

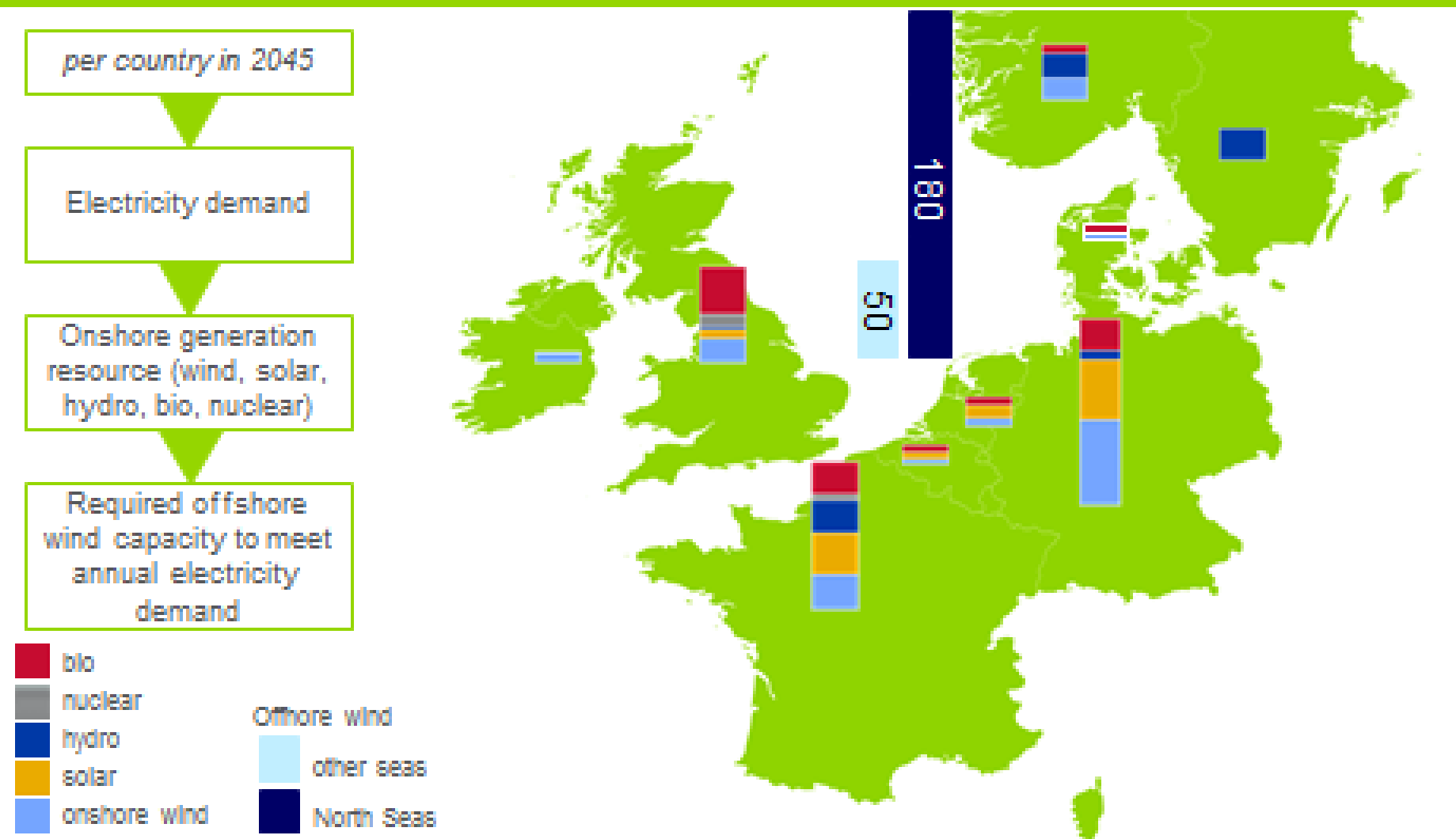
Potential flagship projects of the North Seas Energy Cooperation

Sue Harrison, BEIS UK

Henriette Nesheim & Nicole Versijp, DG Energy

Midterm conference: "PROMOTIoN Shaping a meshed
HVDC offshore grid for the Northern Seas"

NORTH SEAS OFFSHORE WIND IS PIVOTAL TO REALIZE A 100% DECARBONIZATION OF THE ELECTRICITY SUPPLY



Offshore wind contribution to RES targets: cooperation, cost reduction and MSP optimisation required

2030 & 2050 RES targets of EU

- 2030: Cut GHG emissions by 40% (compared to 1990) and increase RES share in energy mix to 27%
- 2050: Cut GHG emissions by 80-95% (compared to 1990)

Significant contribution by offshore wind

- North Sea, Baltic Sea and EU Atlantic Ocean potential of 64-86 GW installed by 2030 (WindEurope)
- North Sea potential up to 250 GW by 2050 (WEC)

Challenges for expansion of offshore wind

- Cross-stakeholder cooperation on regional level
- Reduction of offshore grid development cost
- Optimisation of maritime spatial planning (MSP)

Based on developed knowledge, North Seas Energy Cooperation took a practical approach

NSCOGI: From 2009 until 2016

- Theoretical approach: design a regulatory, legal and market framework to incentivise projects
- No concrete projects:
 - Too early, high cost of offshore wind generation
 - Insufficient interest from business community
 - BUT developed comprehensive theoretical framework

NSEC: From 2016 until today

- New context: significant cost reductions in offshore wind and political commitment for 2030-50
- Agreed (cluster) approach:
 - Bottom-up identification of potential flagship projects
 - Extensive stakeholder interaction and support for early movers
 - Learning by doing - step-by-step development of framework
 - Share knowledge and best practices

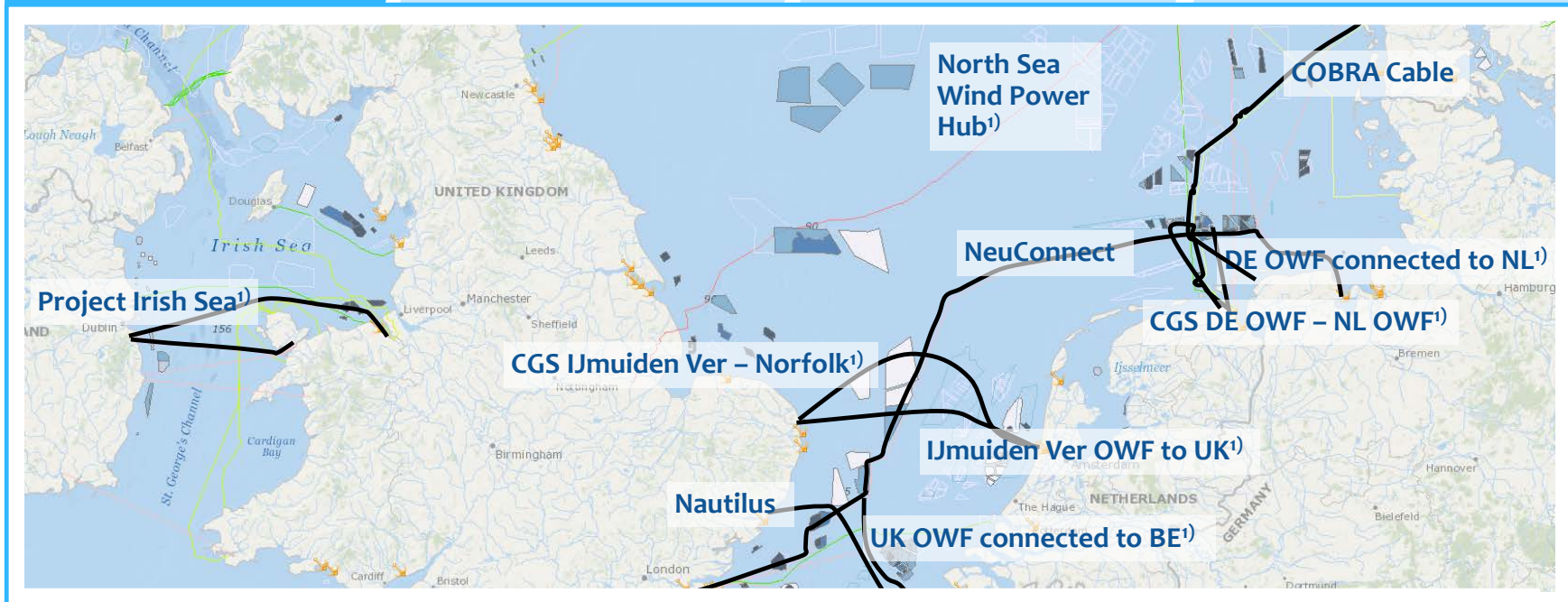
In a study, potential flagship project starting points identified in 4 clusters across North Seas

Phase 1:
Identification

Phase 2:
Evaluation

Phase 3:
Action Plans

Phase 4:
Lessons learned



Source: 4COffshore

1) Location / routing indicative

High-level project validation and support for early movers as first steps towards optimised grid

Phase 1:
Identification

Phase 2:
Evaluation

Phase 3:
Action Plans

Phase 4:
Lessons learned

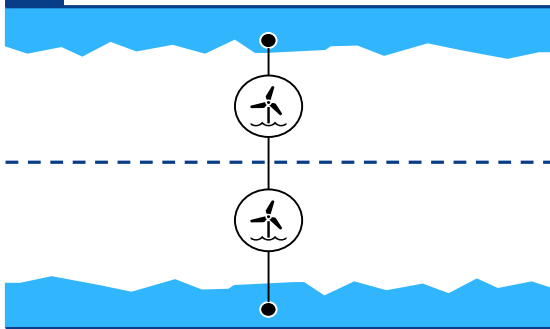
- High-level evaluation of potential flagship projects regarding commercial and societal benefits; assessment of barriers to project implementation
- Development of cluster-specific Action Plans to overcome identified barriers and facilitate implementation
- Collection and dissemination of lessons learned and best practices
- Flagship projects are considered potential building blocks of future grid – modular development: no-regret projects and built-in optionality

Long-term (regionally) optimised grid (possibly including storage / power to X) addressed by PROMOTiON

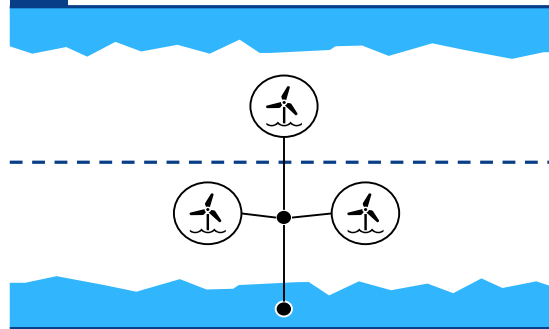


Six hybrid project concepts: building blocks for optimised grid development

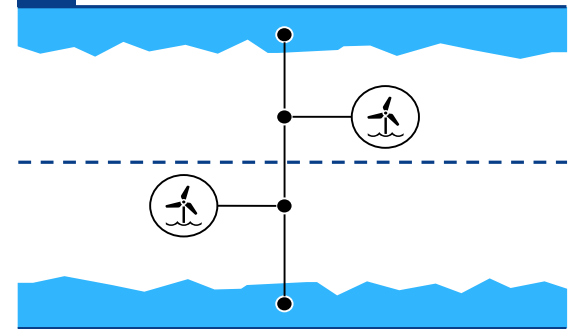
A "Combined grid solution"



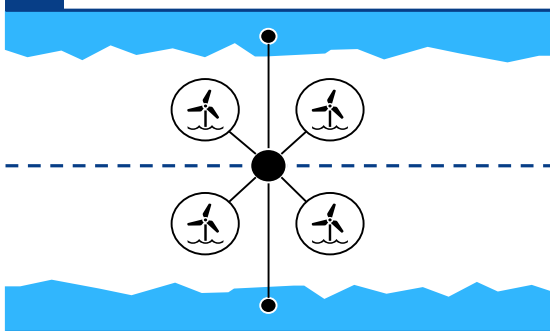
B "Modular grid"



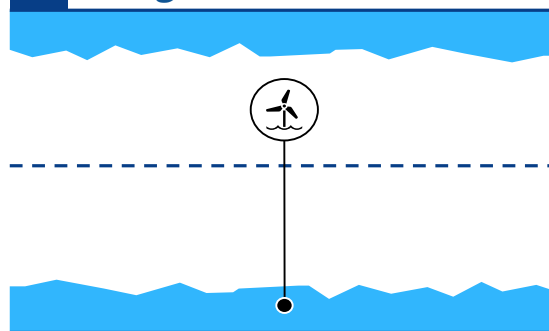
C "Interconnector tie-in"



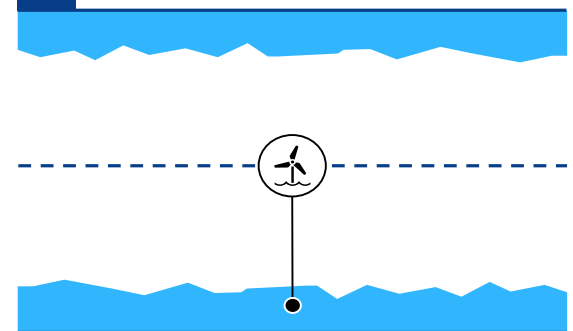
D "Offshore hub"



E "Neighbour lease"

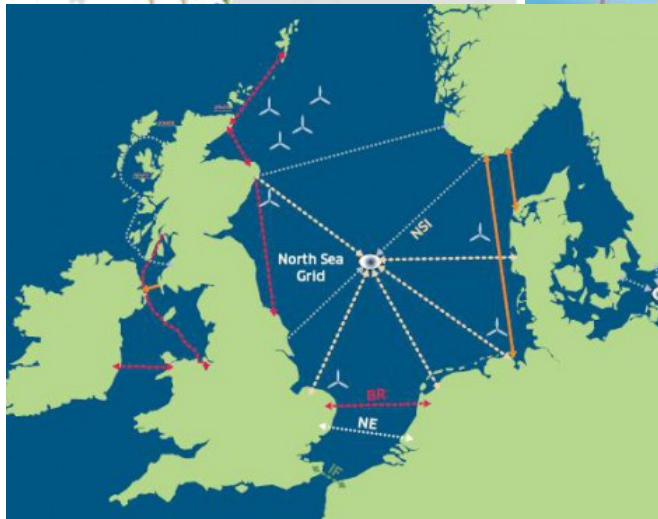
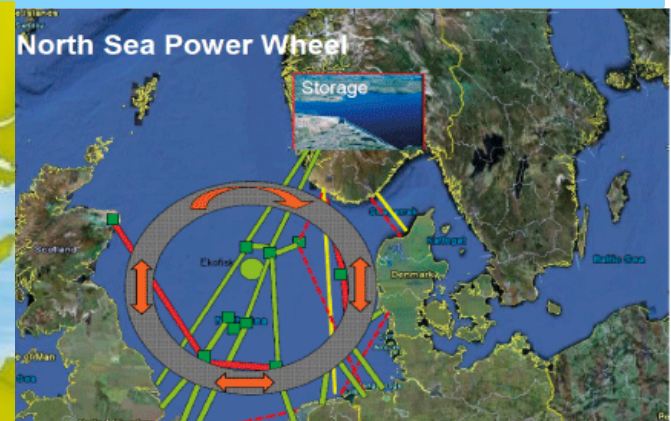


F "Cross-border OWF"



⊙ Offshore wind farm ● Converter station - - EEZ border — Offshore cable

The future offshore grid?



Thank you for your attention!
Do you have any questions?

