GW of offshore wind by 2030** when combined with wind further advanced in its development.

Moves towards a more **centralised, strategic network planning** that is critical for delivering affordable, clean and secure power, as we journey towards our net zero future.

The Holistic Network Design

A first of its kind, integrated approach for connecting 23GW of offshore wind to Great Britain and transporting the electricity generated to where it will be used.

Primarily includes offshore wind projects that secured seabed leases through **The Crown Estate's Offshore Wind Leasing Round 4 and Crown Estate Scotland's ScotWind Leasing Round.**

Assumes 1 GW of floating wind from the upcoming Celtic Sea leasing round and some additional projects that are due to connect at a similar place and time to others in scope.

Balances the four objectives of cost to consumers, deliverability and operability and impact on the environment and on communities.

We developed a **recommended design** and a **radial counterfactual design**.

Key Benefits compared to the radial design

Save consumers £5.5bn in costs from 2030 compared to the radial design

£54bn network investment

Increases availability of offshore wind by 32 TWh over 10 years from 2030 compared to the radial design

2 million tonnes CO_2 equivalent savings between 2030 and 2032 compared to the radial design

Overview of the recommended HND

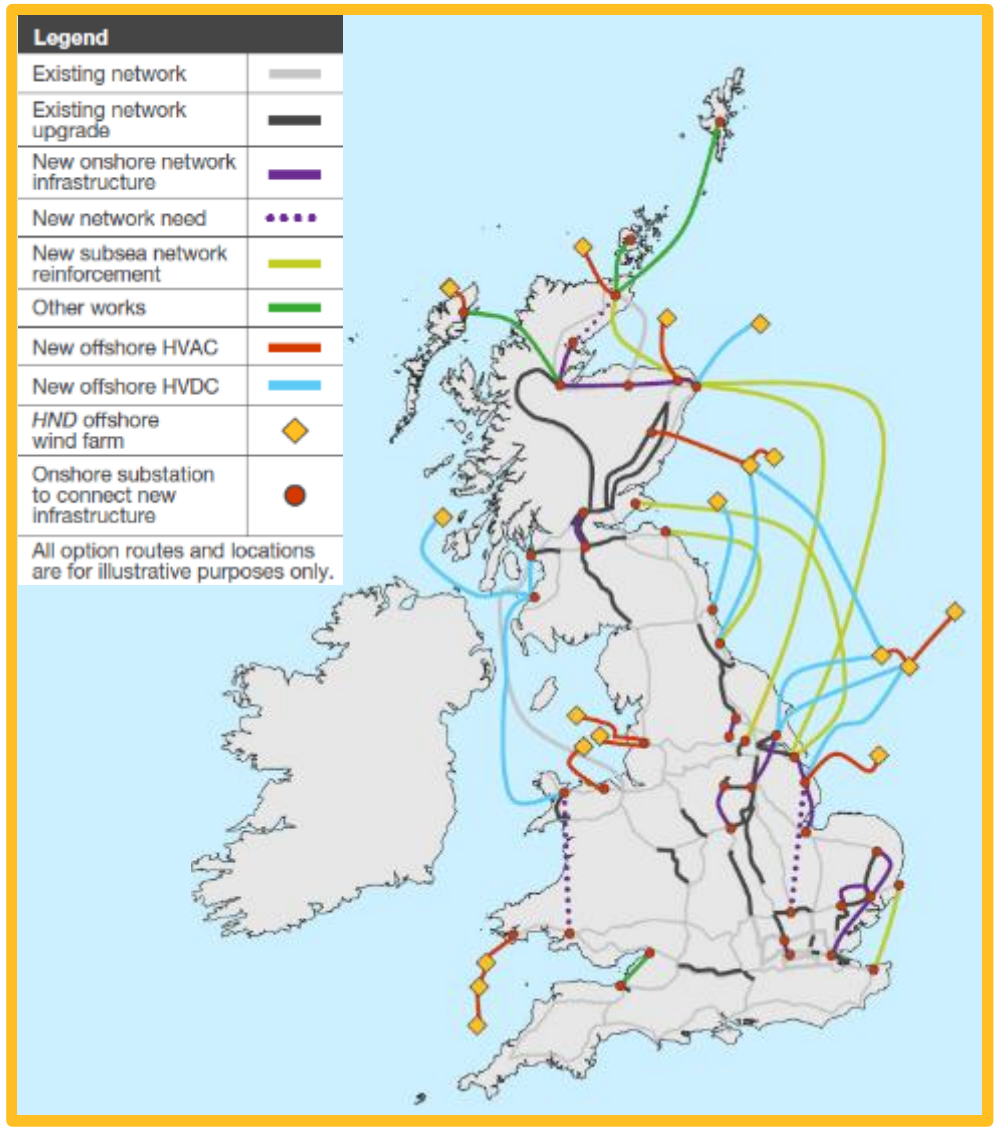
Connects all 18 in scope offshore wind farms (23 GW).

15 landing points.

Establishes new offshore connections between different onshore regions.

Identifies and distinguishes onshore transmission projects that are required to facilitate the 2030 ambitions.

Reduces the impact on the seabed by up to a third smaller footprint of cables coming to shore compared to the radial design.



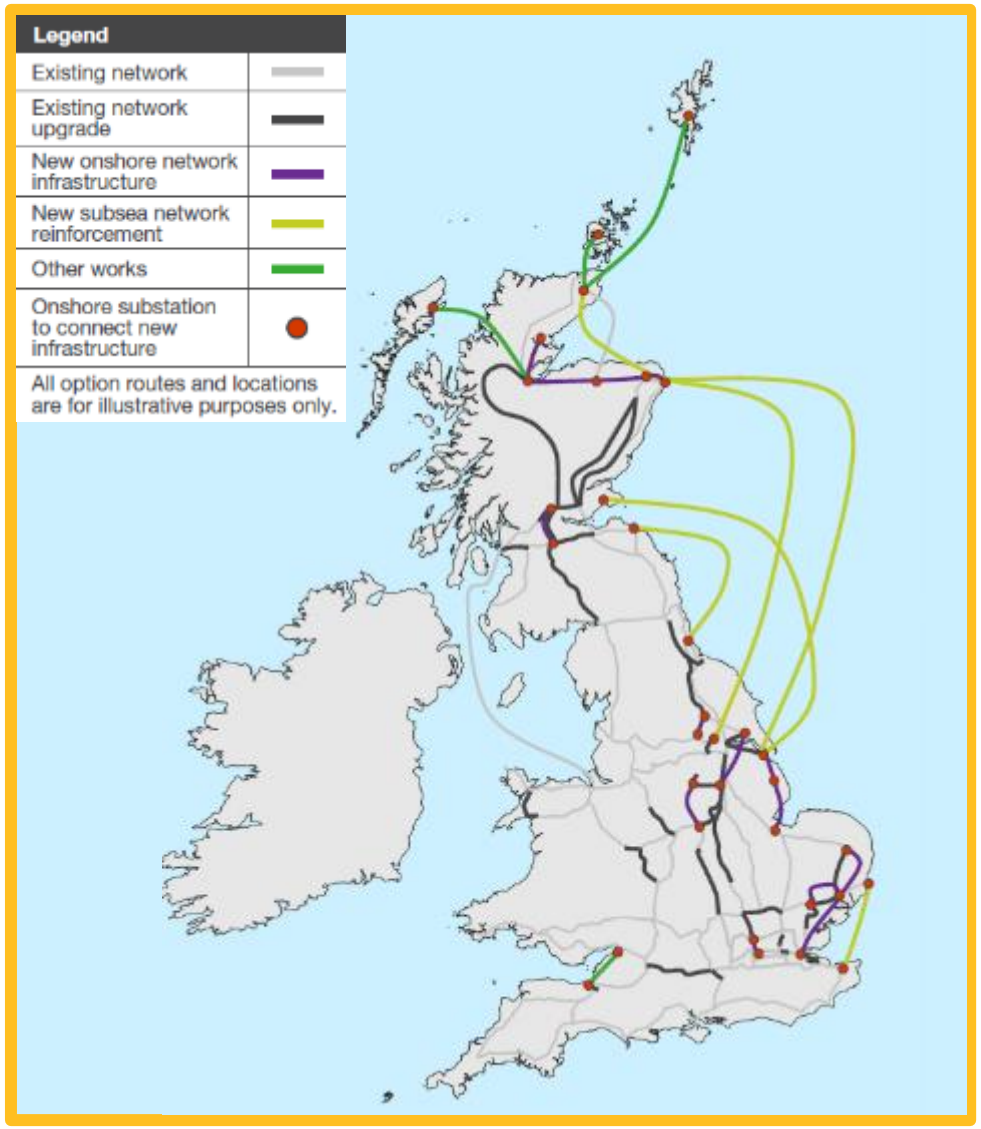
System-wide view

Number of reinforcements by 2030:
94

Total investment cost
£21.7 billion

91 reinforcements have been highlighted previously through our annual NOA process.

11 reinforcements require acceleration in their delivery to meet 2030.



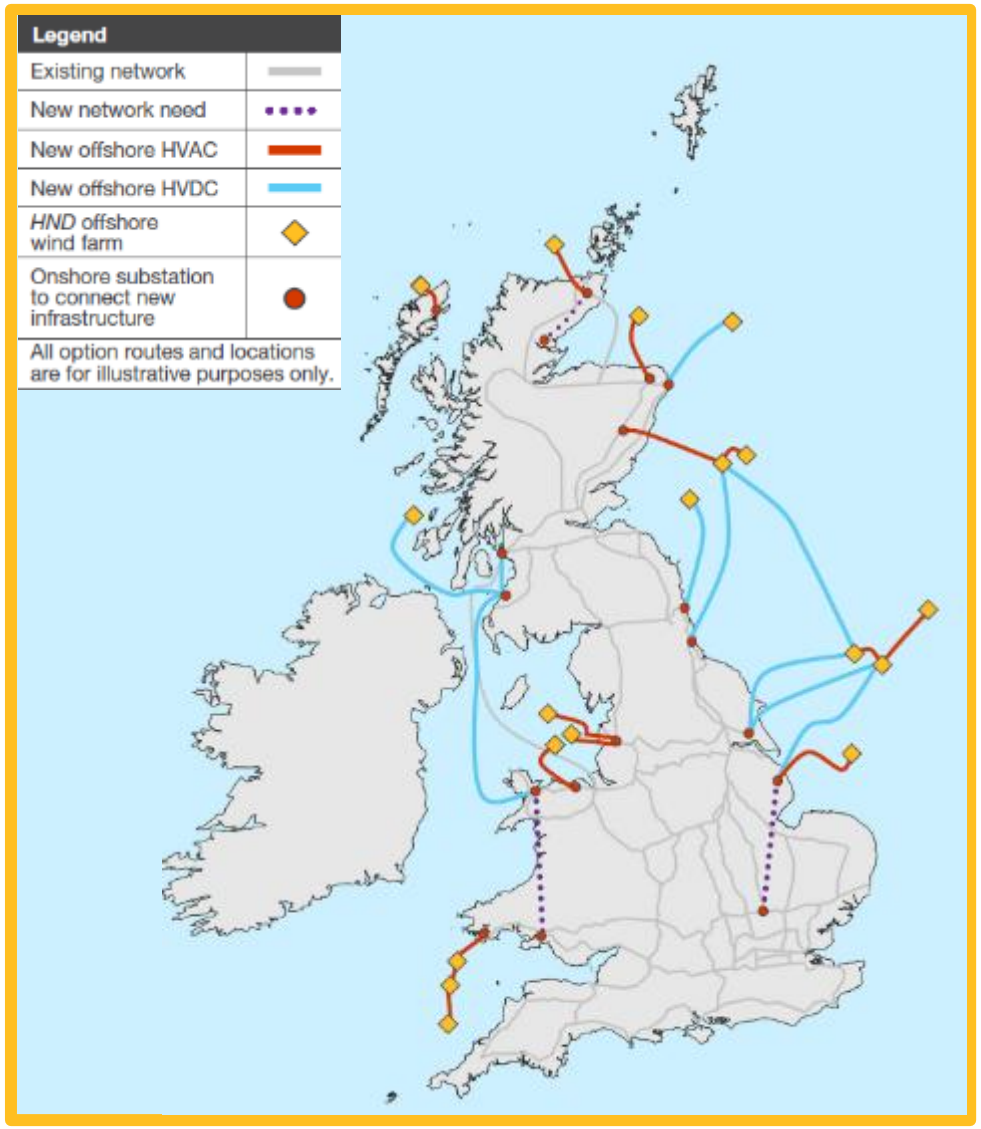
System-wide view

The offshore network results in different power flows on the onshore network, driving 3 new network needs.

These new requirements build on existing and planned network development.

They are in the very early stages of development.

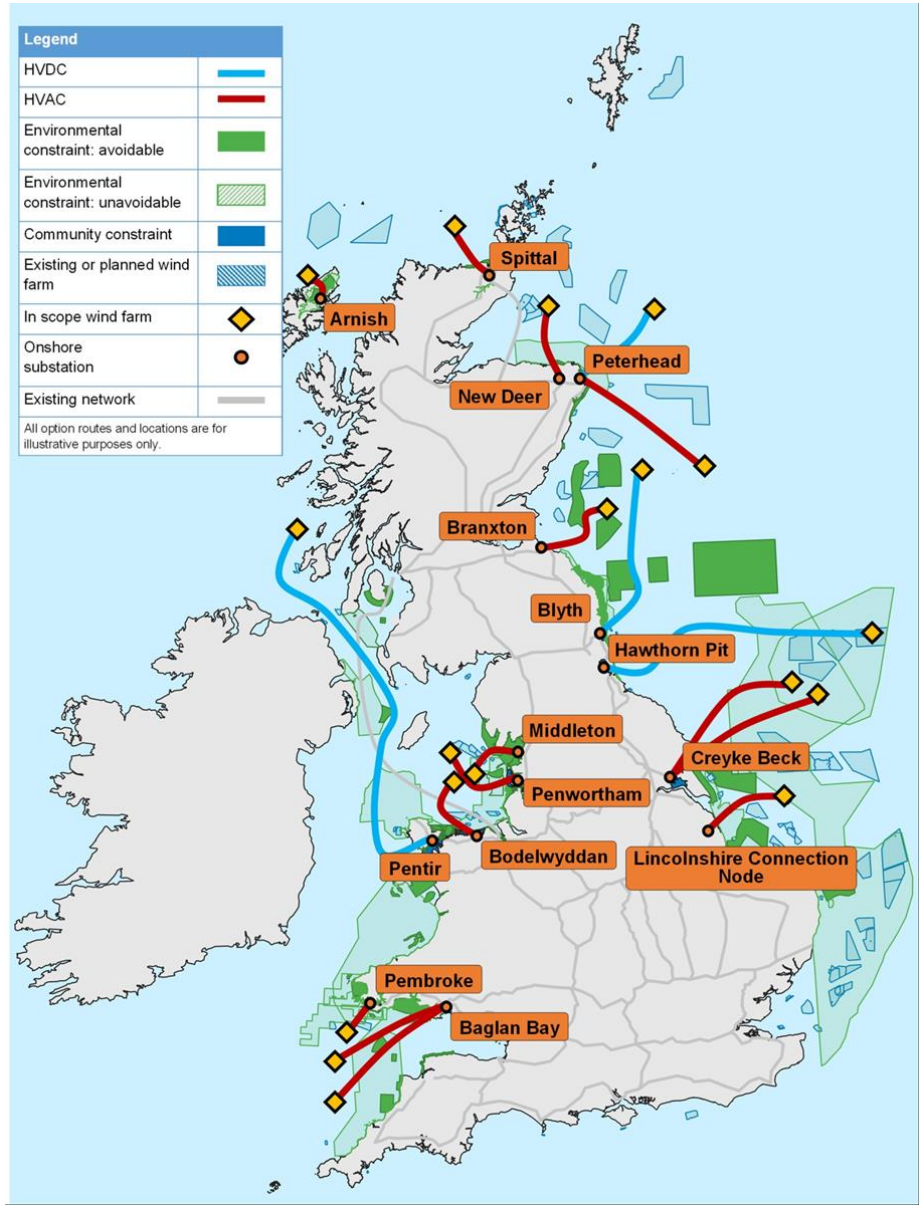
The TO will now take these options forward for detailed design, exploring many different route options, including onshore, offshore or a combination of both.



System-wide view

Radial design followed he same process but restricted to point to point connection design

Used as the ‘counter-factual’ to quantify the benefit of co-ordination



- More detail

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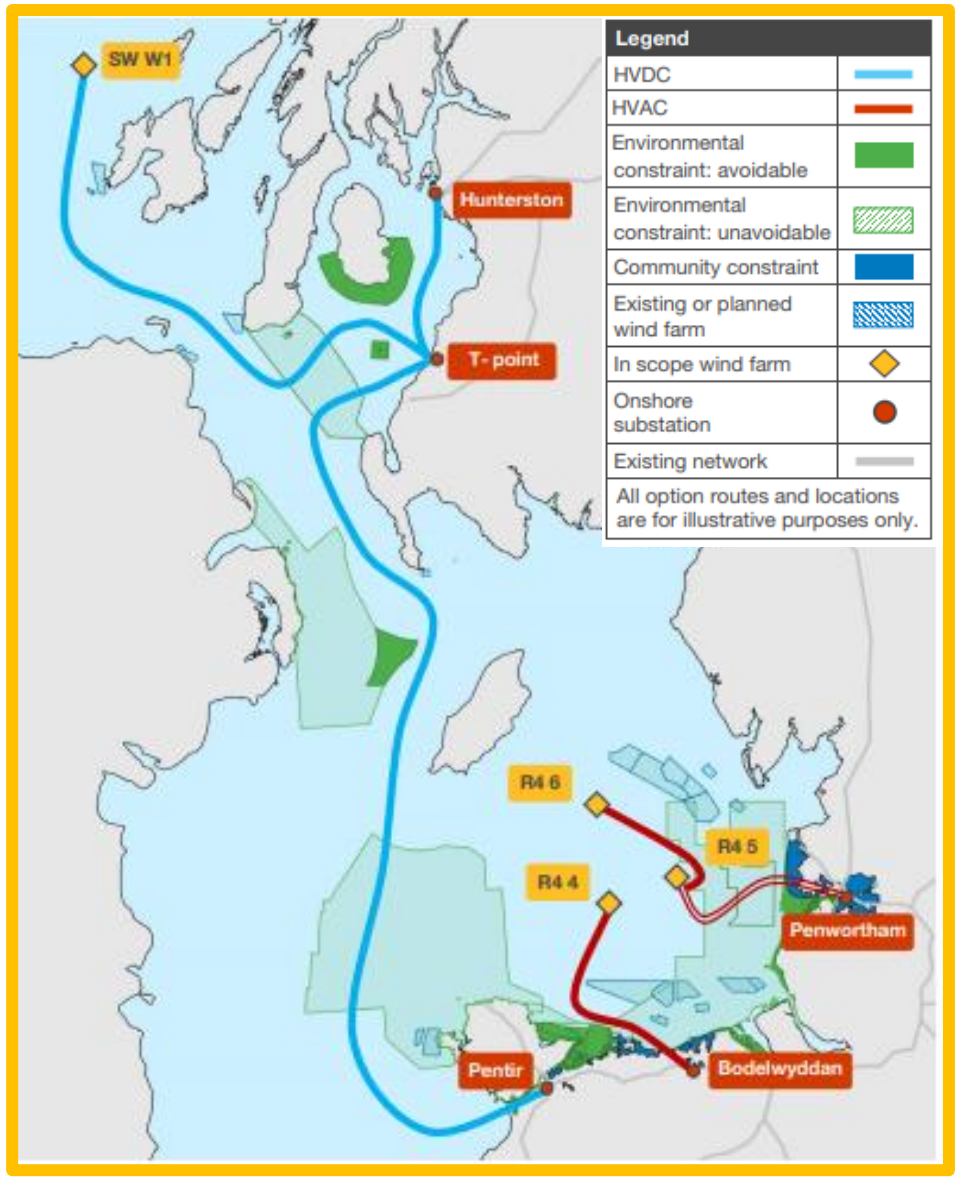
North West Region

Number of generators:
Four

Combined offshore wind capacity:
5.5 GW

Design:
Wind farm in West Scotland connects to a T-point with connections into both Scotland and Wales.

Irish Sea wind farms connected radially with two sharing a route corridor.

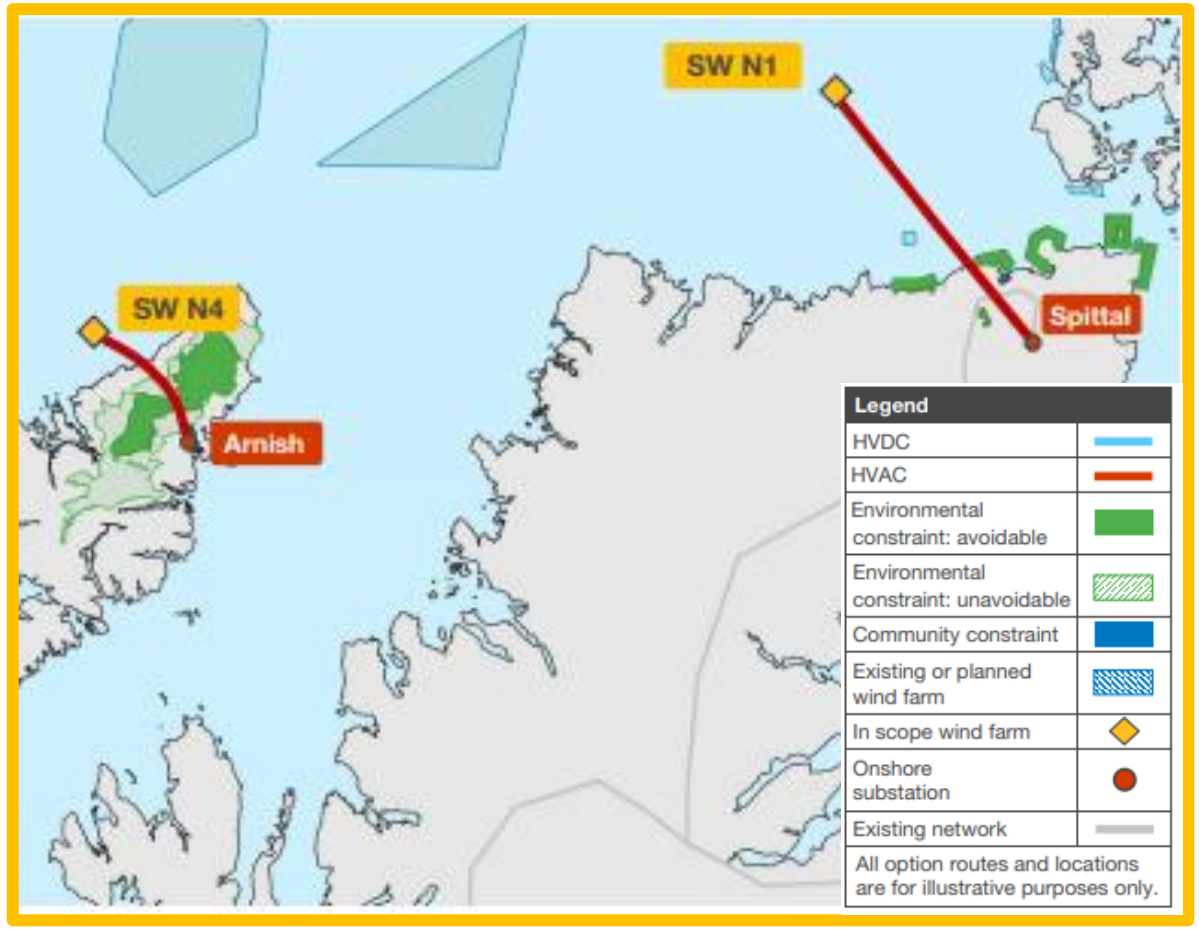


North Scotland Region

Number of generators:
Two

Combined offshore wind capacity:
3 GW

Design:
Radial connections



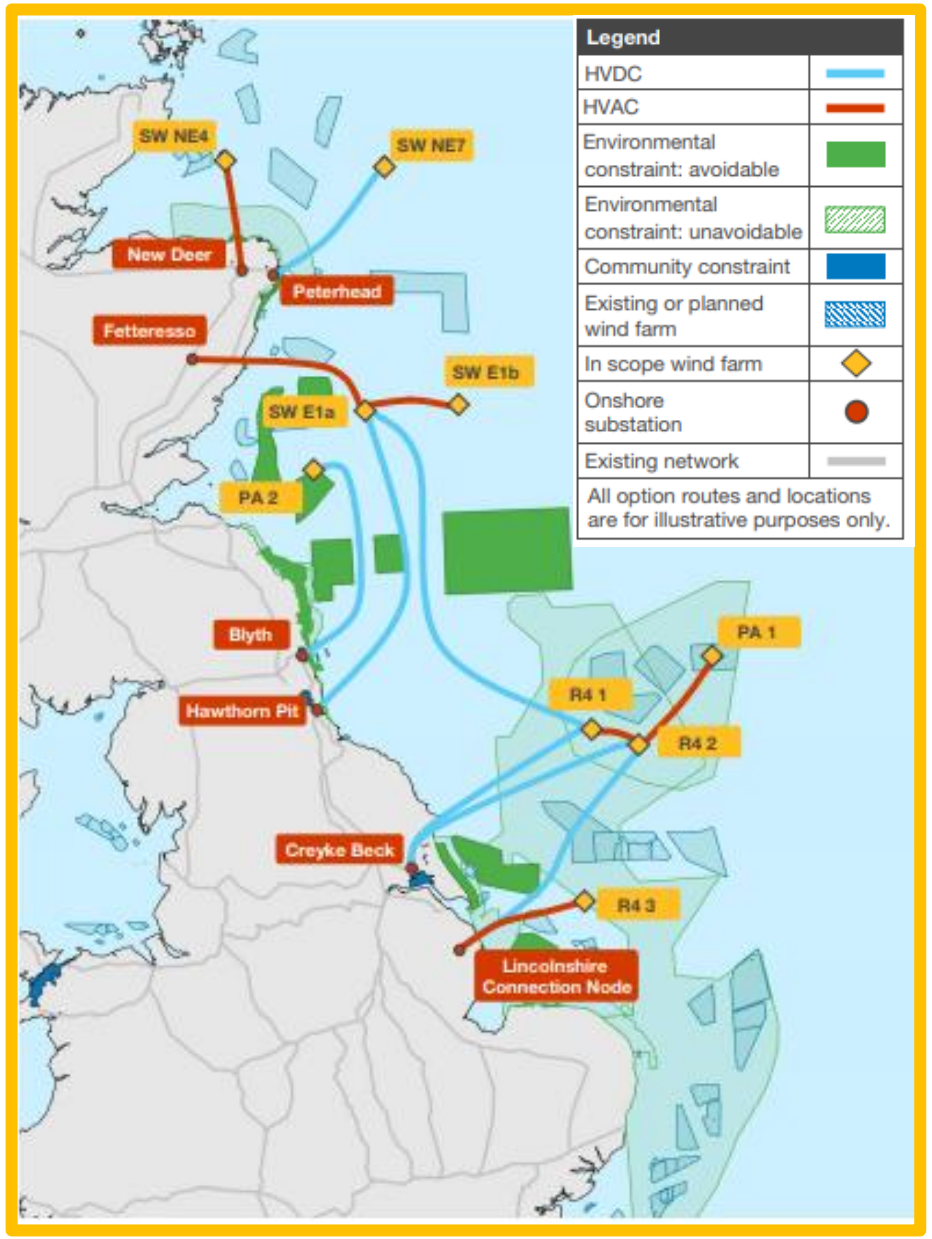
East Coast Region

Number of generators:
Nine

Combined offshore wind capacity:
13.3 GW

Design:
Offshore network connects wind farms on the East Coast to various substations in the region.

Our proposals also provide additional capacity between Scotland and England.

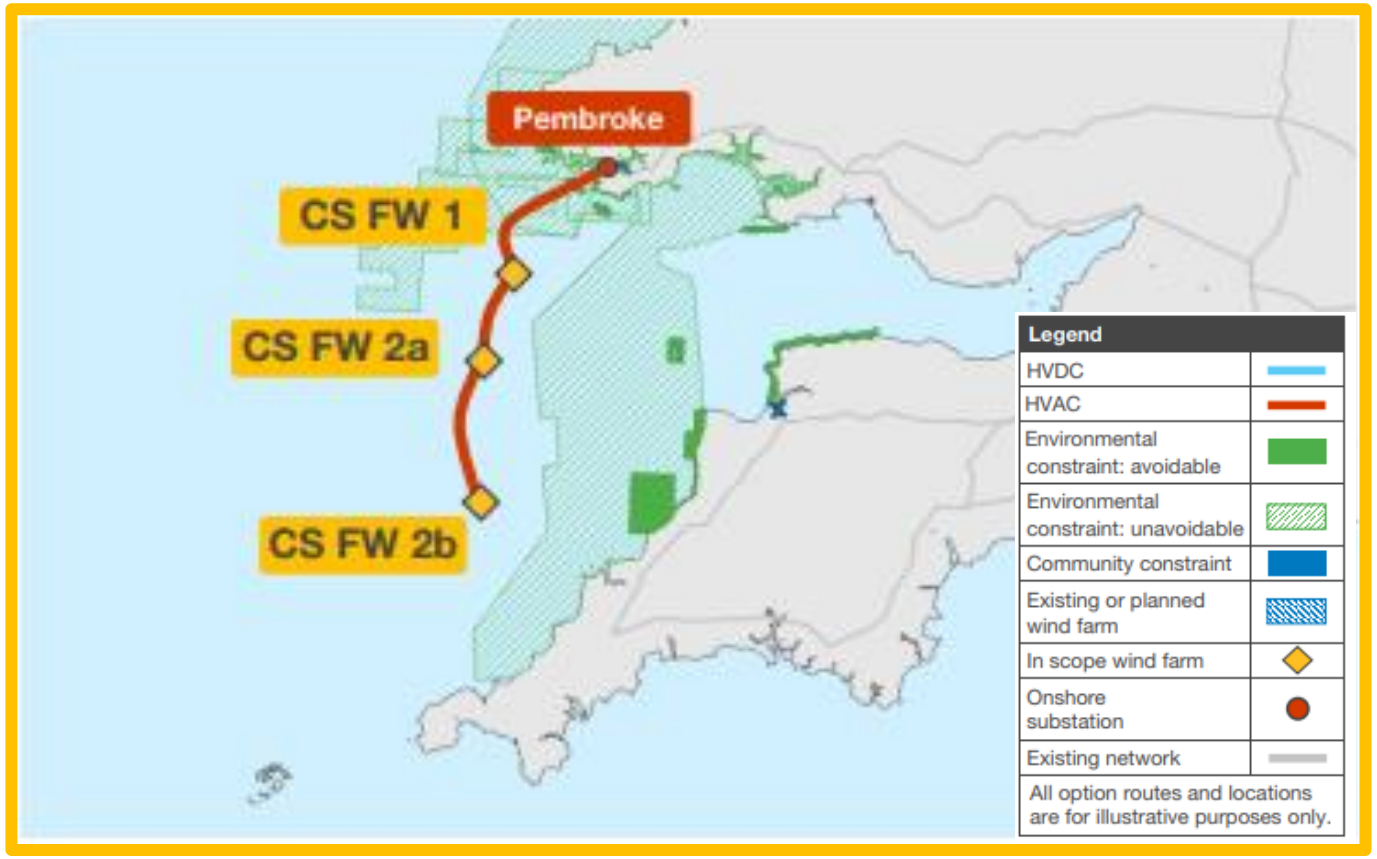


South West Region (indicative)

Number of generators:
Three

Combined offshore wind capacity:
1 GW

Design:
Our proposals for the South West connect offshore wind to the substation in Pembroke



Delivery and connection

A Detailed Network Design (DND) and consenting process will be undertaken following this publication by the party responsible for developing each asset.

Creation of DNDs will further refine HND recommendations, including specifics on:

- Technology choices
- Transmission routes
- Where substations and converter stations will be located

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