Network DC

How HVDC circuit breakers can help achieve Net Zero

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THE UNIVERSITY of EDINBURGH

SuperGrid Institute
Shaping power transmission

Scottish & Southern Electricity Networks
TRANSMISSION

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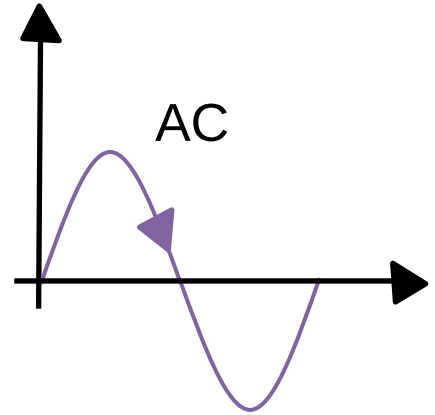
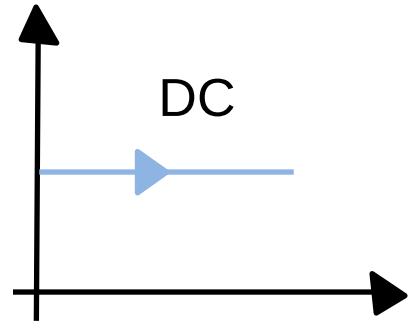
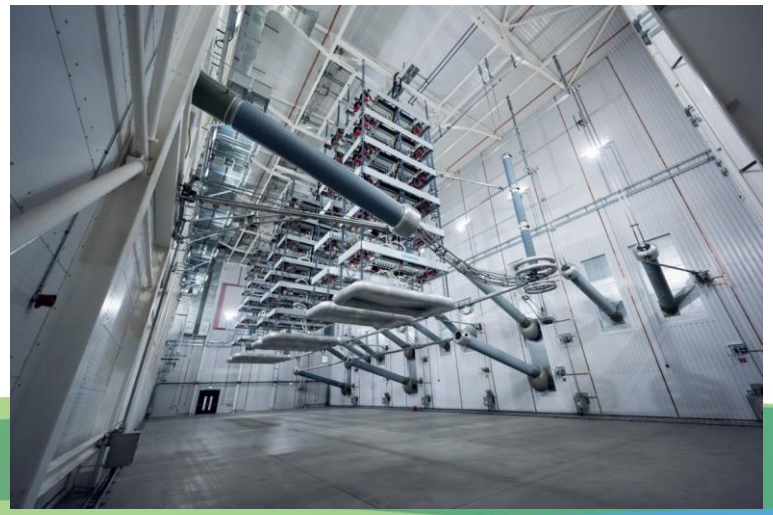
Context

- Massive opportunity and challenge of offshore wind
- Unprecedented change in transmission networks
- New technologies / supply chains / methods / risks
- Innovation needed now for build in 10+ years
- Strategic Innovation Fund (SIF) vision







Lots of HVDC

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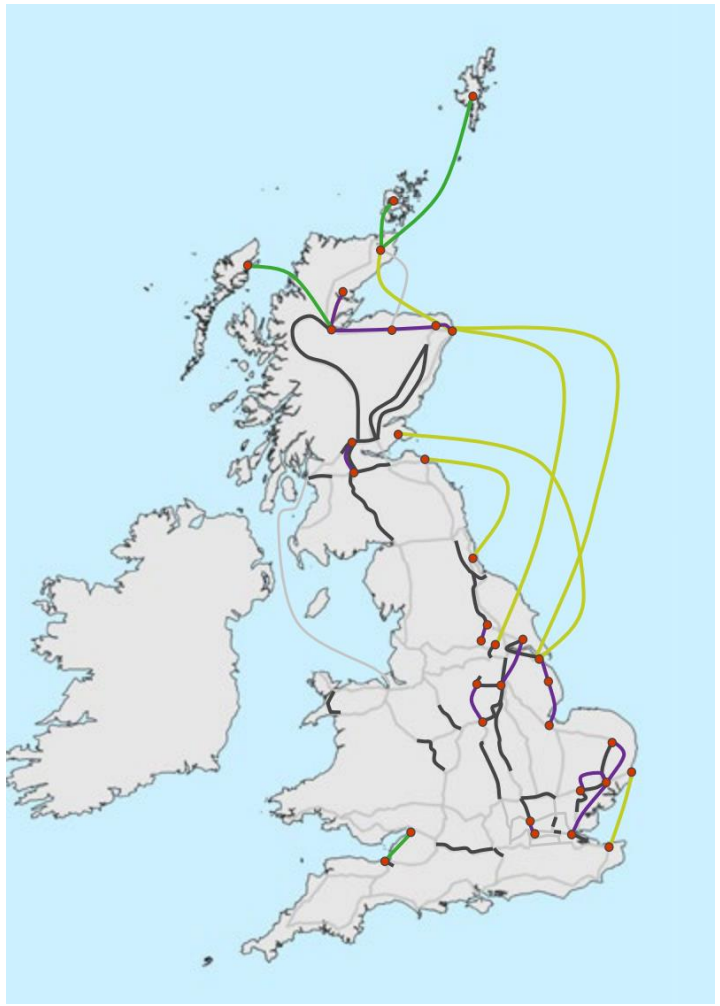

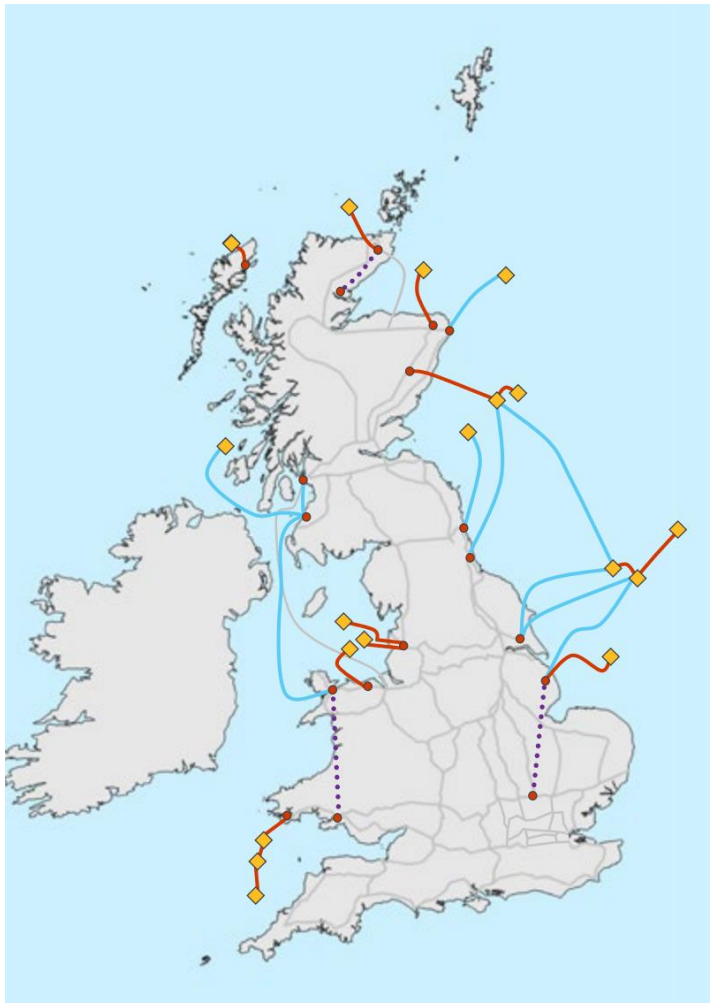

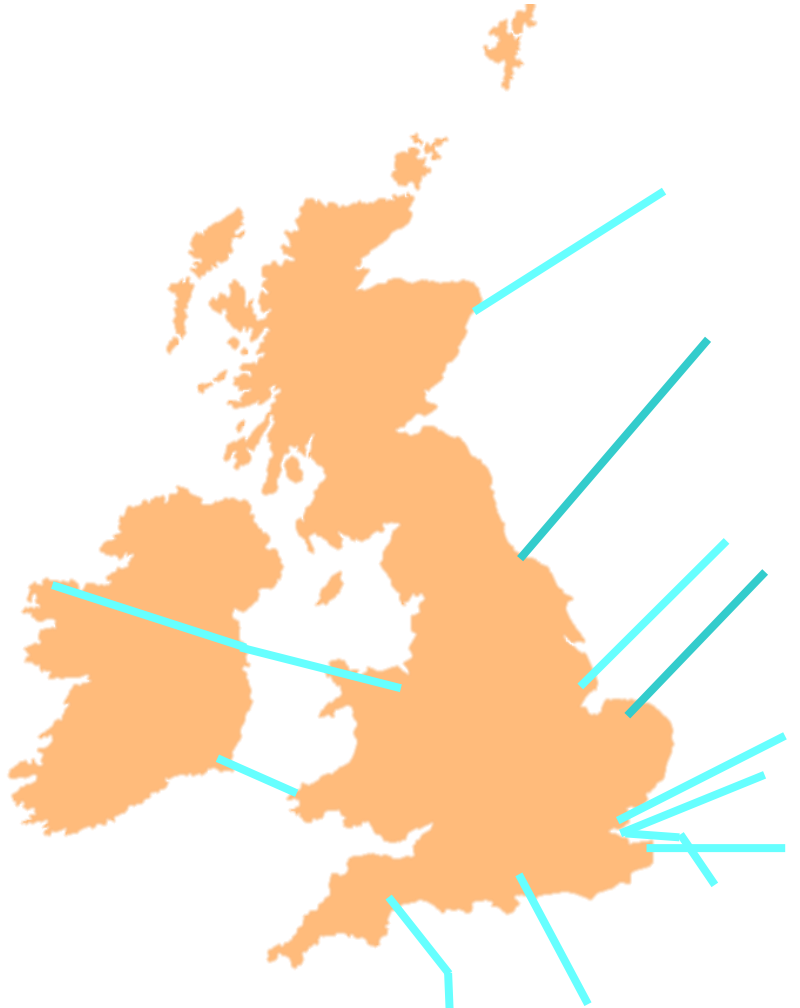

National Grid ESO Holistic Network Design (HND)

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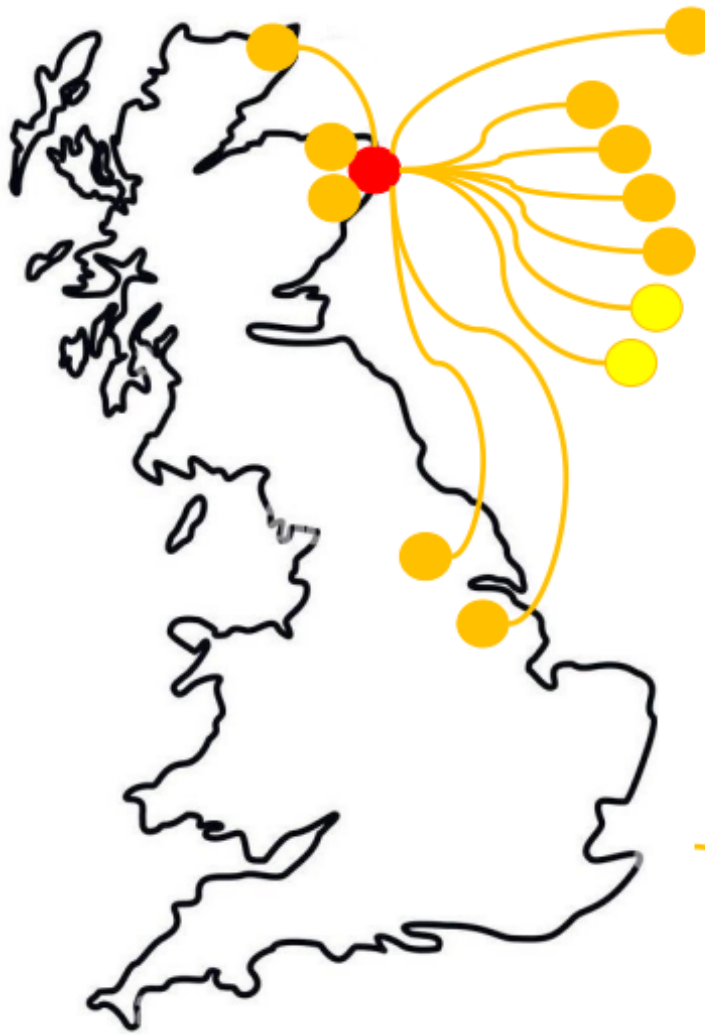
Peterhead (Project Aquila)



Link to overseas AC network

Radial Infeeds from offshore wind farms

DC Hub at Peterhead

HVDC Converter Stations
Two at Peterhead
One in the far north of Scotland (Spittal)
Two in central England
One in an another country
Multiple at offshore wind farms (or other radial infeed sources)

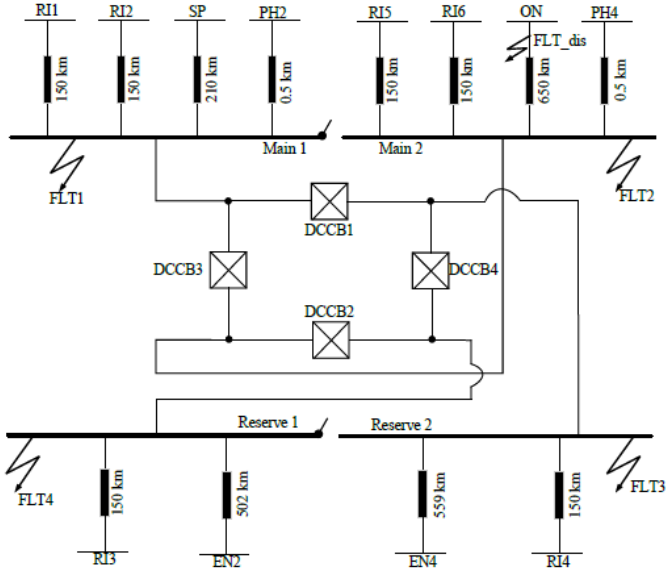
Additional connections made possible by use of DCCBs

Links shown as single lines but all are BIPOLE connections

Now: Standalone HVDC projects

Future: HVDC networks

Networks need DCCBs



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Challenges

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TECHNICAL

Different technologies (MECHANICAL / HYBRID)

Modelling and simulation

Integration with HVDC control

Design trade-offs

Specifications and standards

POLICY

Legal and regulatory frameworks

Uncertainty of grid development

COMMERCIAL

Need for demonstration

Understanding risks

SUPPLY CHAIN

Suitable market signals

Ensuring competition

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Collaboration

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TECHNICAL

Different technologies

Modelling

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Roll-Out and Benefits

- DCCB benefits in hundreds of millions per site
- SIF Discovery & Alpha
  - Obstacles identified
  - Developing understanding
  - Draft specifications
  - Early technical policies
- SIF Beta
  - Test and demonstration
  - Route to market
  - DCCBs in network plans