

Northern Lights CO₂ transport and storage at scale



Børre Jacobsen, 31st October
2023

Longship value chain



LONGSHIP

CO₂ capture

Capture from industrial plants.
Liquefaction and temporary storage.



NORTHERN LIGHTS SCOPE

Transport

Liquid CO₂
transported by ship.



Receiving terminal

Intermediate onshore storage.
Pipeline transport to offshore
storage location.



Permanent storage

CO₂ is injected into a saline aquifer.



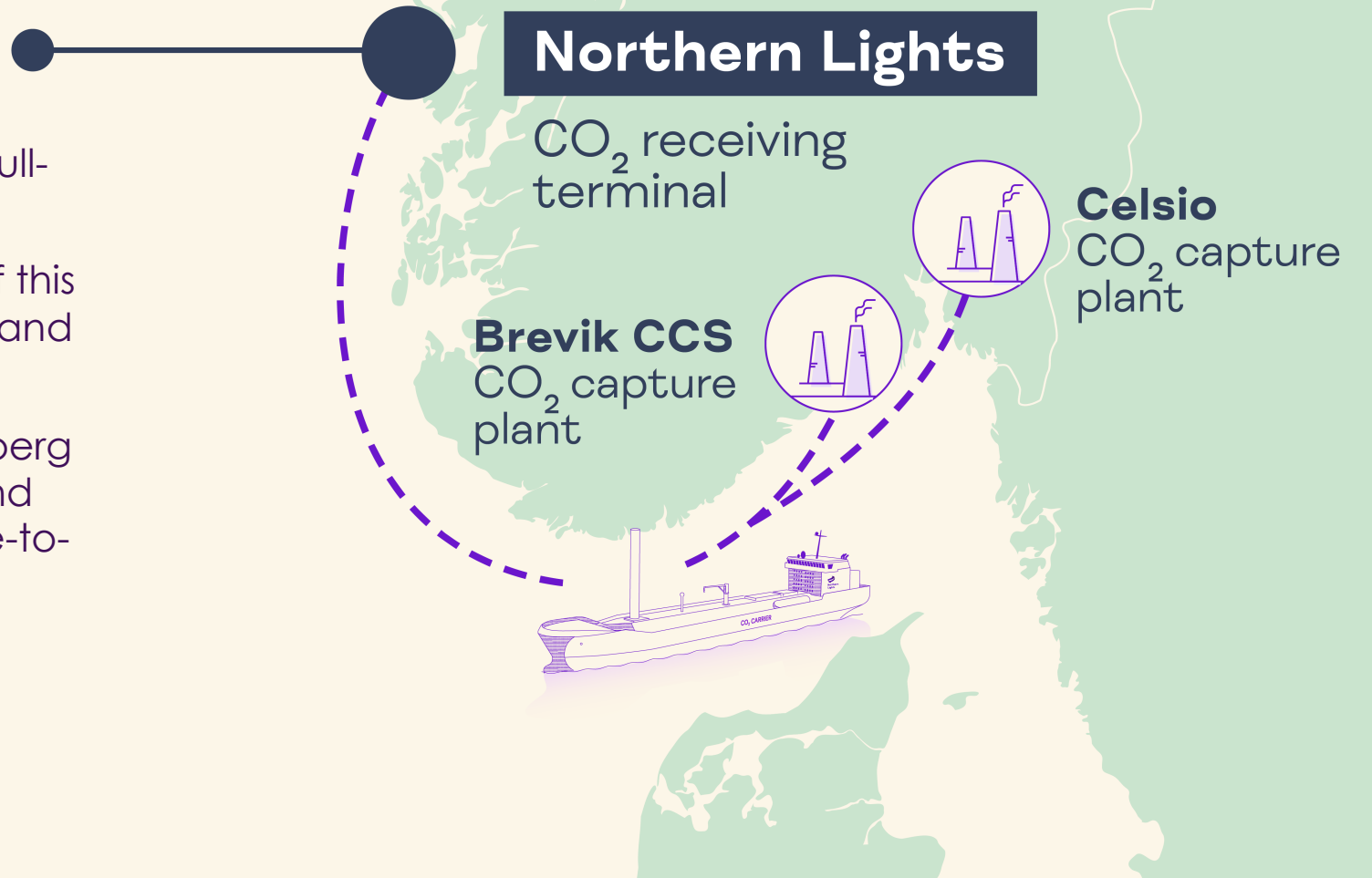
100 km

2 600 m



The Longship project

- The first phase of the Northern Lights development is **80% funded** by the Norwegian state
- Part of the **Longship project** (launched 2020): the Norwegian government's ambition to develop a full-scale CCS value chain in Norway
- Aiming to **demonstrate the potential** of this decarbonisation approach to Europe and the world.
- Includes **CO₂ capture** from the Heidelberg Materials cement factory (Norcem) and the Hafslund Oslo Celsio (Celsio) waste-to-energy plant.



Status update



Northern Lights visitor centre
Øygarden, Norway



Onshore facilities

Storage tanks

Workshop

Future expansion

Admin/visitor centre

Injection pumps

Pipeline tunnel

Jetty

→ Construction progressing according to plan, **more than 90% complete**

→ **Ready for operation in 2024**

Drilling completed

- Drilling of **exploration well** in 2020 confirmed reservoir in Johansen formation suitable for **safe and permanent CO₂ storage**
- Located within CO₂ storage **license EL001** in the North Sea, awarded in January 2019
- Drilling operations for a **CO₂ injection well** and a **contingent injection well** completed November 2022
- Preliminary results confirm the **storage capacity** of at least **5 million tonnes** CO₂ per annum



Photo: Transocean

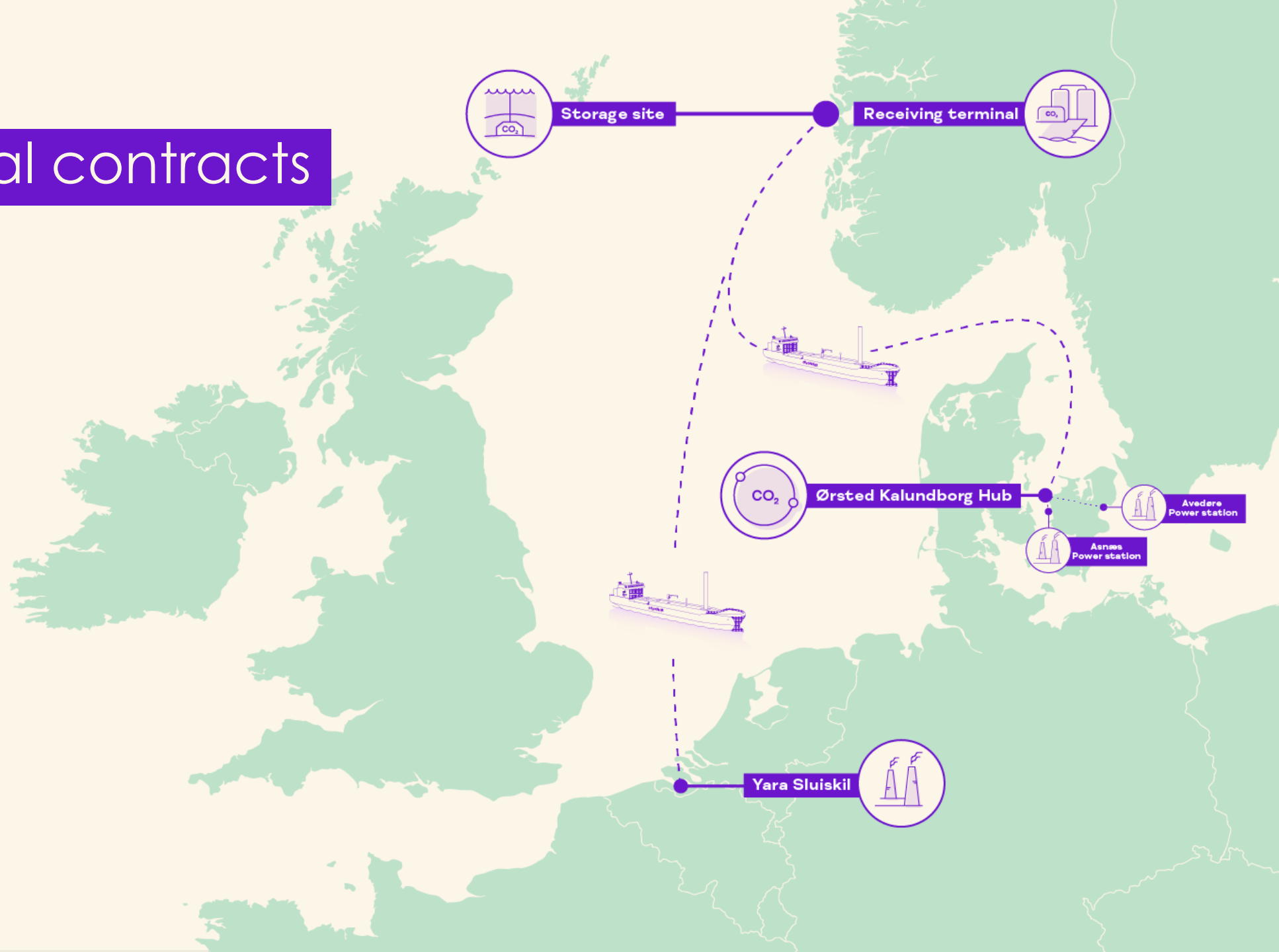
Ship transport status

- **Two LCO2 transport ships** under construction at Dalian Shipbuilding Industry Co shipyard in China – 50% completed
- Ship building **contracts awarded** in October 2021
- **Construction start** marked by steel cutting ceremony in November 2022
- **World's largest** custom LCO2 ships
- Ships on schedule to be **delivered** in 2024
- **Third** ship building contract awarded in September 2023 for delivery in 2025



Ship construction at Dalian Shipbuilding Offshore Co. September 2023

Commercial contracts



Commercial contracts



Yara

- Ammonia and fertiliser plant in the Netherlands
- Main terms of agreement signed in August 2022
- 800.000 tonnes CO2 annually



Ørsted

- Bioenergy plants in Denmark – negative emissions
- Transport and Services Agreement signed in May 2023
- 430.000 tonnes CO2 annually



Northern Lights

norlights.com