

**MAKE
POSSIBLE**

**Offshore CCS
&
Experience from Northern
Lights CCS Project**



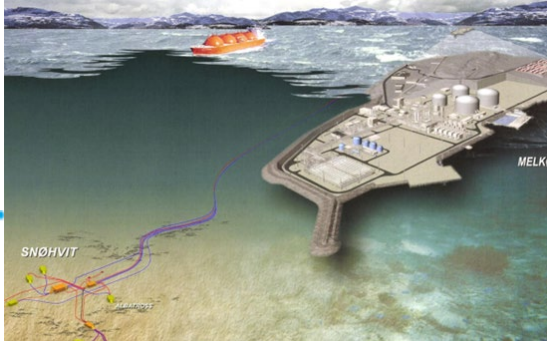
2024 JAPAN CCS FORUM – 04 DEC

subsea 7



**MAKE
POSSIBLE**

Selected projects in harsh environment and seismic active areas



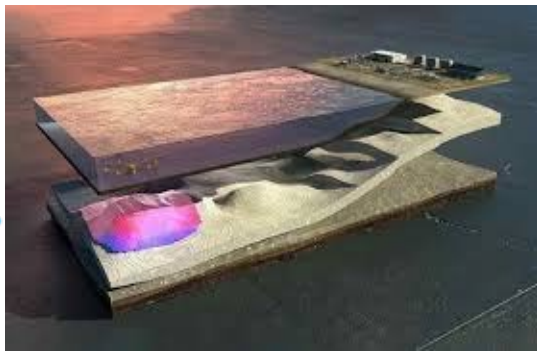
Snohvit CO2 Injection,
Norway



Ormen Lange, Norway



West Nile Delta, Egypt



Sakarya, Türkiye



Viking CCS Pipeline Survey,
UK



Yunlin and Formosa 2
Wind Farms, Taiwan

CCS Delivery Chain

Capture

Transport

Store





CO₂ transport & storage at scale - Longship



NORTHERN LIGHTS SCOPE

CO₂ capture

Capture from industrial plants.
Liquefaction and temporary storage.



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.



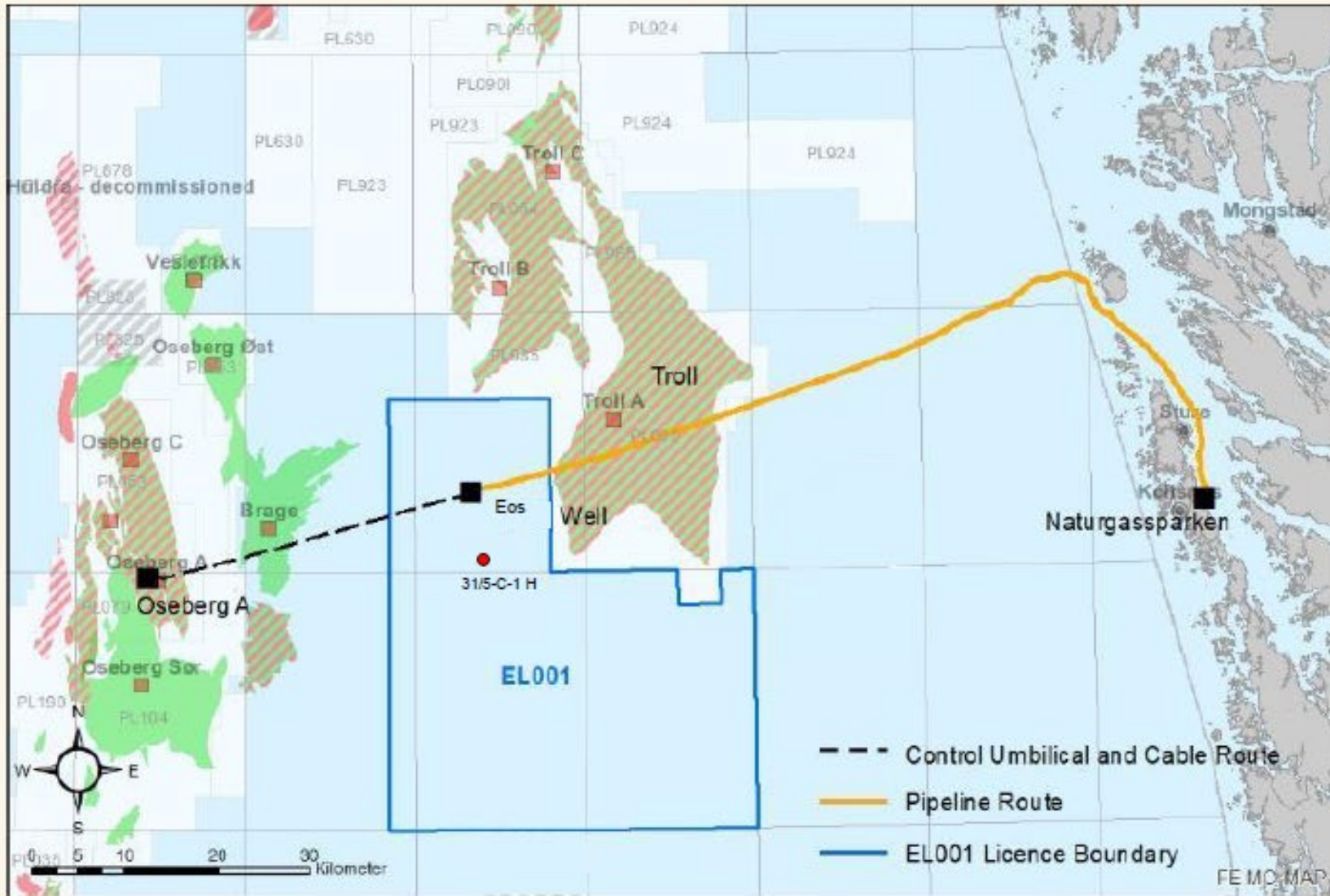
100 km

2 600m

Phase 1: 1.5 MTPA, 80% state funded



Subsea Facilities and Wells



MAKE
CARBON CAPTURE
AND STORAGE
POSSIBLE

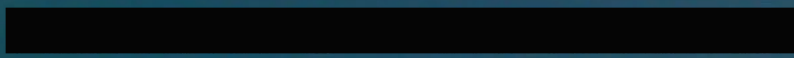




KP 24

KP 23.7
DCC 0.03
593 673.15
6 734 836.31
562.8

03/05/2024 10:58:11



HDG:305.64

D:189.48

ROV Q22

Alt:1.86 KP: 29.657

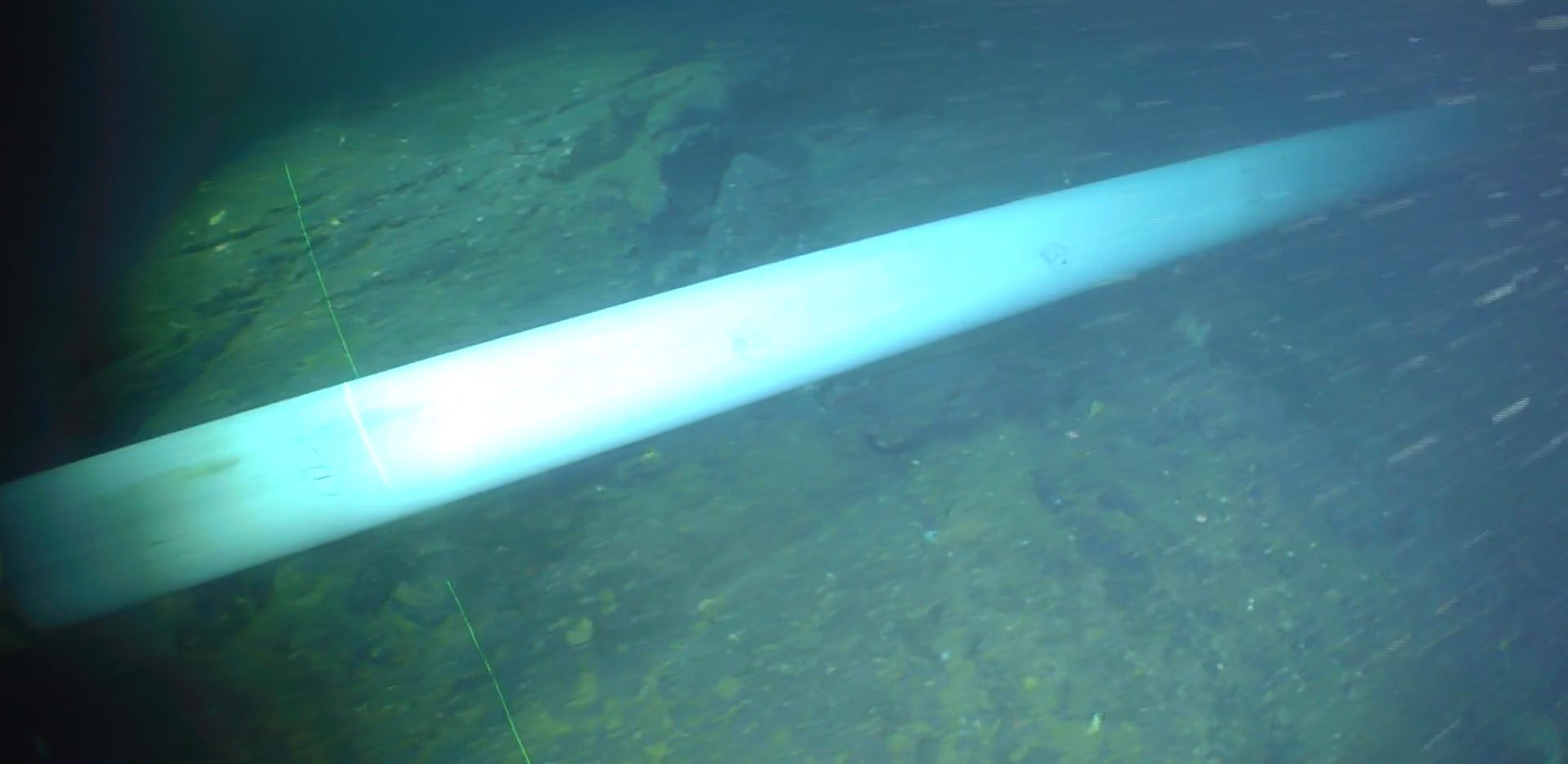
DCC:-0.11

Pitch:-0.35

Roll:1.06

SMG:0.52

Task: As-Laid Survey - CO2 Flowline Trip 2/3



MAKE
POSSIBLE

subsea 7



What should we expect offshore Japan?

General

- Significant Seismic Activity
- Challenging seabed conditions
- Intensity of Shipping Activity
- Sensitivity to Fishing Industry
- Environmental Sensitivity

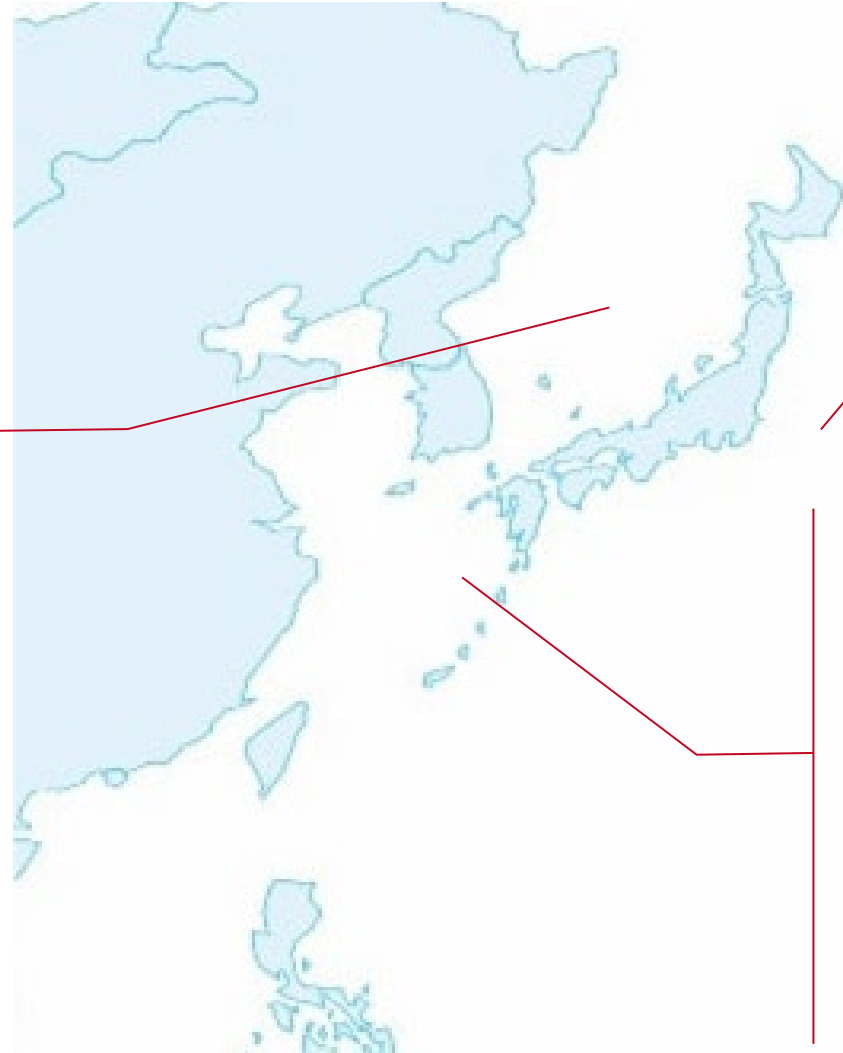
Sea of Japan

Seabed:

- Very rough/volcanic near the coast
- Sharp vertical scarps
- Shelf extends further than the Pacific side

Metocean:

- Tsunamis due to refraction of waves caused by seismic events



North Pacific

Seabed:

- Large canyons radiating from the shore
- Shallow near shore, but rapid steep drop off into ultradeep past the shelf
- High density of fault lines

Metocean:

- High current
- Large swell
- Tropical Storms

East China Sea

Seabed:

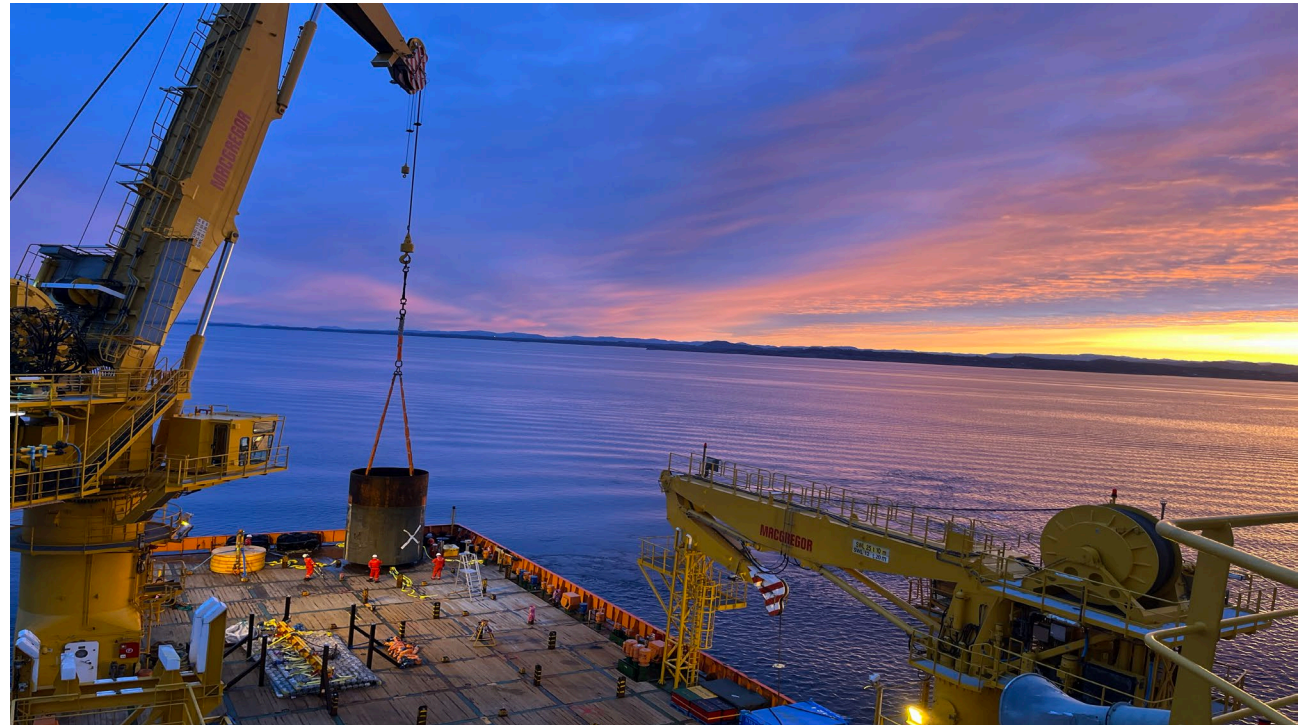
- Shallower continental shelf
- Deep trenches, canyons giving mix of hard volcanic outcrops and softer sediment layers

Metocean:

- Strongest ocean current (Kuroshio Current)
- Locally generated waves and long-period swells
- Seasonal monsoons and occasional typhoons
- Some areas with significant tidal variations

Lessons from the first offshore open-source CCS project

- Northern Lights has subtle, but very important differences to typical oil and gas projects
- Challenging shore approach and landfall
- Temperature and flow assurance challenges
- Materials and corrosion
- Structure design to ensure dryness of CO₂ at all times
- Pre-commissioning – driving dewatering train with CO₂



Carbon Capture and Storage is happening, but support still needed



CCS is necessary to achieve emission targets



Technical solutions are known for both capture, transport and store



Challenging economics



Governmental support and funding required



Regulatory and legislative requirements need progress



International collaboration and cross-border agreements needed

THANK YOU



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