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EUROPEAN CLIMATE GOALS FOR 2050 REQUIRE SUSTAINABLE CONCEPTS TODAY

- Decarbonization drives the transformation of the **energy system**.
- Electricity with a key role:
  - Mostly **renewable generation** distant from load centers – especially offshore wind energy
  - Increasing share of electricity in **final energy consumption**

➢ Integration of renewable generation is a **spatial and temporal challenge** for the energy system.

➢ Further enhancement of the **overall energy system** needed for RES integration to achieve the climate goals – from a system‘s perspective including **sector coupling**.

CO_2-neutral

climate neutrality in the EU by 2050

~ 450 GW

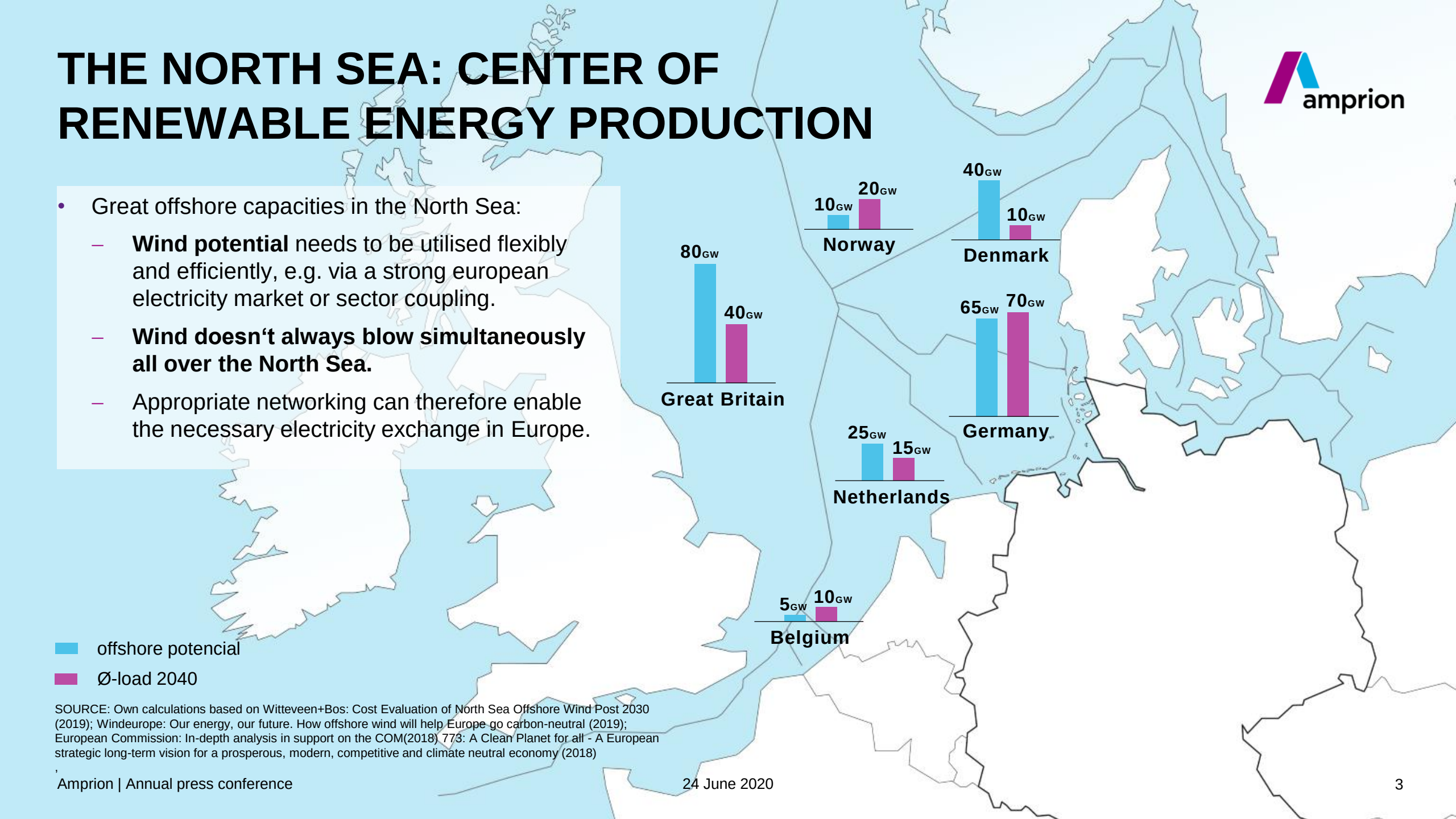
offshore capacity required to achive the EU 1.5°C target

10

years needed on average to build a new power connection

THE NORTH SEA: CENTER OF RENEWABLE ENERGY PRODUCTION

- Great offshore capacities in the North Sea:
  - **Wind potential** needs to be utilised flexibly and efficiently, e.g. via a strong european electricity market or sector coupling.
  - **Wind doesn‘t always blow simultaneously all over the North Sea.**
  - Appropriate networking can therefore enable the necessary electricity exchange in Europe.



offshore potencial

Ø-load 2040

SOURCE: Own calculations based on Witteveen+Bos: Cost Evaluation of North Sea Offshore Wind Post 2030 (2019); Windeurope: Our energy, our future. How offshore wind will help Europe go carbon-neutral (2019); European Commission: In-depth analysis in support on the COM(2018) 773: A Clean Planet for all - A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy (2018)

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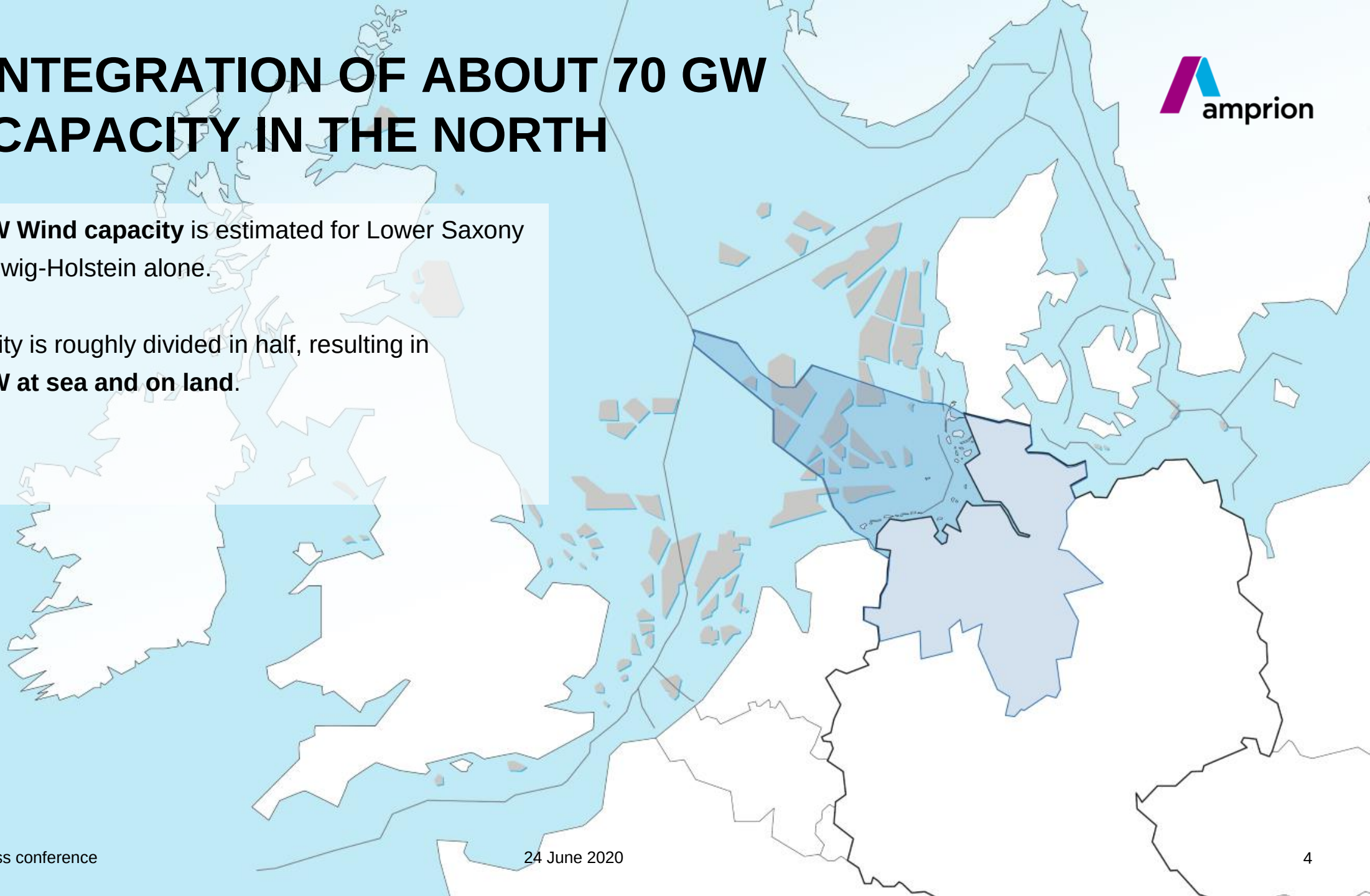
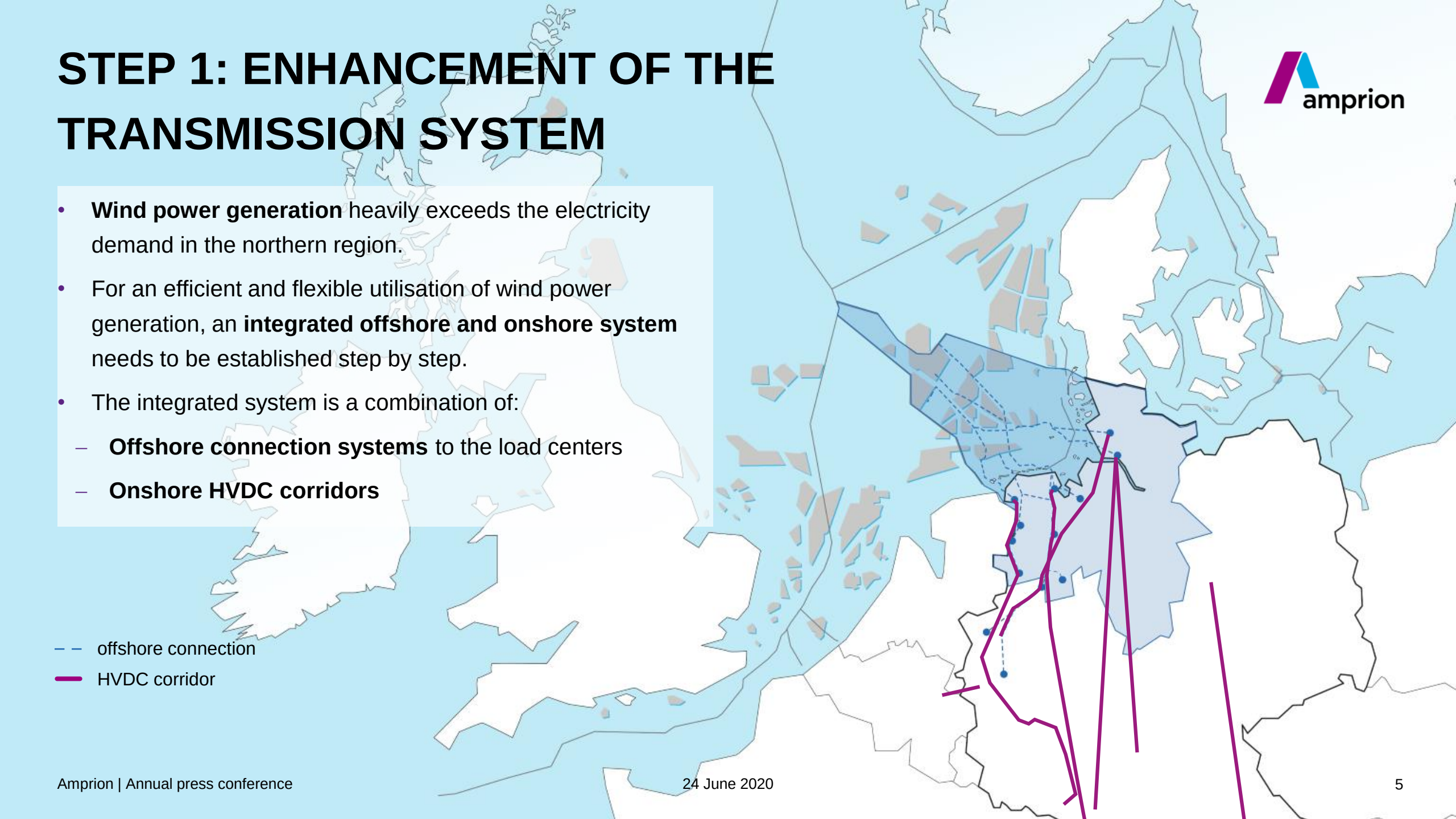
2035: INTEGRATION OF ABOUT 70 GW WIND CAPACITY IN THE NORTH

- **60 – 70 GW Wind capacity** is estimated for Lower Saxony and Schleswig-Holstein alone.
- This capacity is roughly divided in half, resulting in **30 – 35 GW at sea and on land**.



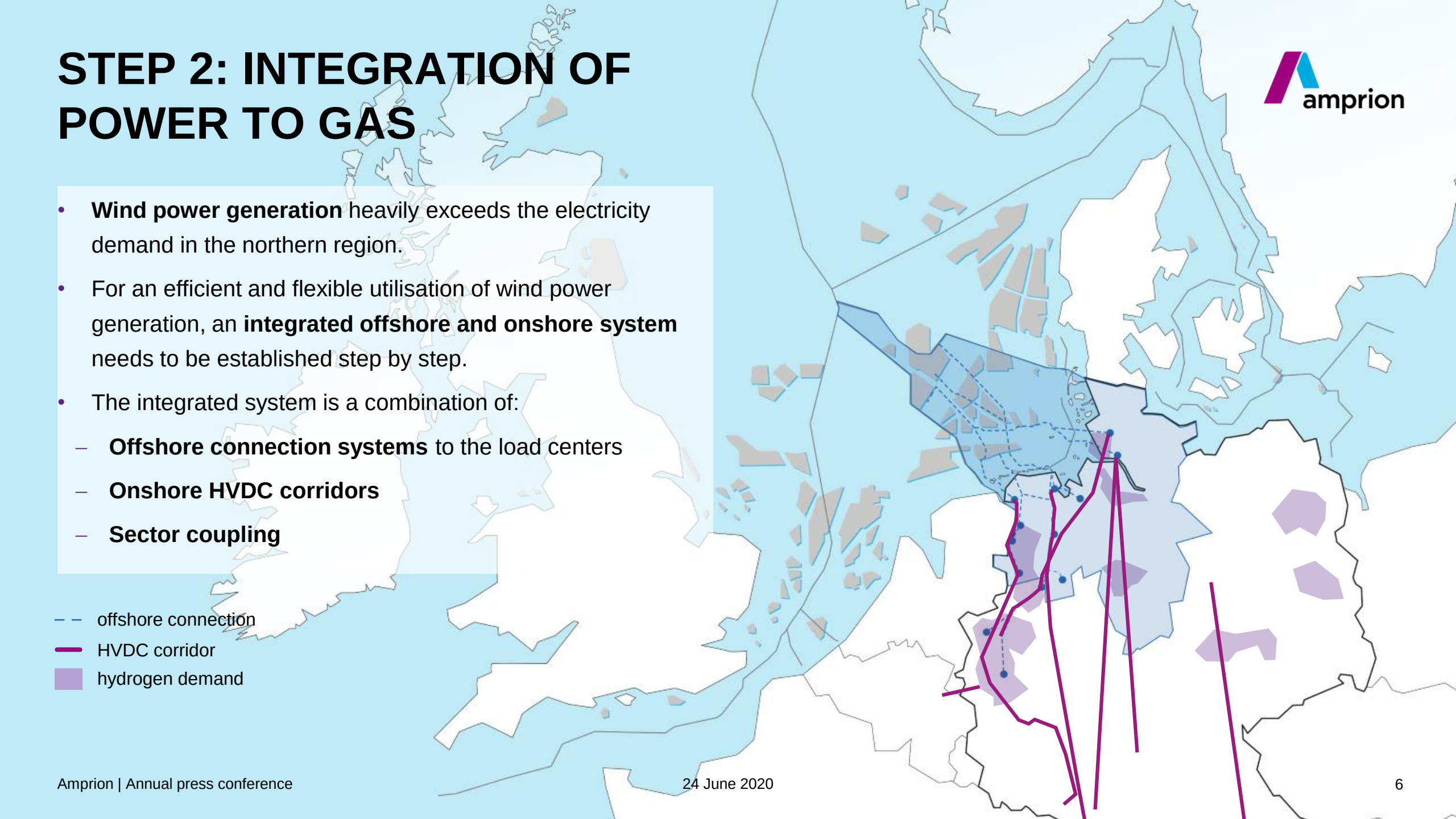
STEP 1: ENHANCEMENT OF THE TRANSMISSION SYSTEM

- **Wind power generation** heavily exceeds the electricity demand in the northern region.
- For an efficient and flexible utilisation of wind power generation, an **integrated offshore and onshore system** needs to be established step by step.
- The integrated system is a combination of:
  - **Offshore connection systems** to the load centers
  - **Onshore HVDC corridors**



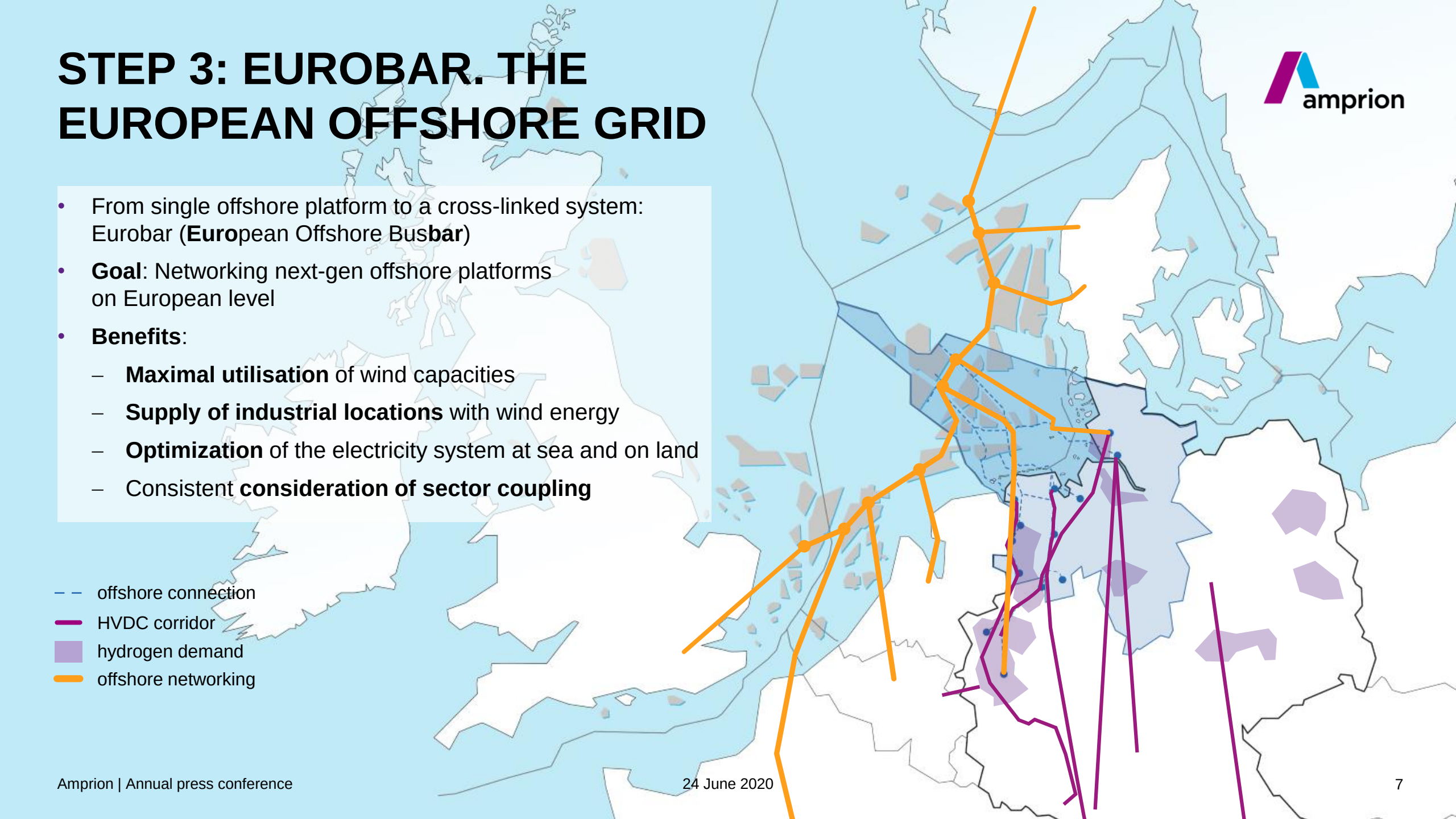
STEP 2: INTEGRATION OF POWER TO GAS

- **Wind power generation** heavily exceeds the electricity demand in the northern region.
- For an efficient and flexible utilisation of wind power generation, an **integrated offshore and onshore system** needs to be established step by step.
- The integrated system is a combination of:
  - **Offshore connection systems** to the load centers
  - **Onshore HVDC corridors**
  - **Sector coupling**



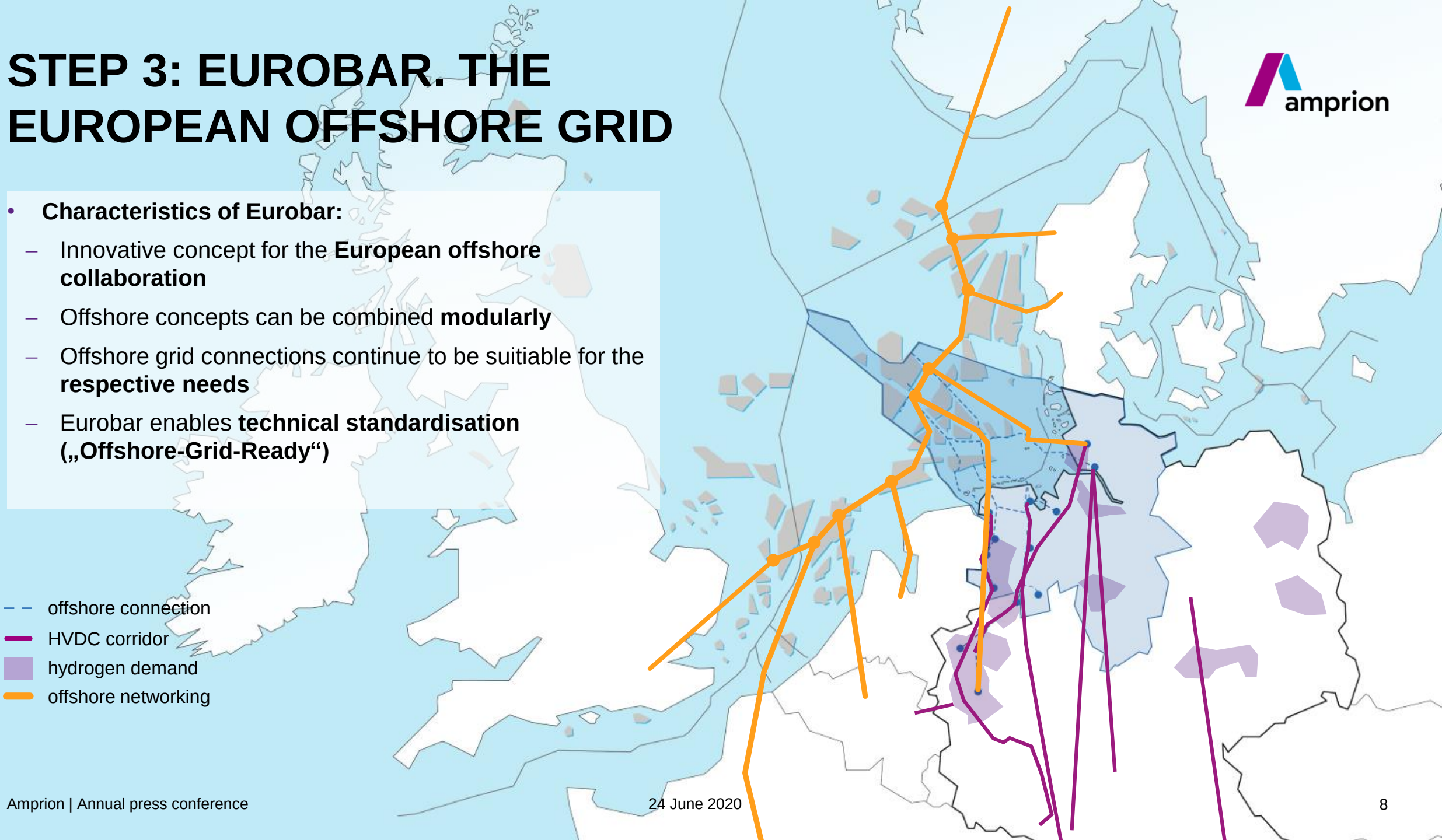
STEP 3: EUROBAR. THE EUROPEAN OFFSHORE GRID

- From single offshore platform to a cross-linked system: Eurobar (**Euro**pean Offshore Bus**bar**)
- **Goal**: Networking next-gen offshore platforms on European level
- **Benefits**:
  - **Maximal utilisation** of wind capacities
  - **Supply of industrial locations** with wind energy
  - **Optimization** of the electricity system at sea and on land
  - Consistent **consideration of sector coupling**

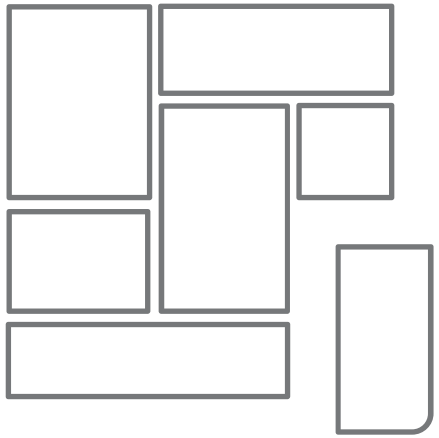


STEP 3: EUROBAR. THE EUROPEAN OFFSHORE GRID

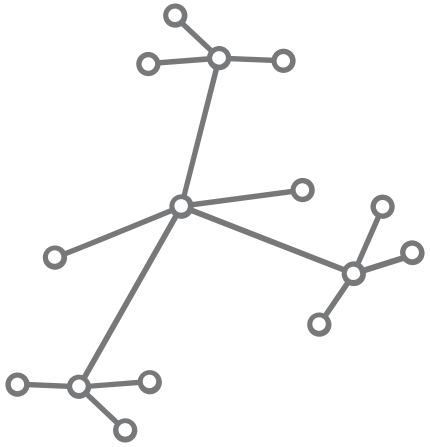
- **Characteristics of Eurobar:**
  - Innovative concept for the **European offshore collaboration**
  - Offshore concepts can be combined **modularly**
  - Offshore grid connections continue to be suitiable for the **respective needs**
  - Eurobar enables **technical standardisation („Offshore-Grid-Ready“)**



EUROBAR – A JOINT INITIATIVE



MODULAR
Due to its modular composition Eurobar can be expanded step by step.



SYSTEM-ORIENTED
Eurobar is a new component in the future European energy system.

COLLECTIVE
Eurobar is a joint system that can be implemented autonomiously by international partners.

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