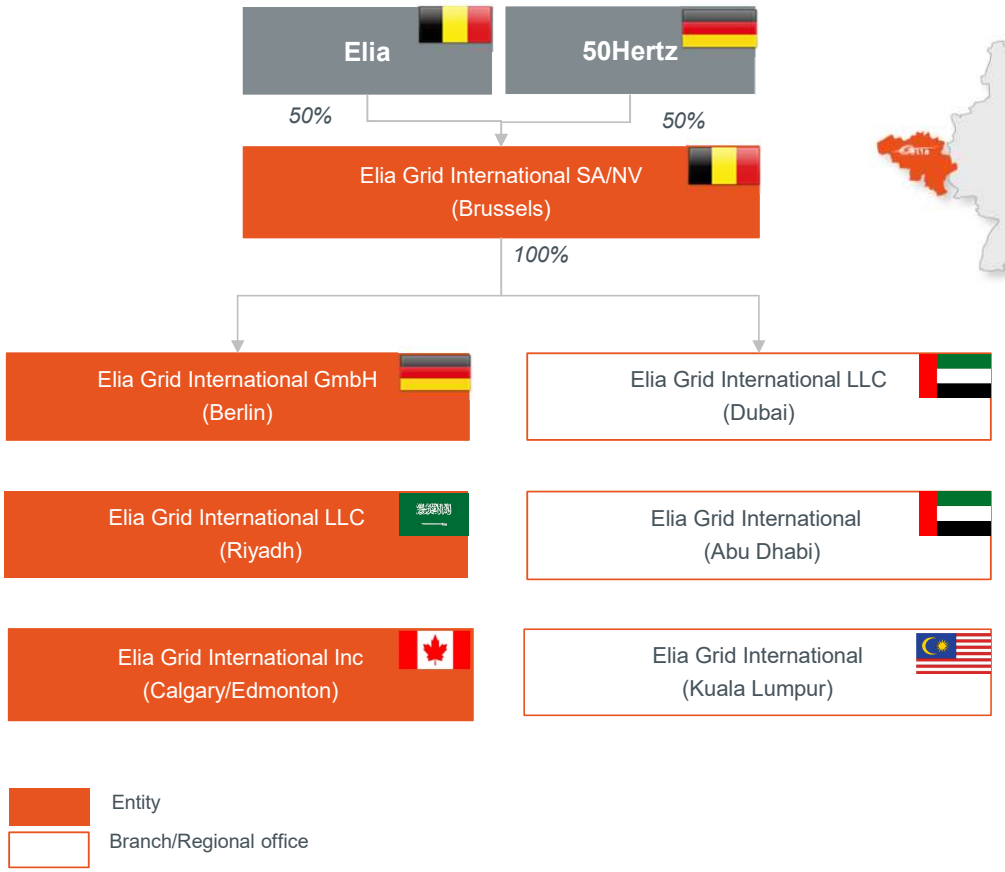
Bridging The Provinces

Harnessing European Insights: Bridging Provinces with Hybrid Offshore Wind Interconnectors and Energy Islands

18.05.2025

EGI is a fully ring-fenced company, delivering power consultancy services through offices strategically positioned in key regions



EGI builds on Elia Group's experience to provide state-of-the-art solutions for its worldwide partners

EGI embodies **the international ambitions** of the Elia Group:

- Offers **consultancy and engineering services** to the international energy market,
- Develops and manages **power system projects for third parties**

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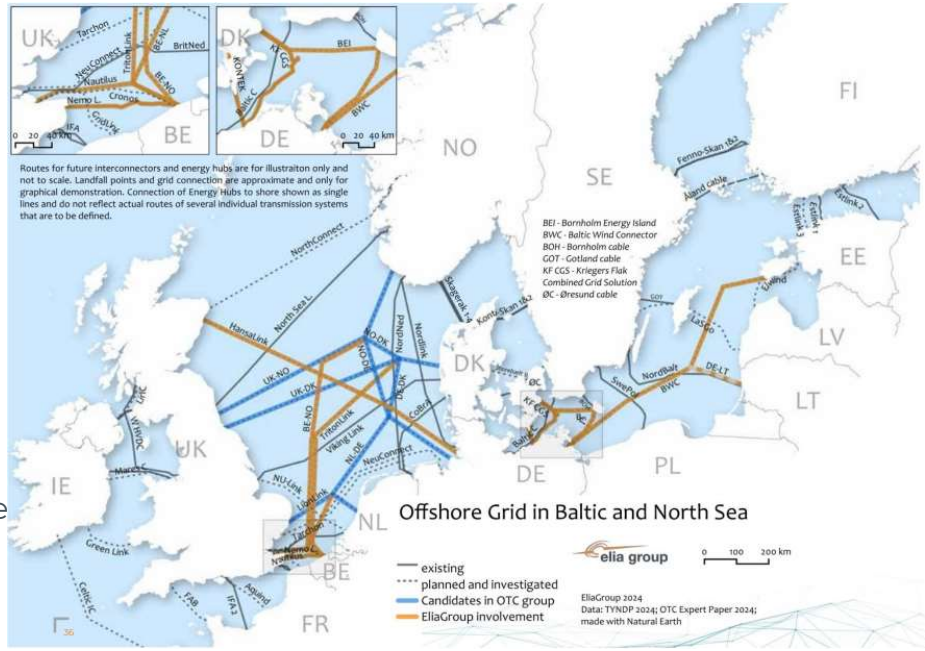
Moving from radial (point to point) connection toward integrated cross border connections

- Using maritime space and resources more efficiently by using same subsea cables for connecting offshore wind and trading electricity
- 1 of of 7 GW will be connected via Offshore Hybrid Interconnectors*
- Hybrid Corridors will progressively grow up to 14% of offshore RES in 2050*
- Price reductions spill out benefits beyond hosting countries by reducing future price peaks and lowering prices**
- Increases utilisation rate (from 55% to 65%)= value of asse reduces risk**
- Increasing levels of collaboration through hybrid interconnectos leads to increased interco. capacities



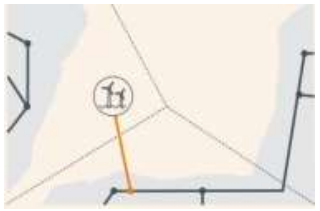
ENTSO-E Offshore Network Development Plans (ONDPs) as part of its Ten-Year Network Development Plan (TYNDP) for 2024

**Going Like The Wind by Elia Group - Issuu

Elia Group's Offshore technology coverage

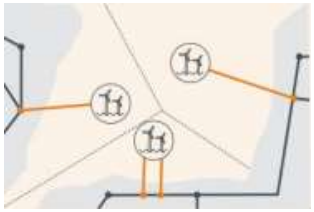
Trend: Increasingly complex technologies to lower transmission cost and environmental impact
Result: Innovation

Radial connections



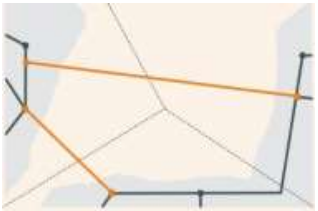
Baltic I (48MW)
Baltic II (288 MW)

Modular connections



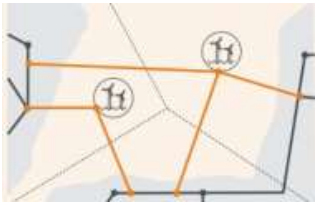
Ostwind I (735 MW)
MOG I (1 GW)
Ostwind II (750 MW)

Point-to-point interconnectors



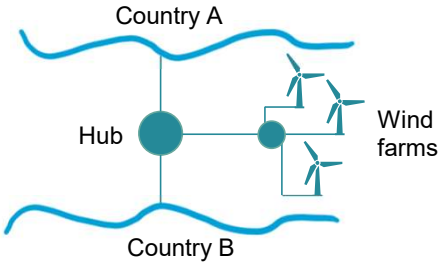
Kontek (600 MW HVDC)
NEMO Link (1 GW HVDC)
Hansa Power Link (700 MW HVDC)

Hybrid interconnectors



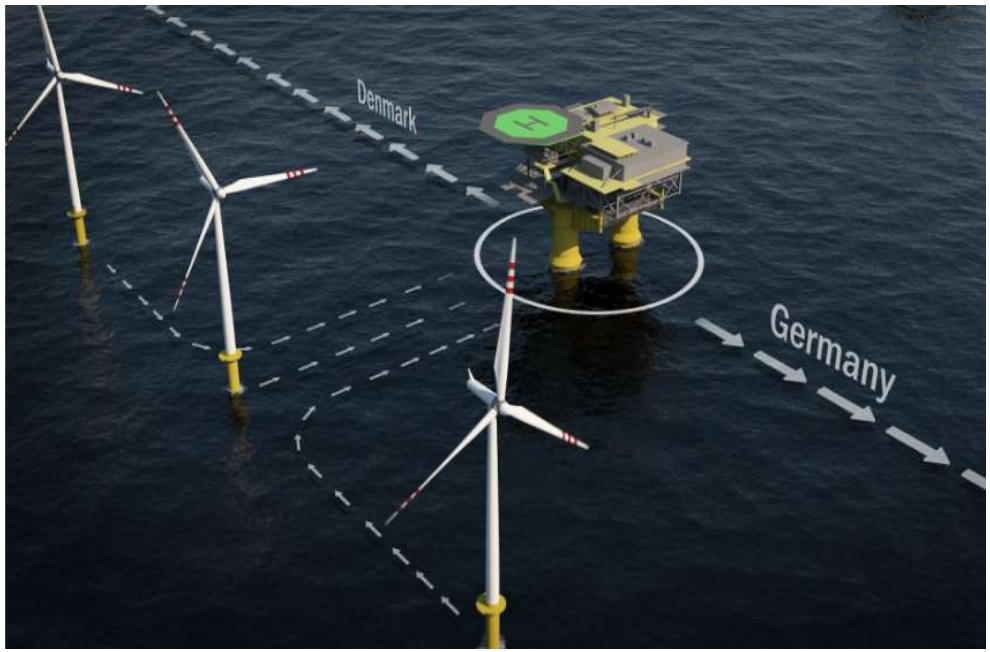
Kriegers Flak CGS (440 MW)

Offshore hubs / Multi-Purpose Islands



Bornholm Energy Island (2 GW HVDC)
Princess Elisabeth Island(2GW)
Nautilus

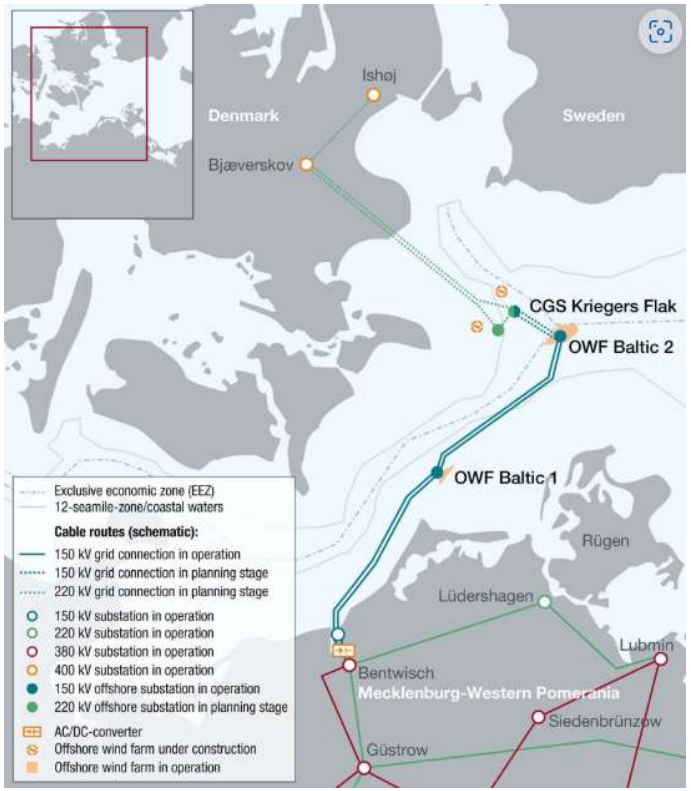
Kriegers Flak: Combined Grid Solution (CGS): from 50Hertz (Germany TSO) and Energinet (Danmark TSO)



- World´s first Hybrid interconnector serves two purposes:
  1. Connects across borders and allows for electricity exchange
  2. Feeds respective grids with offshore wind from 3 OWFs
- During high winds, energy from wind farms is fed in and during low winds, available capacity is exchanged through 2 subsea cables.
- Provides balancing services-> esp. Key for higher RES integration
- Connects and facilitates exchange between operations in DE and DK2 which use different phases (150 to 220 kW)-back to back converter in DE
- Most possible assets are onshore

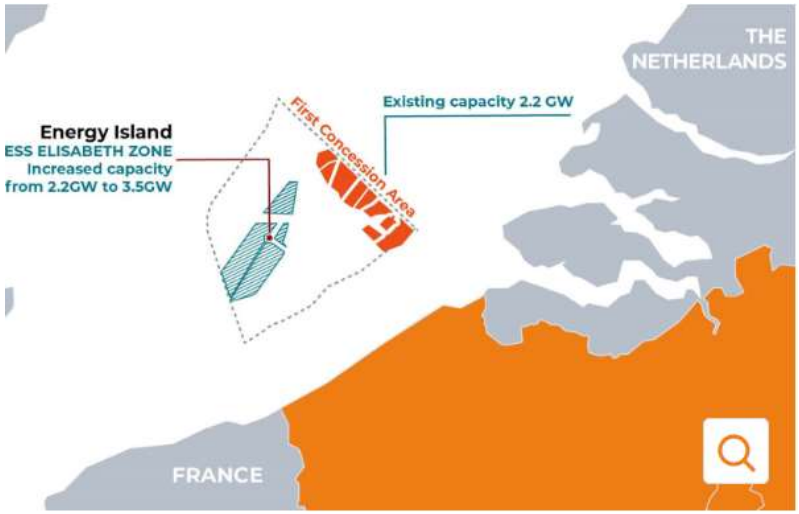
Kriegers Flak: Combined Grid Solution (CGS): from 50Hertz (Germany TSO) and Energinet (Danmark TSO)

- Construction began end of 2016 and official operation by end of 2020
- Chosen as Project of Common Interest (PCI) by EU to be eligible for grant financing
- 440 MW transfer capacity between Germany & Denmark
- Germany OWF: Baltic 1 (48 MW) and Baltic 2 (288 MW)
- Denmark: Kriegers Flak OWF (600 MW)
- HVDC Lines



MIO: The Master Controller acts as the 'brain' of the entire system. It calculates the available capacity of the interconnector (based on wind forecasts and the resulting wind infeed) in real-time, prevents overload by controlling the converter and/or the wind farms, maximises the feed-in from the wind farms through active system control, and controls the exchange of electricity between the grids of both countries by means of the converter installed in Mecklenburg-Western Pomerania (Germany

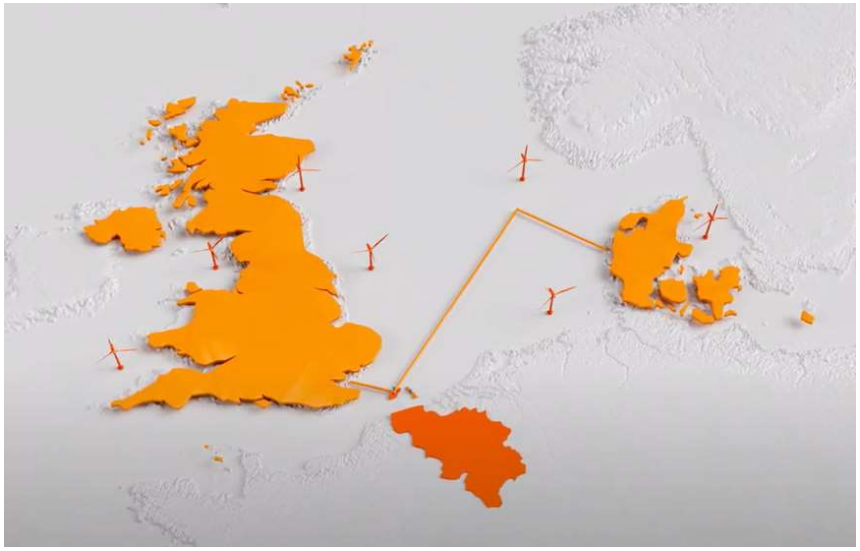
Artificial Energy Island: Elia's Princess Elisabeth Island



Support from the European Recovery Fund

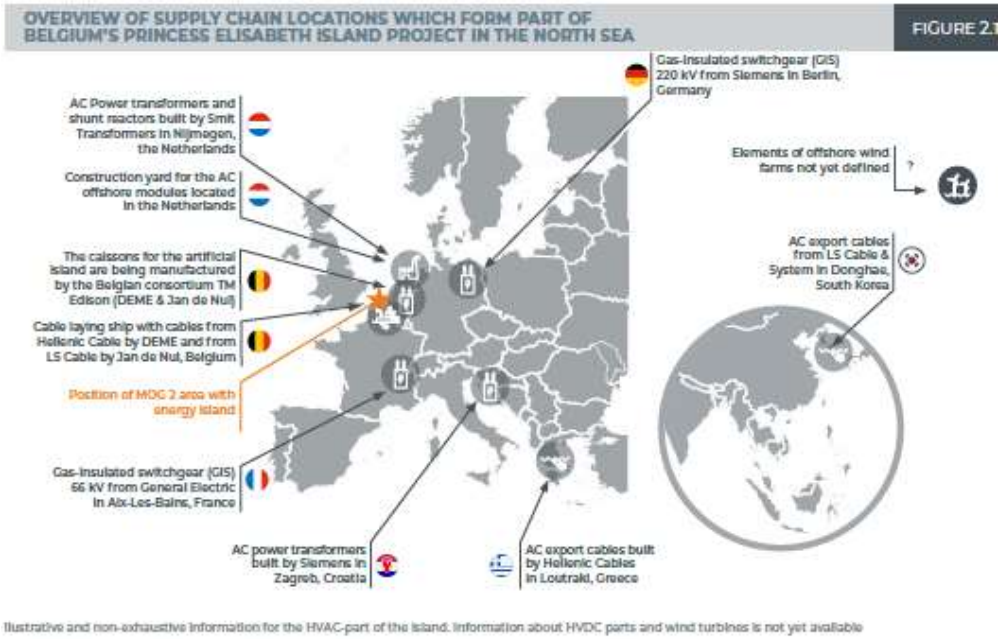
- located 45 km off the Belgian coast in the middle of the Princess Elisabeth Zone - Belgium's second offshore wind zone;
- Landing point for interconnectors in the are (UK & DK);
- Facilitate trade of energy across and offshore wind integration
- host a small harbour and helipad so maintenance crews can access it;
- host both high-voltage direct current (HVDC) and alternating current (HVAC);

- 2022-2023 tendering, permitting, and land applications
- 2024-2026-offland construction
- 2026-2030 construction on the island and connection planned for 2030
- 1 Phase: BE (MOG 2-3.5 GW OWF-AC & DC)
- 2 Phase: UK-BE (Nautilus 1.4 GW OWF)
- 3 Phase : DE-BE (Triton Link 2 GW)
- 4 Phase: Energy Hub (BE-UK-DE) HVDC substation on energy island



Lessons Learned

- Cost and Benefits do not have to be shared **equally** across borders, but must be **fair**
- **=BALANCED ALLOCATION OF RISKS**
- **Early** collaboration and joint planning
- No single country can design, develop, and build, needs Pan European approach
- Sourcing/Parts/Procurement Strategy is coordinated for Hybrid/Hub projects
- Futureproof



=BALANCED ALLOCATION OF RISKS

Source: Elia **Going Like The Wind – Study Oct 2024**