



Scottish & Southern
Electricity Networks

TRANSMISSION

Transmission System Planning HVDC in the North of Scotland

HVDC Operators Forum

21 June 2022



Who we are and what we do

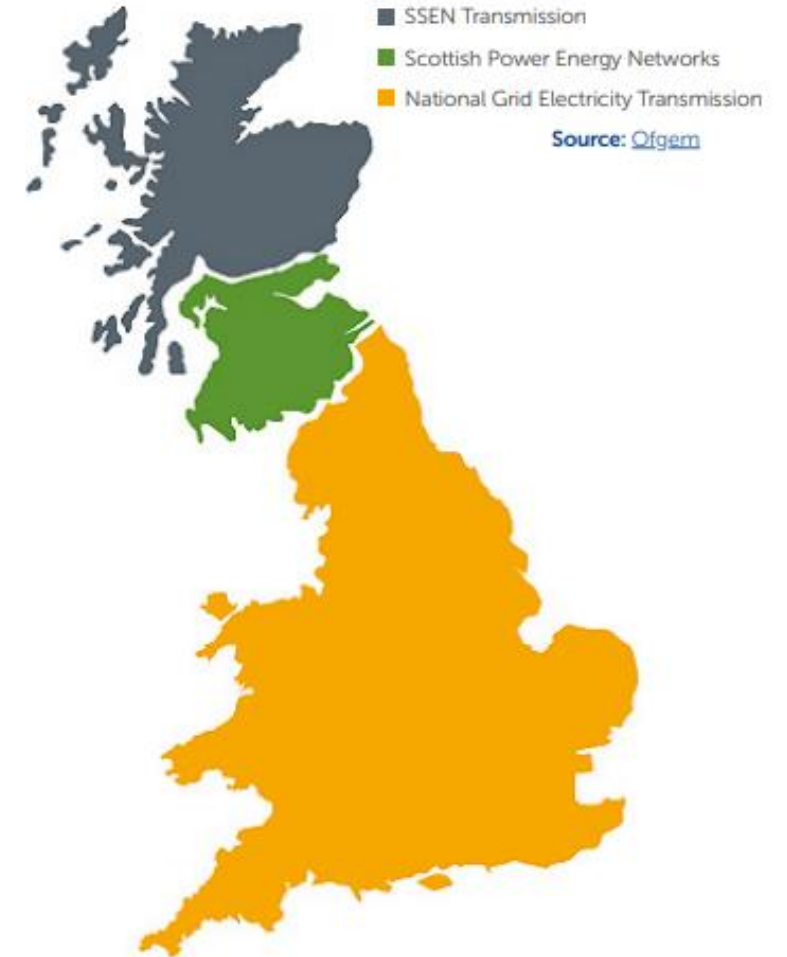
Responsible for the planning, design, construction and maintenance of the electricity transmission system

Critical role to play in transition to net zero, connecting and transporting power from generation source, to areas of demand

Operate under fixed price control period, regulated by Ofgem - current RIIO-T2 period runs from April 2021 to March 2026

Work with National Grid Electricity System Operator (ESO) to plan the network 10 years in advance to meet forecast changes in generation and demand

We plan the development of a safe, reliable and economic electricity transmission system in the North of Scotland, connecting customers to our network and considering the overall growth of generation and demand.



System Planning – Network Requirements

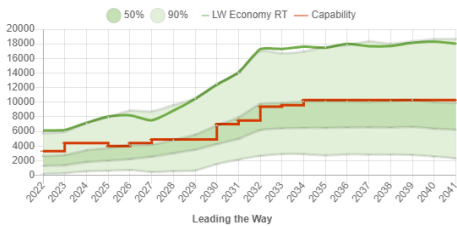
Forecast growth in renewables driving need for major reinforcements

Mid-Scotland (B4) Boundary

Significant growth in renewables driving need for reinforcement

8-13 GW transfer requirement **by 2030** between north of Scotland and south Scotland (existing transfer capability is 'only' **3.2GW**), and up to

18GW by 2040.

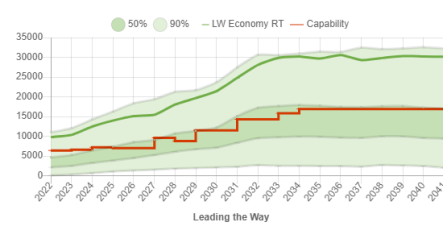


England-Scotland (B6) Boundary

Significant growth in renewables driving need for reinforcement

15-23 GW transfer requirement **by 2030** between Scotland and England (existing transfer capability is 'only' **6.6GW**), and up to

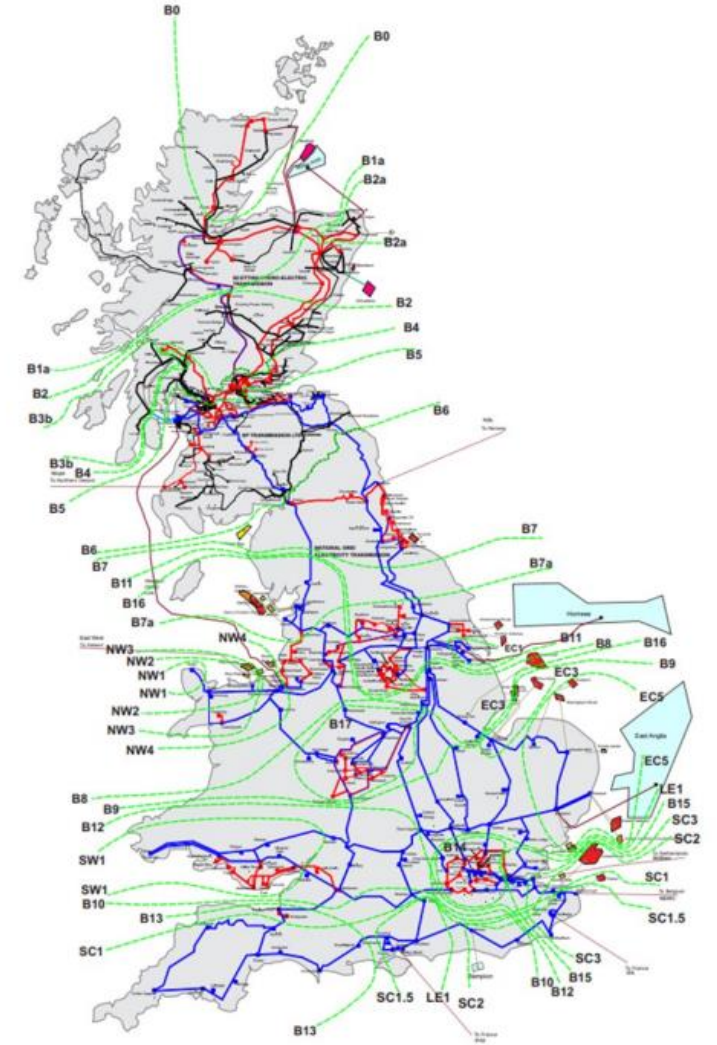
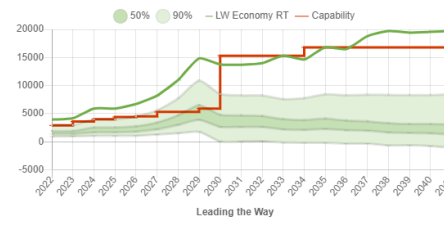
30GW by 2040.



East Anglia (EC5) Boundary

Offshore wind along East Coast of England and new nuclear driving need for reinforcement



12GW offshore wind to connect by 2030 with growth beyond 2030 to deliver net zero outcomes.



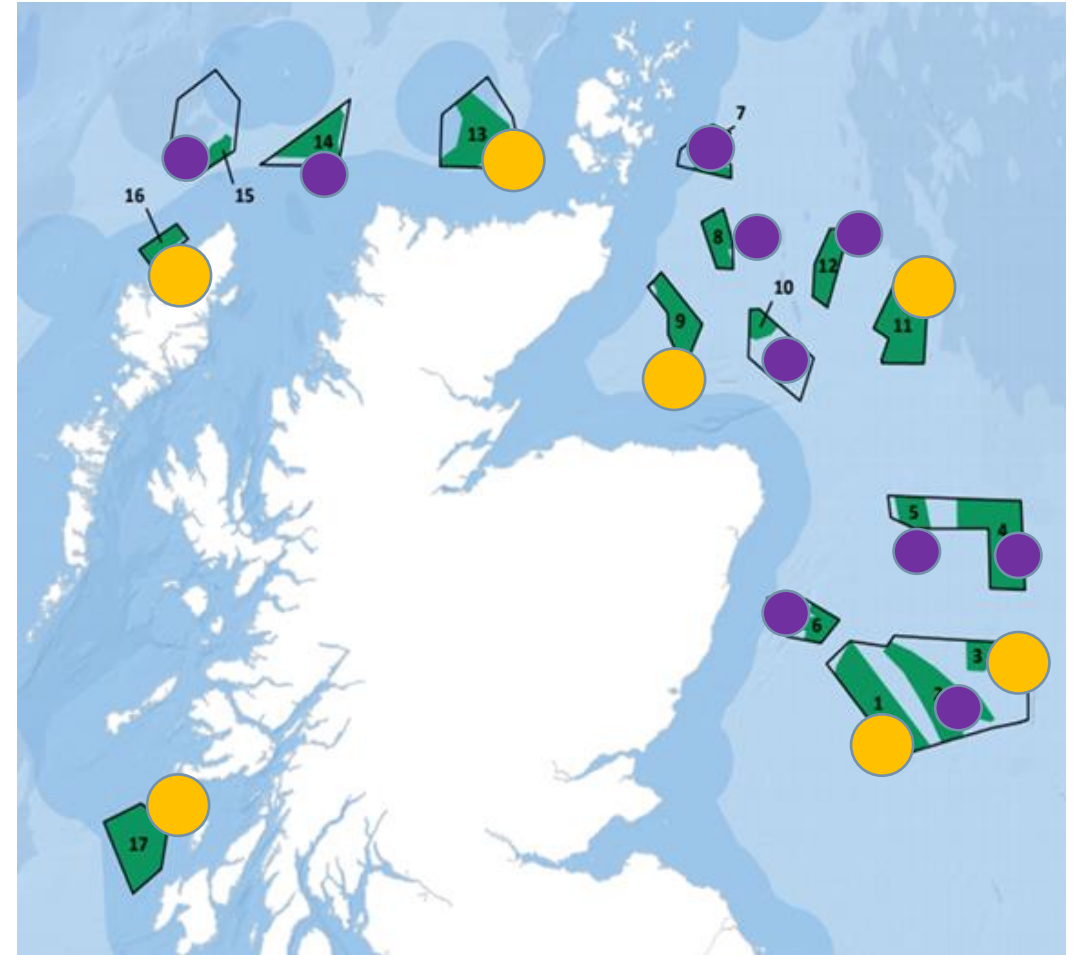
• *Leading the Way Future Energy Scenario most closely aligned to net zero*

ScotWind Offshore Coordination

ScotWind Treatment

-  First tranche ScotWind ~10.7GW
-  Remaining ScotWind ~14.3GW

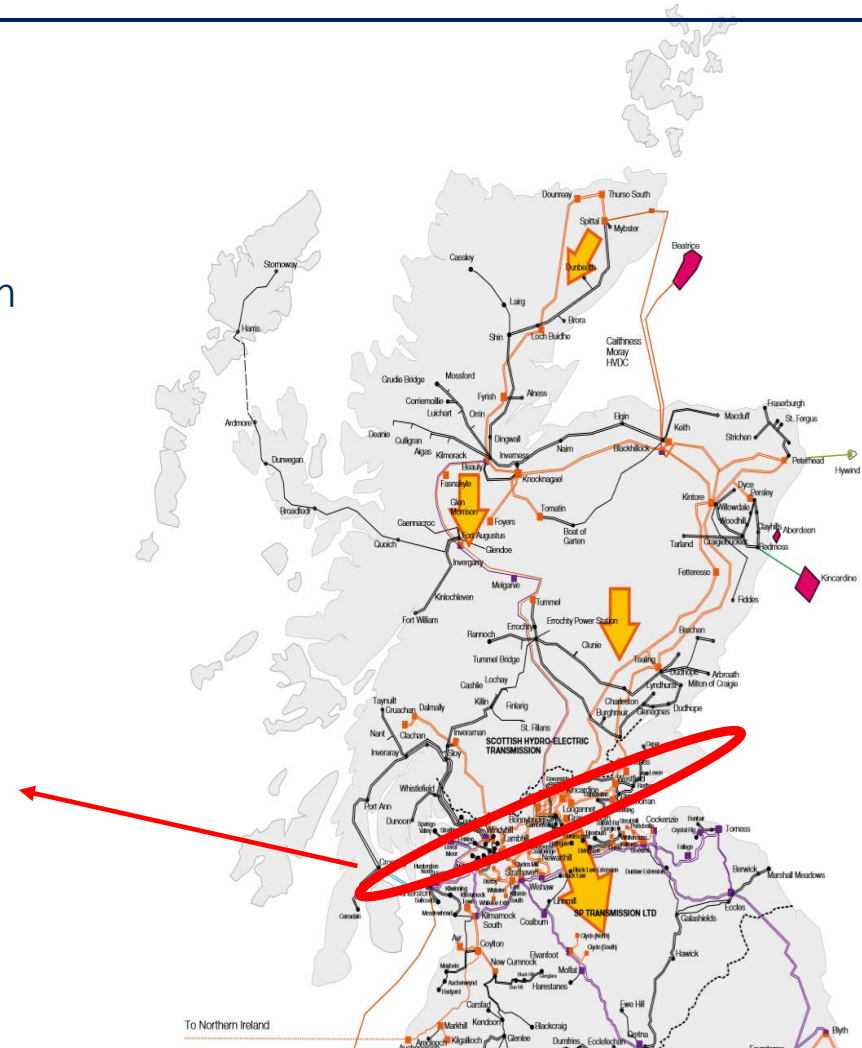
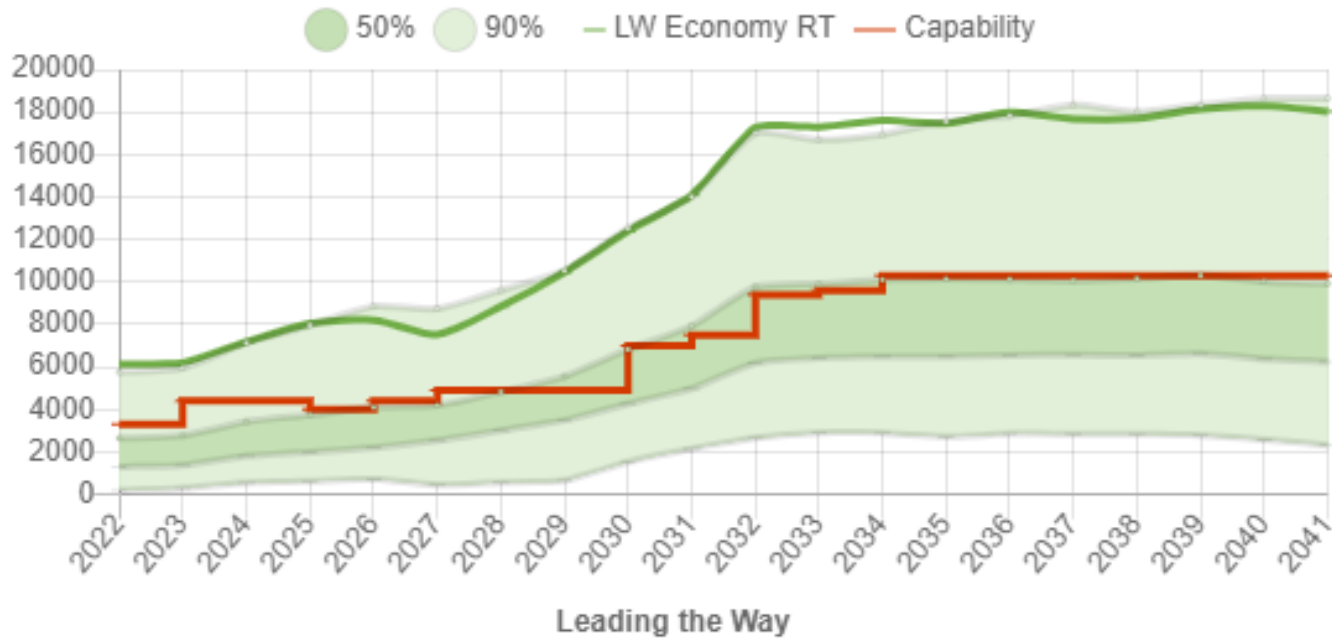
- The June 2022 Holistic Network Design (HND) is considering 'first tranche' ScotWind schemes assessing two designs for offshore works: radial and co-ordinated – the HND will determine which is preferred.
- Following publication of the HND, a refreshed NOA 2021/22 report incorporating the HND will be published.
- HND 2 scheduled for 2023 will build upon HND to determine how to connect the remaining 14.3GW of ScotWind



System Planning – Network Requirements

Investment Drivers (FES 2021)

- Further increase in bulk power flows across SSEN Transmission system
 - Continued north – south power flow prevalence across licenced area



System Planning – Network Requirements

Reinforcements key to enable necessary growth in renewables and transport power to demand centres

Major reinforcements to transfer power north to south

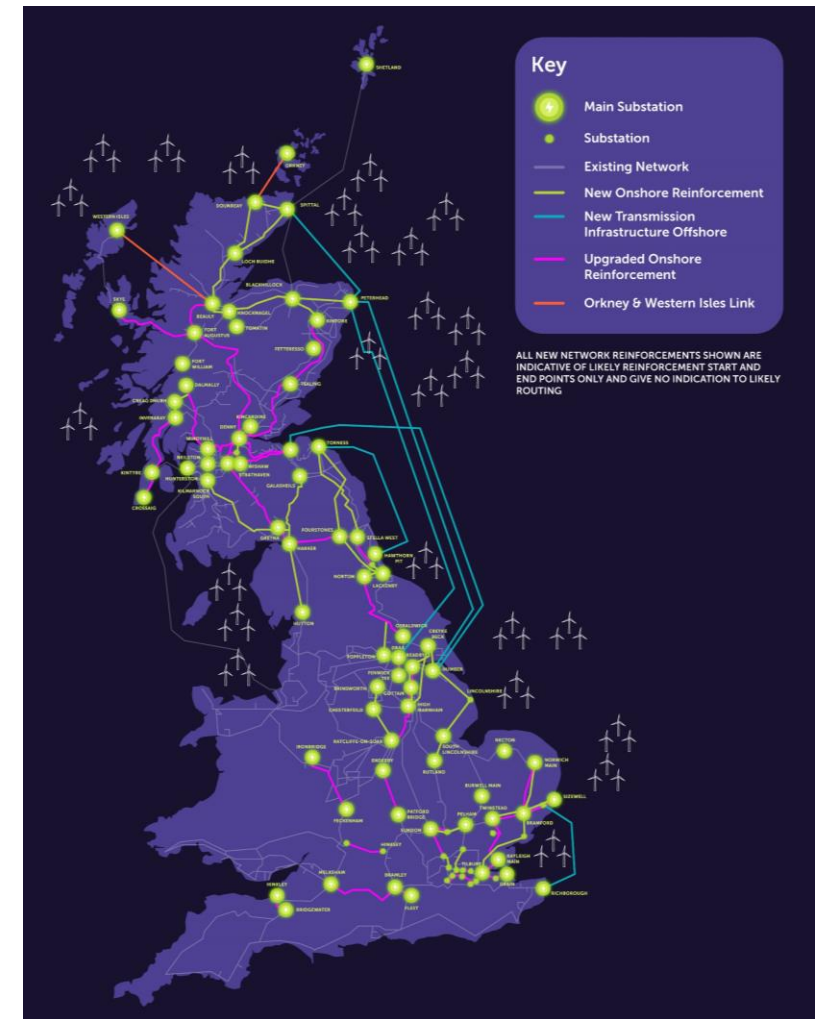
- Multiple offshore HVDC links between Scotland and England, and within the England and Wales System
- Major strategic onshore reinforcements to manage flows across boundary's

Major works in England, onshore and offshore

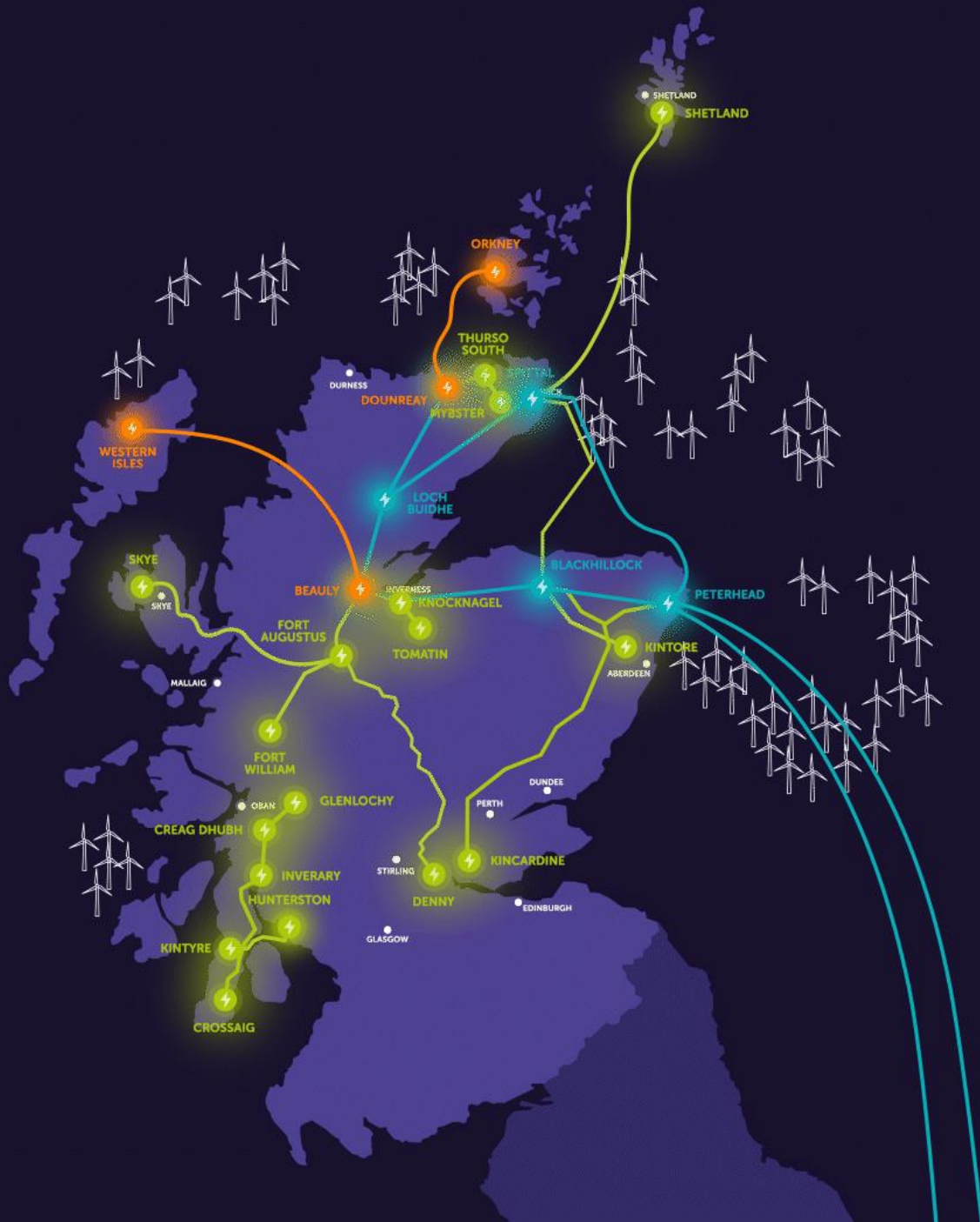
- North of England, East Anglia and Midlands key areas of focus to enable north-south power flows
- Emerging need to connect Celtic Sea offshore wind

Strategic reinforcements are key to deliver 2030 and 2035 targets

'No regret' investments, required under all credible net zero scenarios



Need for Strategic Reinforcement



Reinforcement Project

Peterhead to Drax offshore HVDC Link

Second Eastern Subsea HVDC Link from Peterhead

Beaulieu to Loch Buidhe 400kV Reinforcement

Beaulieu to Blackhillock 400kV Double Circuit Addition

Spittal to Peterhead HVDC Reinforcement

Loch Buidhe to Spittal 400kV Reinforcement

Blackhillock to Peterhead 400kV Double Circuit Addition

c10 Year Overview – Significant Projects

Onshore works

Customer Connections

Skye
 North Argyll
 Blackhillock to Peterhead 400kV
 Beauly to Dounreay 400kV
 Beauly to Blackhillock 400kV
 Loch Buidhe to Spittal 275kV
 Beauly to Loch Buidhe 275kV
 Beauly - Denny 275kV Upgrade to 400kV

Offshore works

- Orkney (AC)
- Spittal to Peterhead (DC)
- Peterhead to Drax (DC)
- Peterhead to South Humber (DC)
- Western Isles Link (DC)
- Associated Connections

Onshore Primary driver	10 Year Total	Commentary
Overhead line (km)	1,500+	Onshore works covers the key asset types listed. T2 Works covers the Certain View of works, along with giving an indication of the Uncertain View. The T3 Works, at this stage, covers the Primary NOA/Scotwind Drivers and not any ancillary upgrades or non-load works.
Underground Cable (km)	110+	
Substation Bays (No.)	360+	
Transformer (No.)	100+	
Approximate No. of contracts	100+	

Offshore Primary driver		Commentary
HVDC Cable route / HVDC Manufactured Cable Length (km)	1,000+ / 2,000+	Offshore profile includes Shetland HVDC (awarded), Western Isles (Committed).
AC Underground Cable route (km)	60+	It is anticipated further projects will be required such as Shetland and Western Isles 2 nd HVDC Links, Eastern HVDC 3 as well as unnamed Scotwind Connection.
HVDC Converters (No.)	6	
Substation bays (No.)	50+	
Transformers (No.)	10+	
Approximate No. of Projects	10+	



- Network Investment in the North of Scotland recommended by the established Annual Network Planning Cycle
- Coordinated onshore and offshore investment progressing through the Central Design Group
- Unprecedented customer connection volume and introduction of new technologies

