



Norwegian Embassy
Tokyo

Norwegian Initiatives in CCS projects.

Japan CCS Forum 2024

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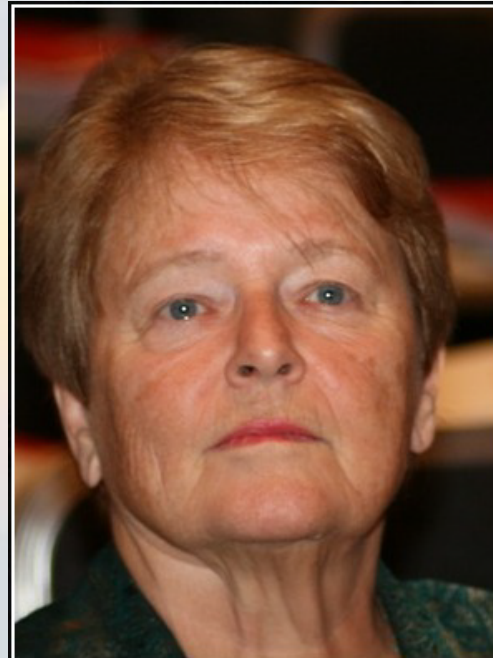
Norwegian sustainability legacy.

Norwegian Prime Minister Gro Harlem Brundtland – UN commission 1987

Early mover: CO2 tax introduced in 1991

Political consensus towards sustainability.

International cooperation: Ocean protection; CCS technology; deforestation..



Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

— Gro Harlem Brundtland —

AZ QUOTES



Main domestic Norwegian CCS projects



2007: Snøhvit LNG 0,7 mill ton/yr

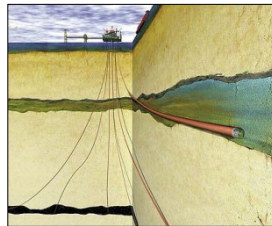


2012: Technology Center Mongstad
Demonstration of capture technology

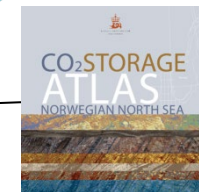


2024: CO2 capture –
cement

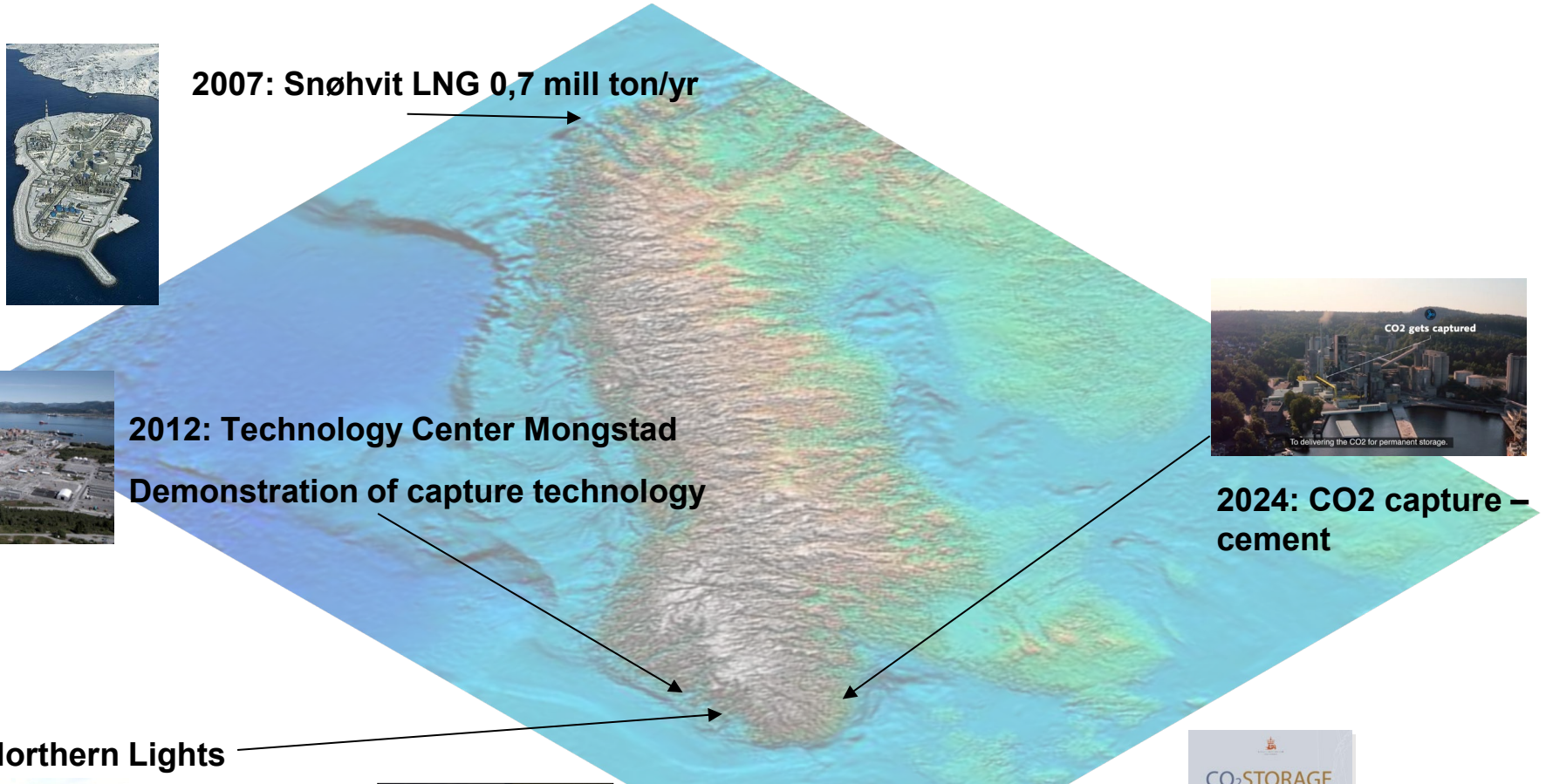
2022: Northern Lights



1996: Sleipner CCS
1 million tonnes/yr

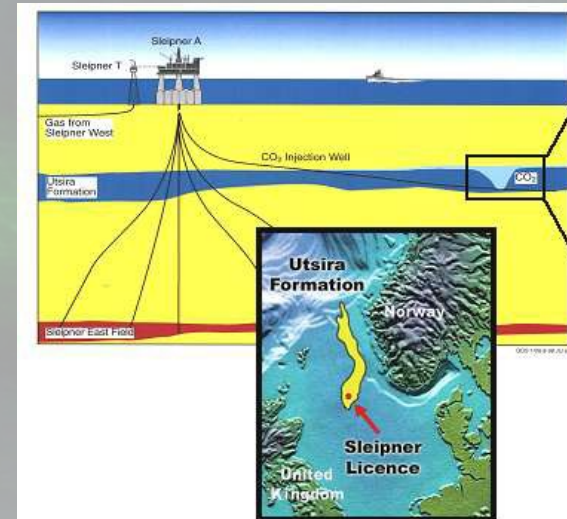


2011: CO2 storage Atlas
Mapping of Norwegian
North Sea (www.npd.no)



1996: The starting point – Sleipner CCS

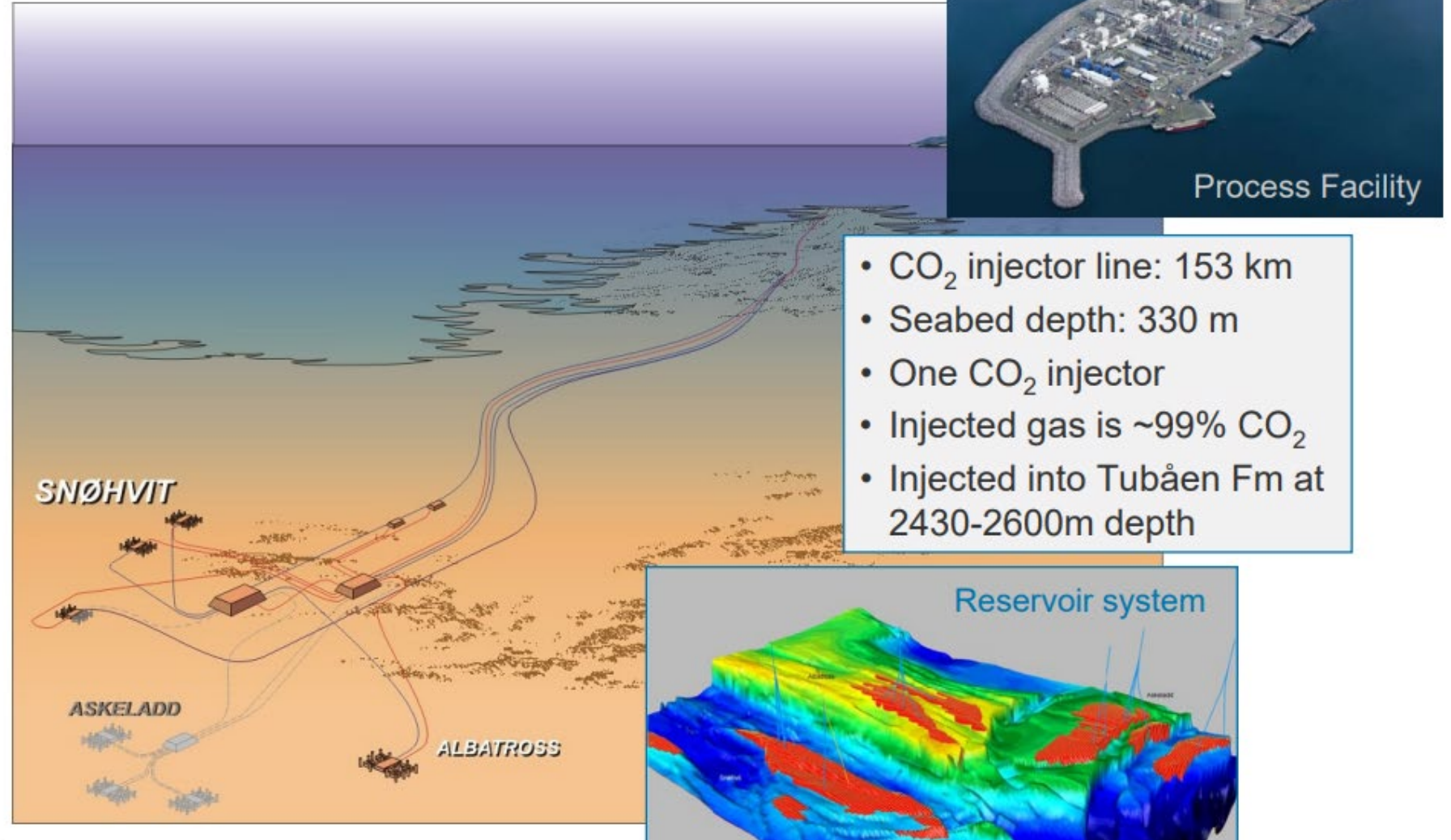
- World's first industrial scale offshore CCS project
- In operation by Norwegian energy company Equinor since 1996
- CO₂ source: reducing CO₂ content in natural gas from 9 to 2.5 %. Offshore/topside capture.
- Financial driver: CO₂ tax of ~45 US\$/ton in 1991
- Injection into saline aquifer 800-1000 m
- 1 million ton/year – accumulated > 20 million ton injected (45% of Norway's annual emission)
- Comprehensive monitoring for integrity and leaks – observed creation of calcium carbonate seals



2008: Second commercial project: Snøhvit LNG with CCS

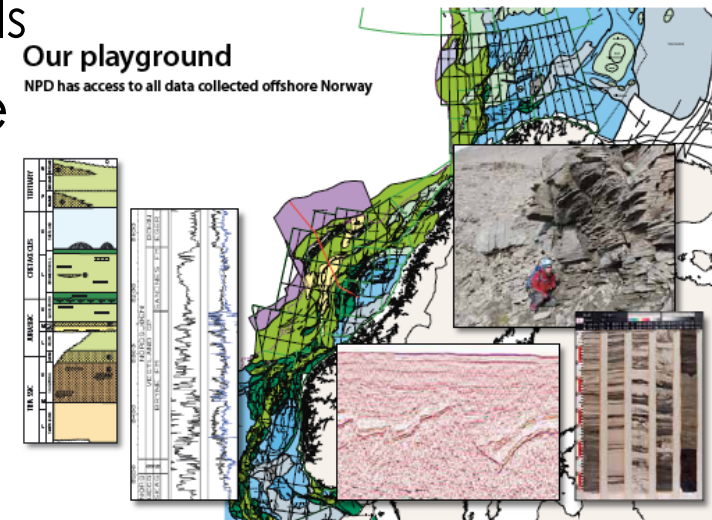
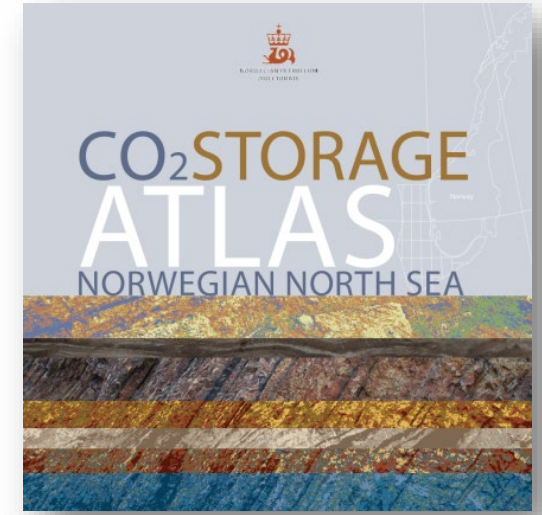
Snøhvit: Key Statistics

- Piped CO₂ separated from natural gas (5-8% CO₂) in onshore LNG plant, and re-injecting in sandstone **below** natural gas reservoir
- CCS started April 2008 – 1 million ton injected

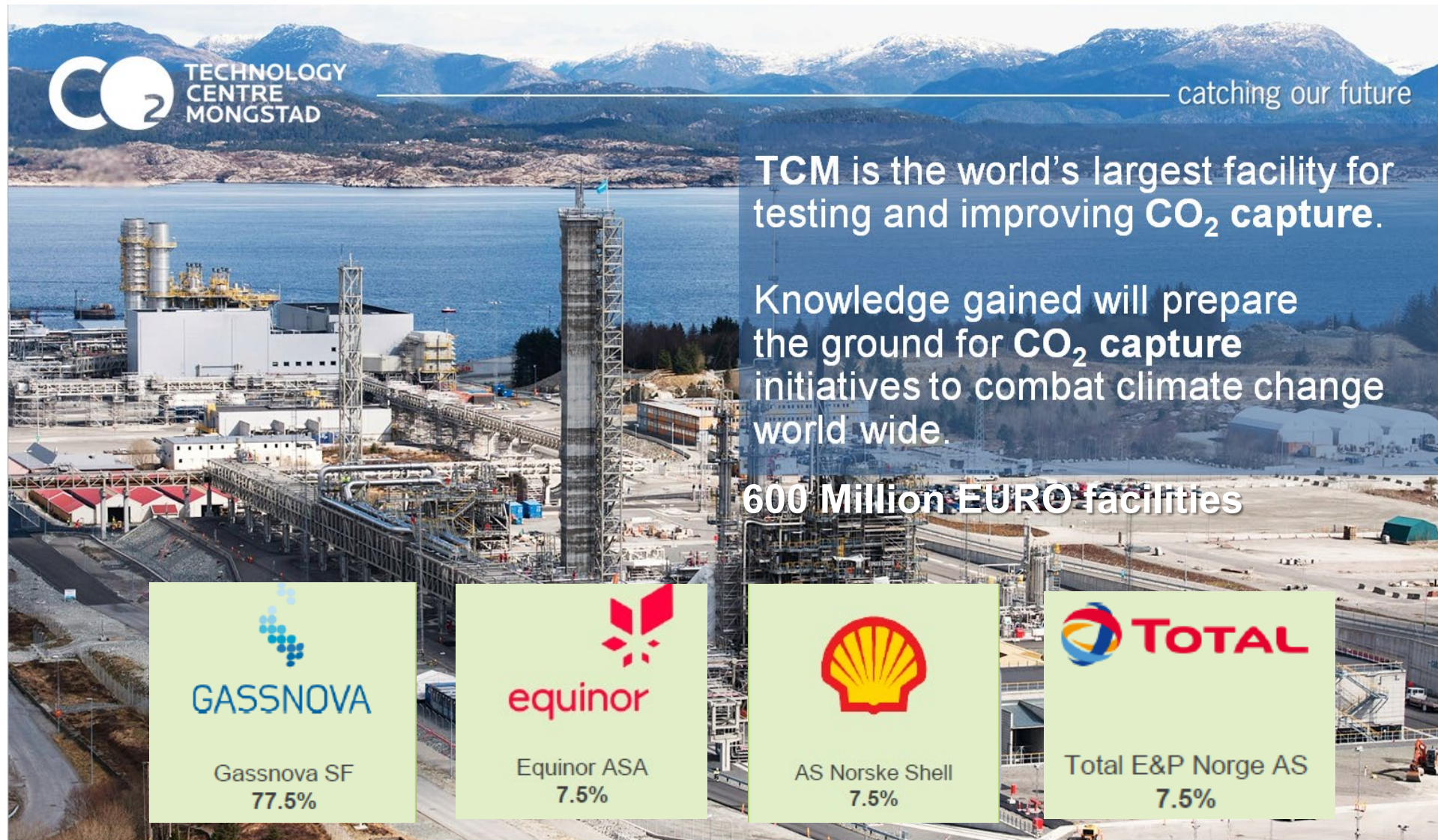


2011: CO₂ atlas for the Norwegian continental shelf

- Compiled by the Norwegian Petroleum Directorate (NPD)
- Objective – to map possible sites for long-term storage of CO₂
- Study of all geological formations and hydrocarbon fields on the Norwegian part of the North Sea
 - Accumulation of 40 years oil and gas exploration activity
 - Huge amount of seismic data, exploration and production wells
- 21 geological formations assessed – grouped into saline aquifer regions
- Total storage capacity of CO₂ in the Norwegian North Sea sector can be up to 70,000 Mton.



2012: The CO₂ Technology Centre Mongstad (TCM)







CO₂ TECHNOLOGY CENTRE MONGSTAD — catching our future

TCM is the world's largest facility for testing and improving CO₂ capture.

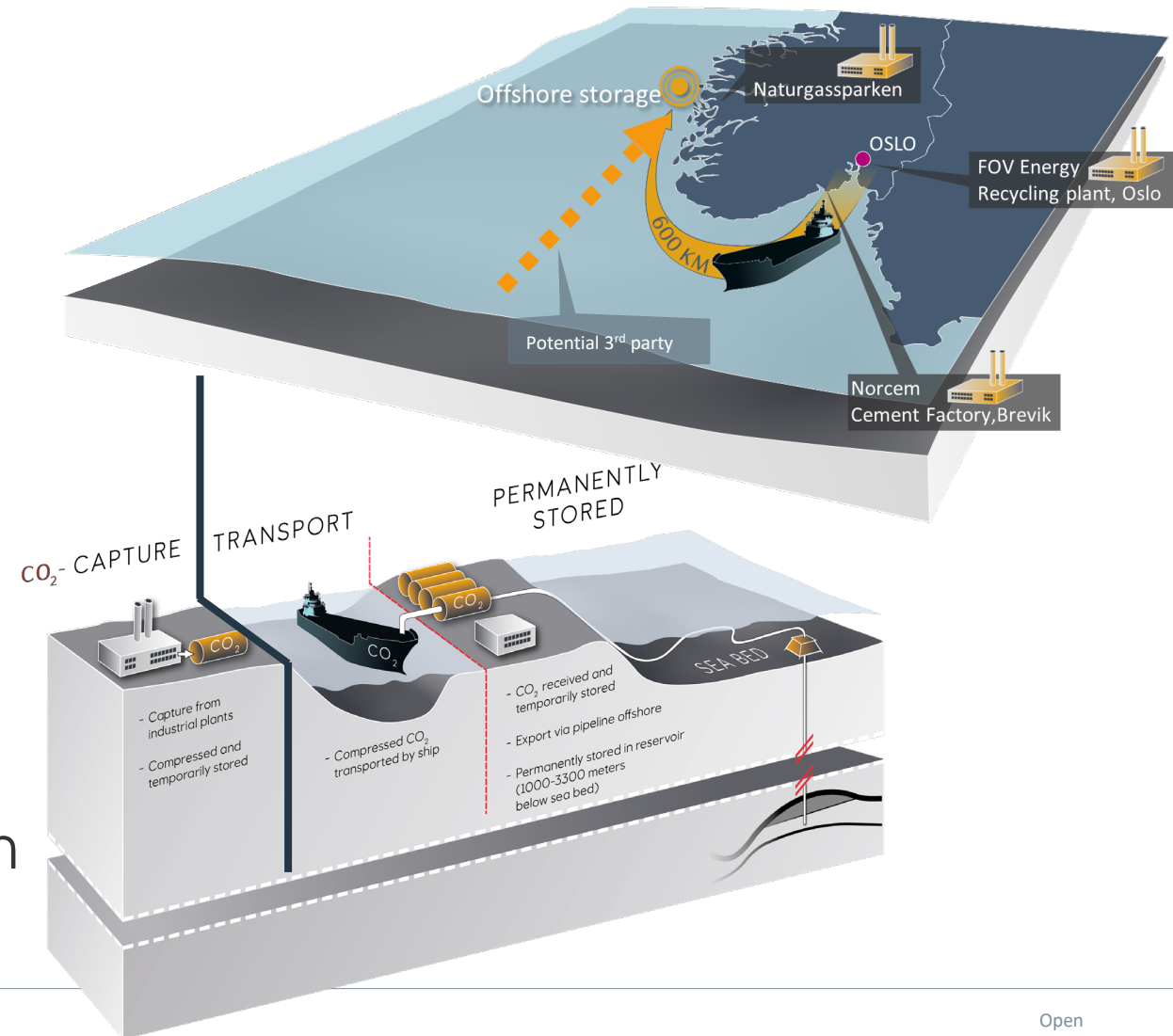
Knowledge gained will prepare the ground for CO₂ capture initiatives to combat climate change world wide.

600 Million EURO facilities

Company	Share
 GASSNOVA Gassnova SF	77.5%
 equinor Equinor ASA	7.5%
 AS Norske Shell	7.5%
 Total E&P Norge AS	7.5%

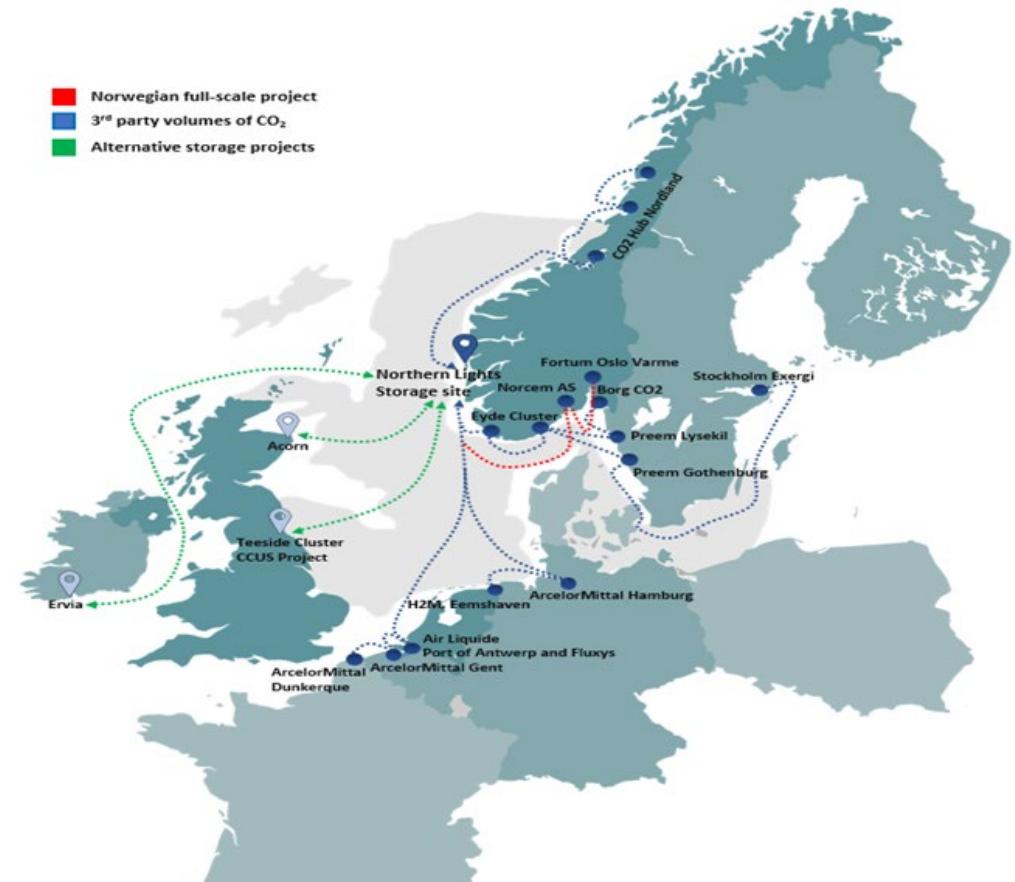
2023: Northern Lights – transport, injection and permanent storage of CO₂

- Facility for CO₂ receiving, temporary storage and permanent deposition in saline aquifer
- CO₂ transported by specialized vessels from point sources in Europe (Norway, Holland, UK..)
- 110 km pipeline under seabed to permanent storage 2,000 meter below seabed.
- Injection capacity up to 1.5 million ton CO₂ per year



CO₂ ship transport

- Currently 4 cargo vessel for CO₂
7500 m³ capacity
Tank Operating Condition: 15 barg, c.-26°C
Offloading @ max 800 m³/hr
- ‘LPG standard’ design
Proven concept (based on food industry model)
- Flexible model – “milk route”
 - Each ship completes trip in ~ 5/6 from point source port
- Japanese “K” Line has charter contract for the vessels



Visualisation of onshore facilities, West Coast Norway



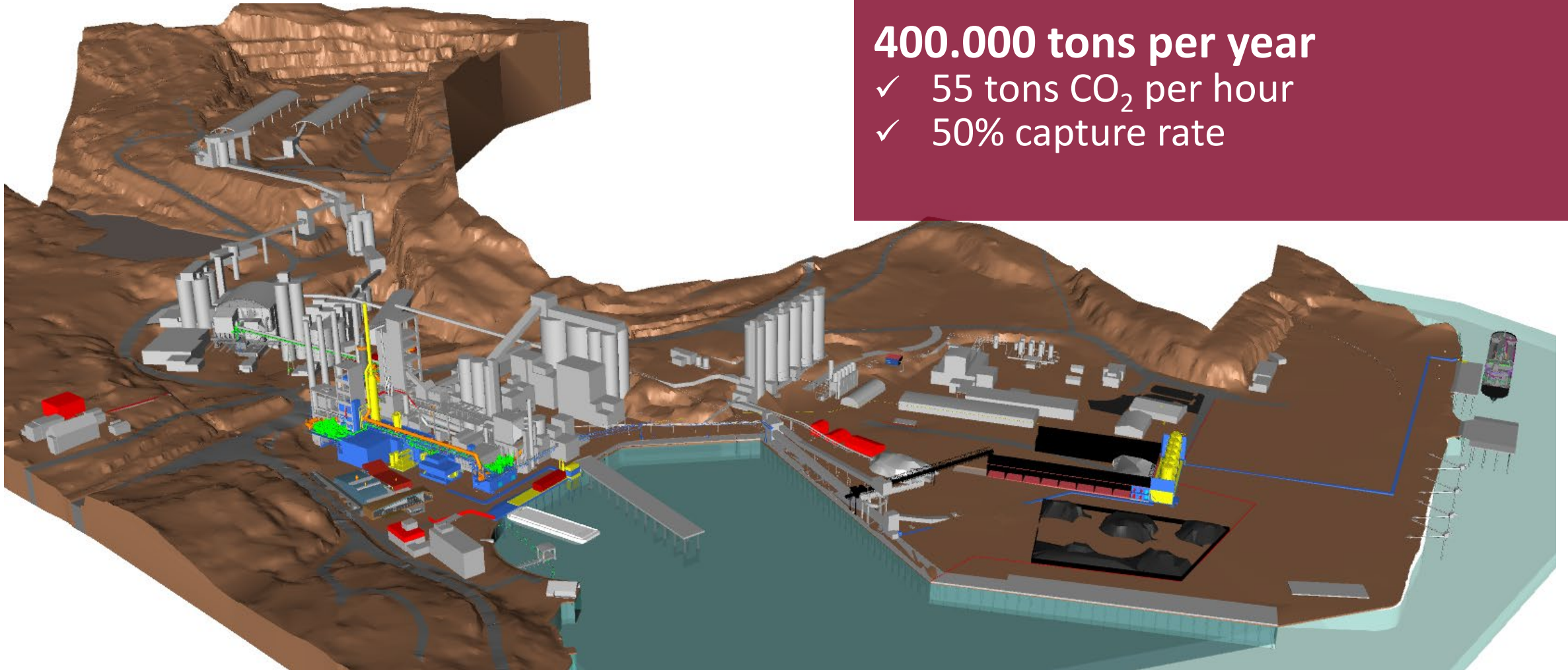
Northern Lights Project

2024: CO₂ capture Norcem Cement Plant – the first user of Northern Lights



400.000 tons per year

- ✓ 55 tons CO₂ per hour
- ✓ 50% capture rate



European eco-system for CCS I

towards an integrated European transport and storage network

Full cycle carbon removal and storage

- Create eco-system for CCS – a community
- Emitters as well as integrated network with other storage locations - safe, secure and cost efficient
- Position for CEF funding (under TEN E)
- A specific, concrete solution for industry by 2024/5, to maintain jobs and reach emission reductions by 2030
- Flexible to scale up as market develops

