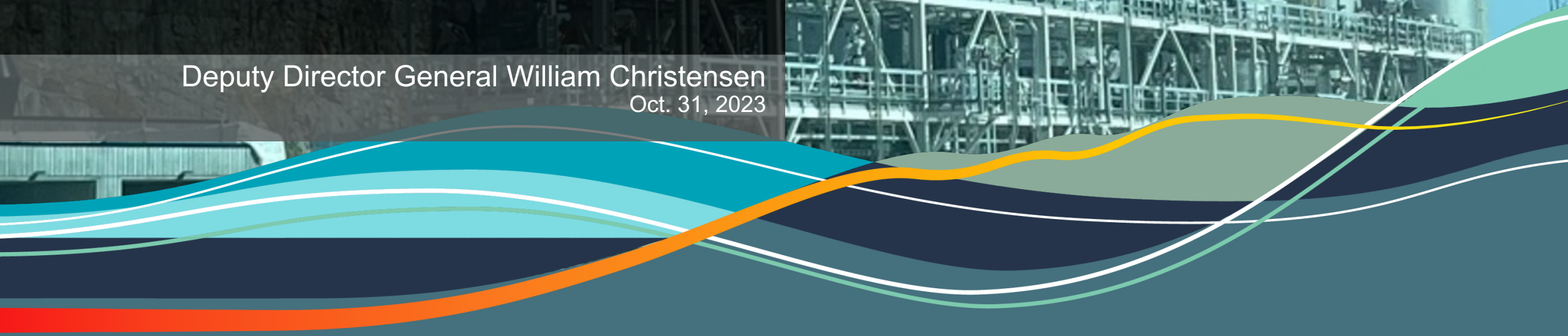




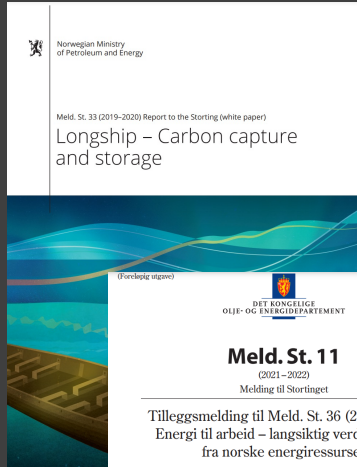
# CCS in Norway – recent developments

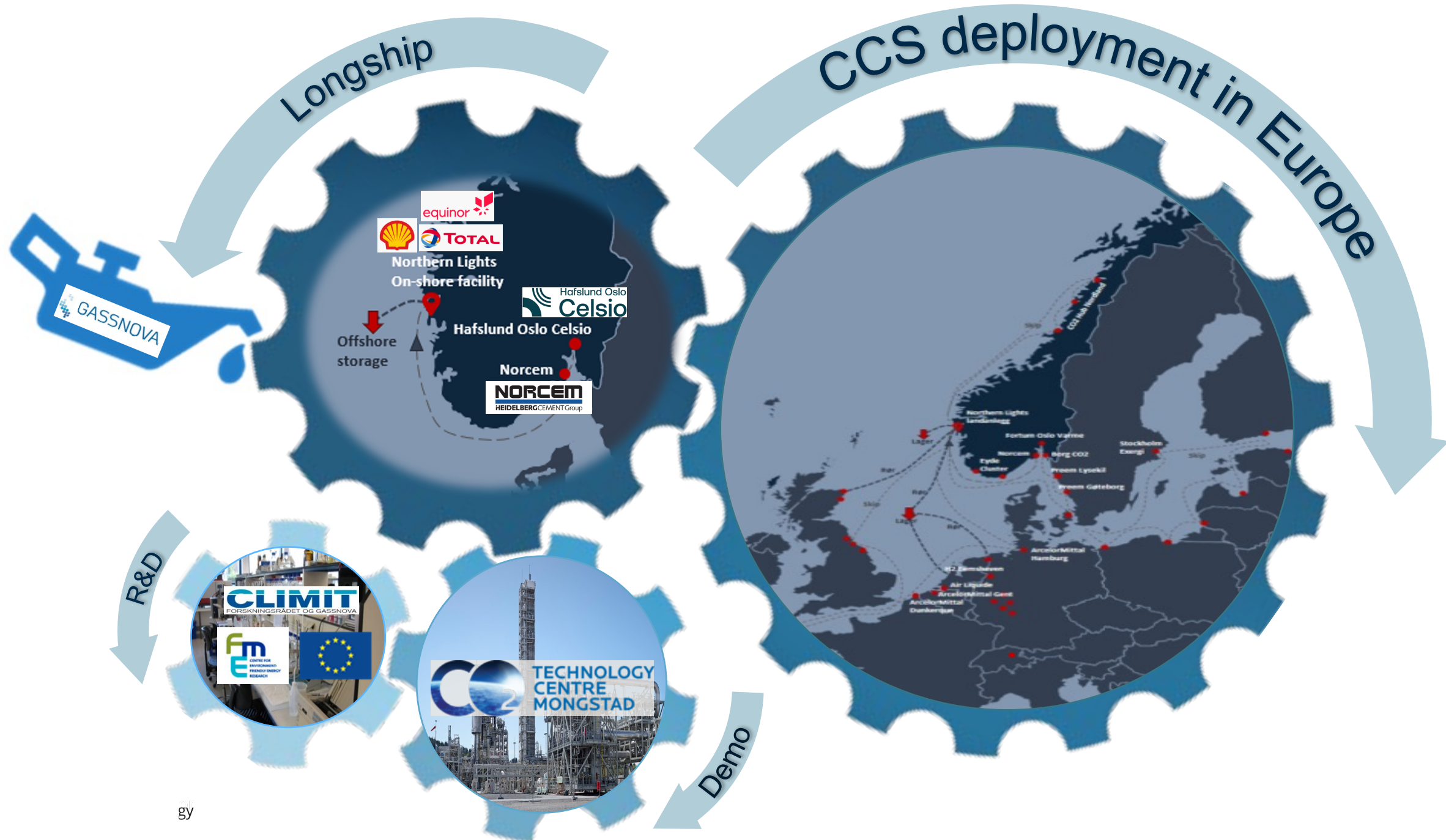
Deputy Director General William Christensen  
Oct. 31, 2023



# The government's objectives for CCS

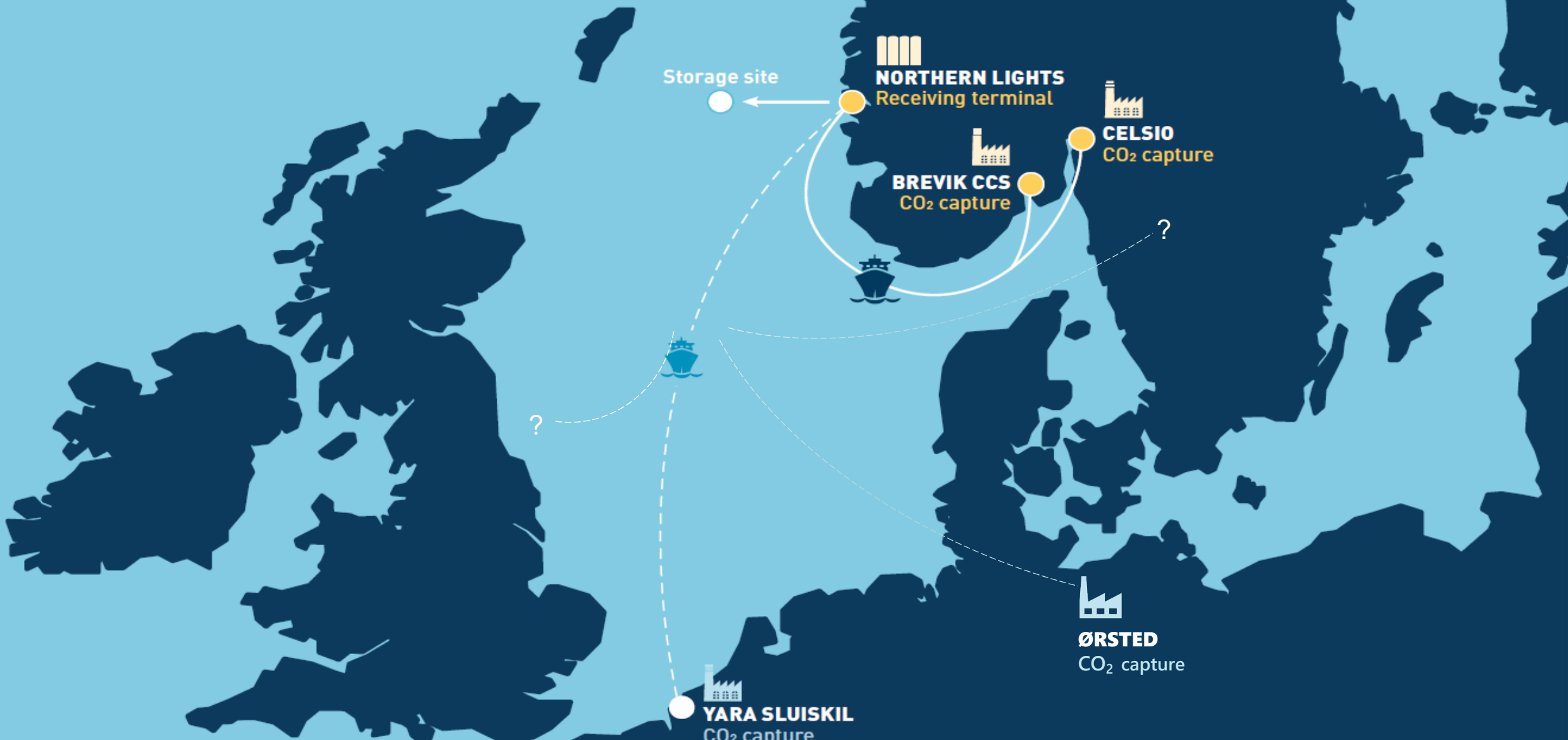
1. Demonstrate that CCS is part of the solution
2. Speed up the development of CCS globally
3. Develop new green industry in Norway
4. Facilitate development of CO<sub>2</sub> storage on a commercial basis
5. Permanent and safe storage







# LONGSHIP















Heidelberg  
Materials

DEMAG

Olje- og  
energi departementet

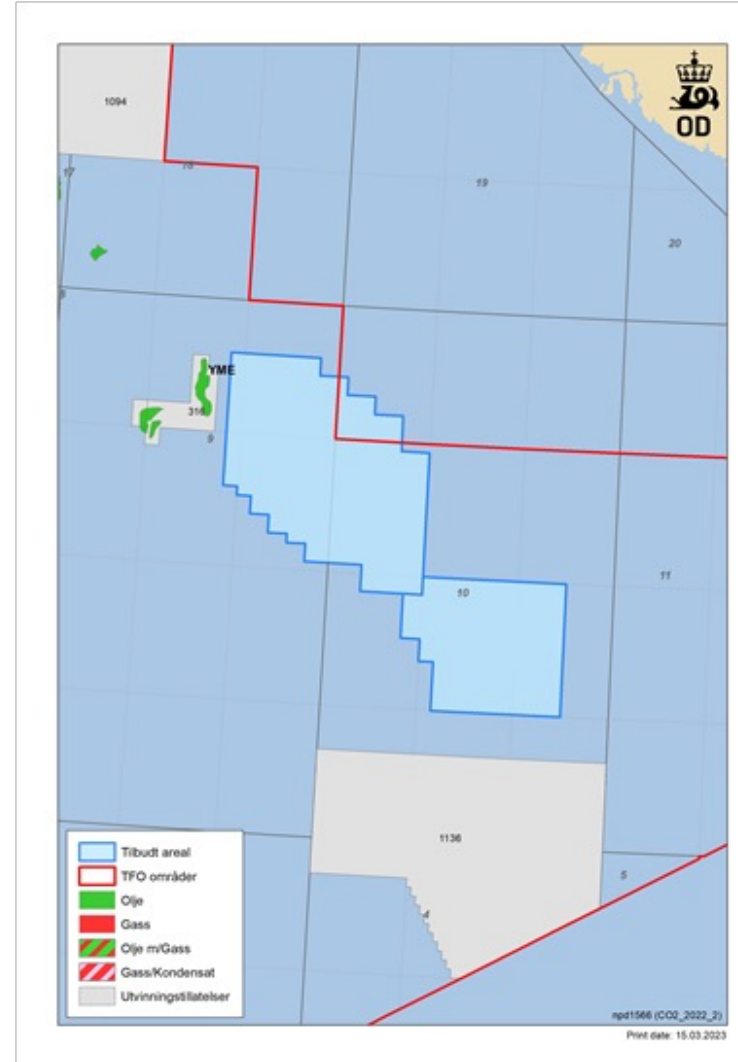


# New licenses for CO<sub>2</sub> storage

**3 new licenses** for exploration of CO<sub>2</sub> storage awarded so far in 2023

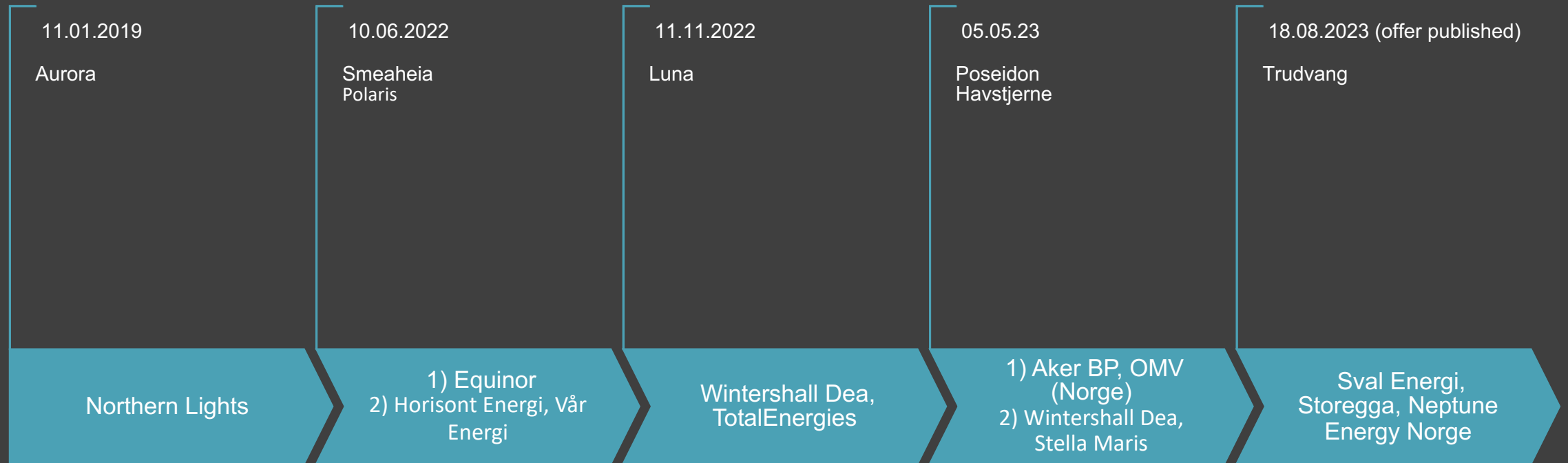
**3 new licenses** for exploration of CO<sub>2</sub> storage awarded in 2022

If the companies reach their targets, there is potential for storing 40 MT CO<sub>2</sub> annually from 2030.





# CO<sub>2</sub> licences awarded to date





# Example: Work obligations and decisions

- Phase 1: 2 years

Acquire 3D seismic, G&G studies including 3D geo- and reservoir modelling, Risk mitigation studies, including description of potential leakage paths for injected CO<sub>2</sub>  
Decision: Concretize (BoK\*) and decision to drill wildcat well, or Drop

Phase 2: 2 years

Drill wildcat well and perform formation test\*\*, Conceptual field development studies, select preferred development concept: Decision: Continuation (BoV\*) or Drop

- Phase 3: 1 year

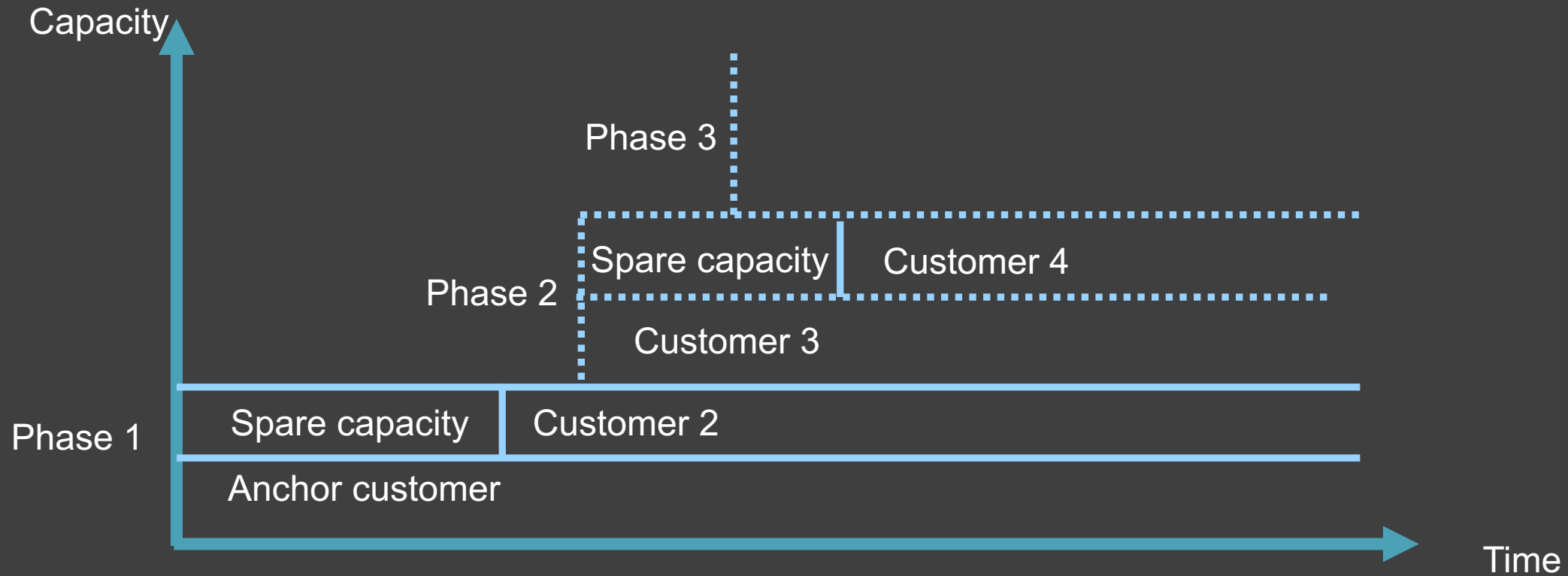
Prepare plan for development and operation (PDO\*). Make Final Investment Decision.  
Decision: Submit PDO or Drop

Total: 5 years





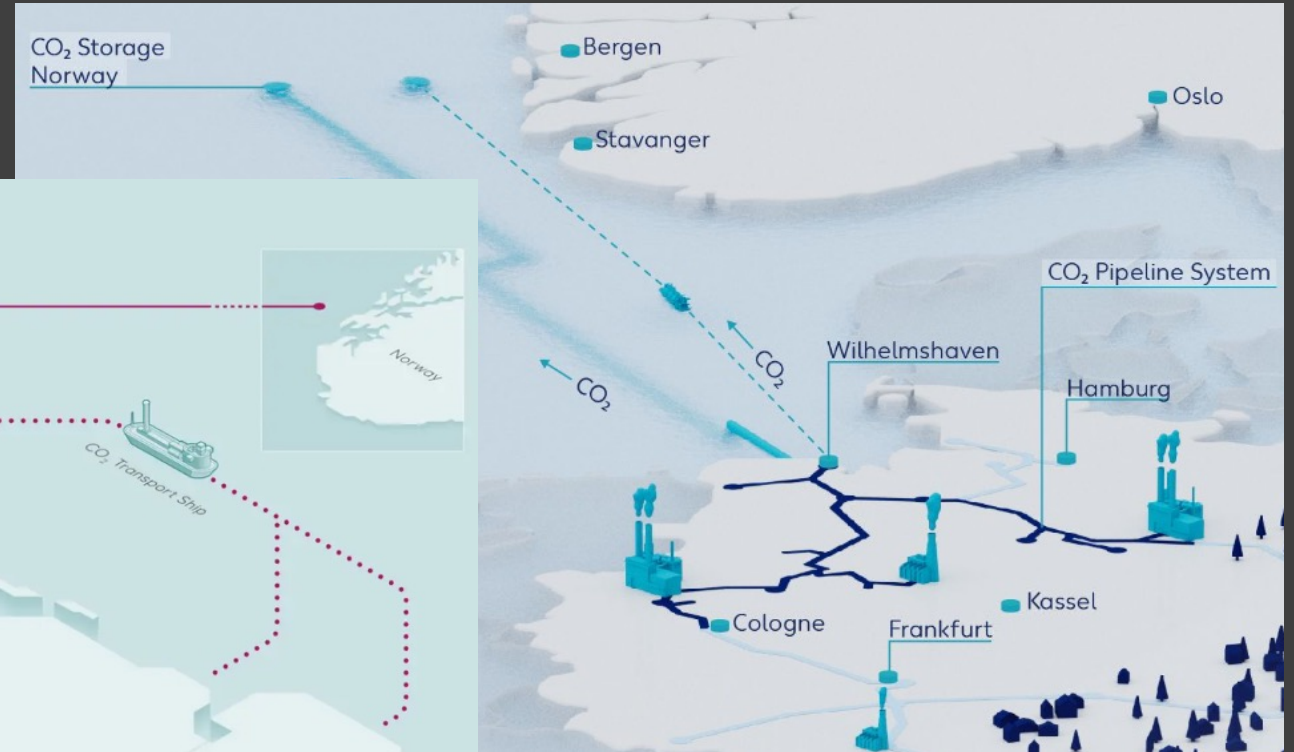
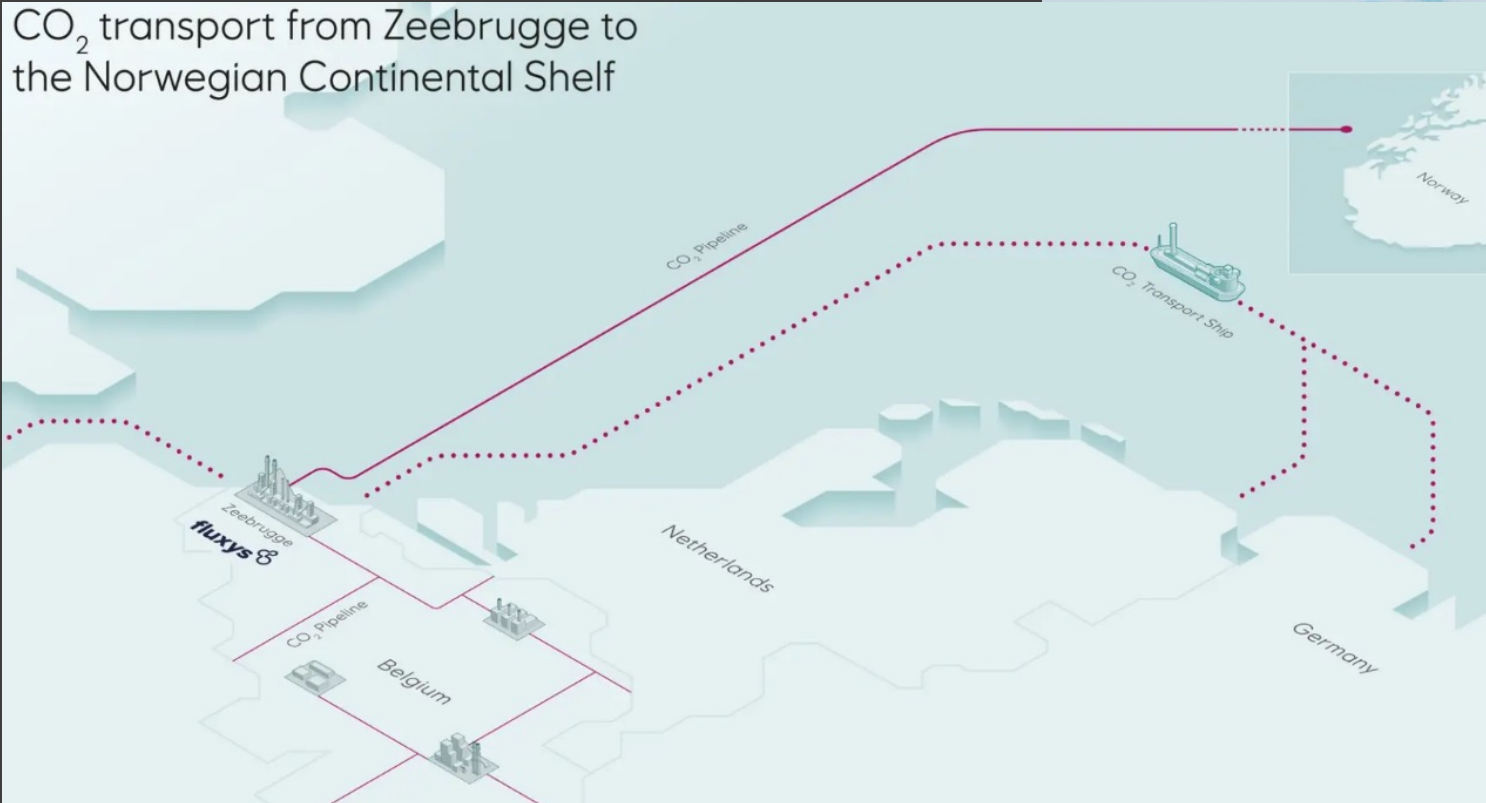
# Typical phased storage business model





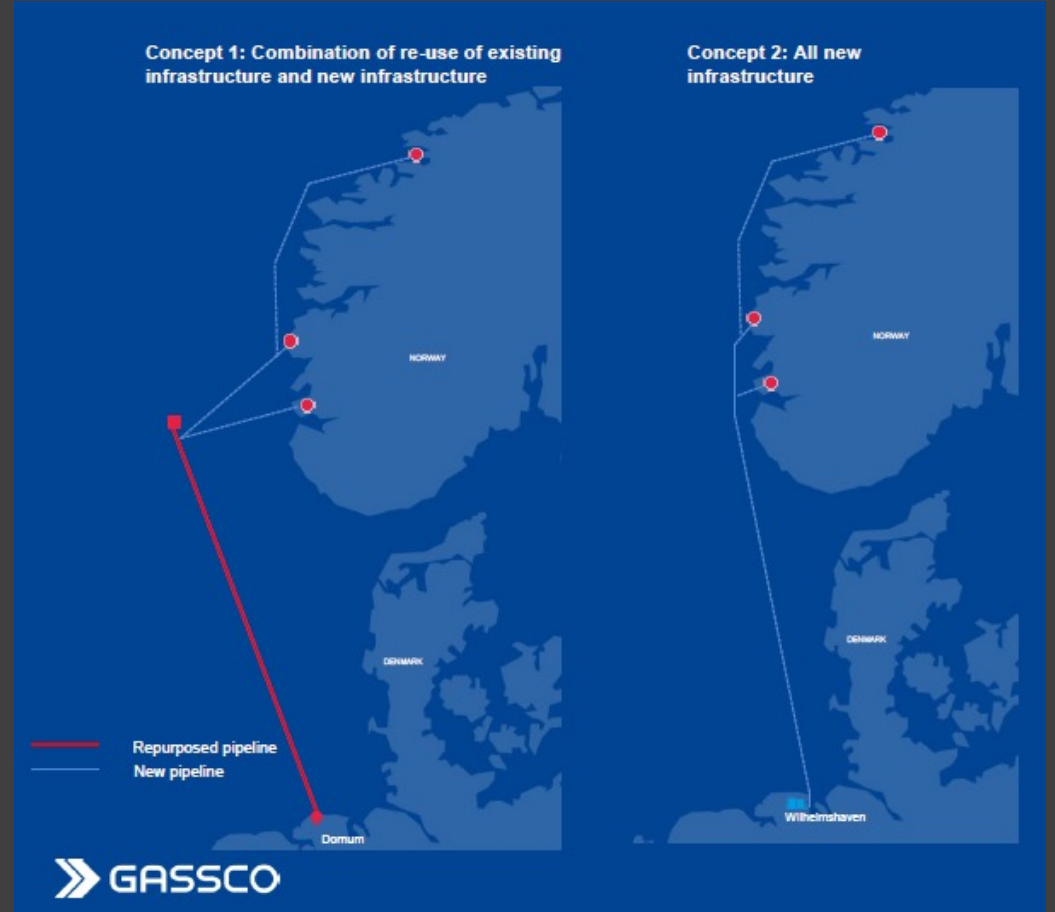
# Pipeline ambitions

CO<sub>2</sub> transport from Zeebrugge to the Norwegian Continental Shelf



- Credit: Wintershall Dea, Equinor







# Status now: Full steam ahead

## Overview of existing and planned CCUS facilities

### AUSTRIA

1. Vienna Green CO<sub>2</sub>\*

### BELGIUM

1. Leilac (pilot capture only)
2. Antwerp@C (Port of Antwerp)\*
3. Carbon Connect Delta (Port of Ghent)
4. Flite\*
5. C4U
6. North-CCU-Hub
7. Power-to-Methanol Antwerp BV

### CROATIA

1. iCORD\*
2. **CO<sub>2</sub> EOR Project Croatia\***
3. Bio-Refinery Project\*

### CZECHIA

1. Onshore storage project

### DENMARK

1. Greensand\*
2. C4: Carbon Capture Cluster Copenhagen
3. Copenhagen

### FRANCE

1. Lacq\*
2. DMX Demonstration in Dunkirk\*
3. Pycasso\*

### GERMANY

1. H2morrow\*
2. Leilac 2
3. Wilhelmshaven

### GREECE

1. Energean Carbon Storage

### ICELAND

1. Orca
2. Helliheiði
3. Silverstone

### ITALY

1. CCS Ravenna Hub\*
2. Adriatic Blue CCS\*
3. Cleankerk

### THE NETHERLANDS

1. Porthos (Port of Rotterdam)\*
2. Aramix (Den Helder)\*
3. Magnum (Eemshaven)\*
4. Carbon Connect Delta
5. H-Vision\*
6. Twence
7. AVR-Duiven
8. Project Everest\*
9. Vlissingen Cryocap FG

### NORWAY

1. **Sleipner CO<sub>2</sub> Storage\***
2. **Snhvit CO<sub>2</sub> Storage\***
3. Longship (including Northern Lights)\*
4. Polaris CCS\*
5. Norsk e-fuel
6. Borg CO<sub>2</sub>\*
7. Fortum Oslo Varne
8. Barents Blue\*
9. Norcem Brevik
10. Pilot CCS project

### POLAND

1. Poland EU CCS Interconnector

### REPUBLIC OF IRELAND

1. ERVIA

### ROMANIA

1. Onshore storage project

### SPAIN

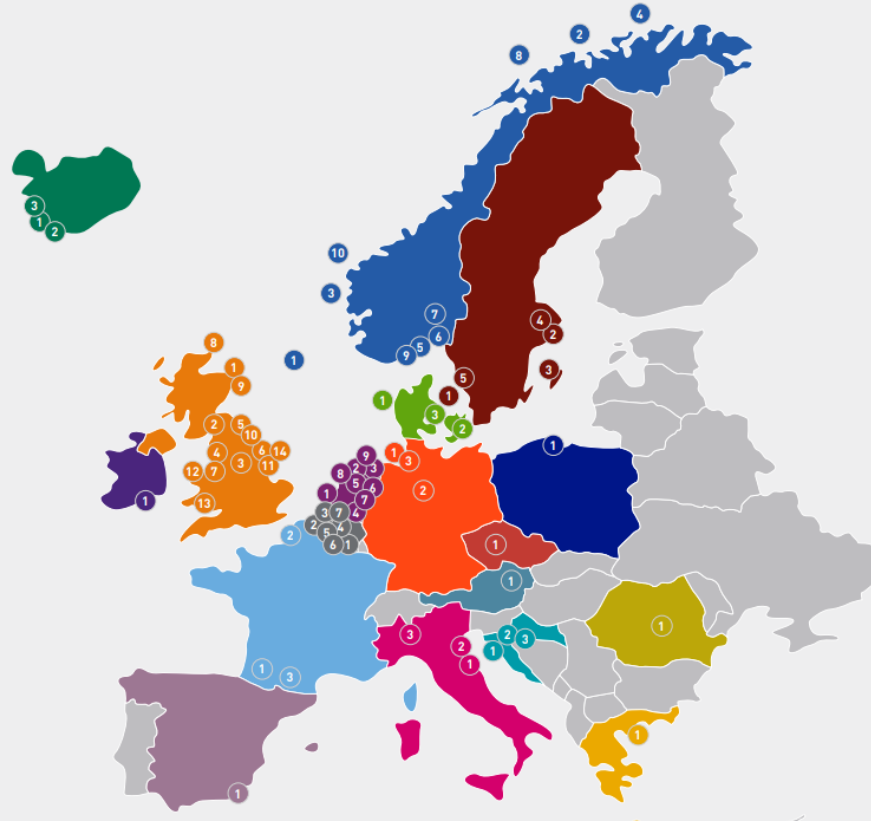
1. CCU Lighthouse Carboneras

### SWEDEN

1. Preem CCS\*
2. Stockholm Exergi Bio-CCS\*
3. Cementsa Slite Plant
4. Vattenfall Uppsala
5. CinfraCap

### UK

1. Acorn\*
2. Caledonia Clean Energy
3. H21 North of England\*
4. Liverpool-Manchester Hydrogen Cluster
5. Net Zero Teesside\*
6. Humber Zero Carbon Cluster\*
7. Liverpool Bay Area CCS Project\*
8. STEMM-CCS\*
9. CO<sub>2</sub> Sapling Transport Infrastructure Project
10. H2Teesside\*
11. H2H Saltend\*
12. HyNet\*
13. South Wales Industrial Cluster
14. Northern Endurance Partnership



\* Project where IOGP members are involved  
Projects listed in **bold** are in operation

Total number of projects: **70**  
Around 60 MtCO<sub>2</sub>/yr stored by 2030

IOGP



Sweden first in the world with carbon-neutral cement plant

### Aker Carbon Capture lanserer karbonfangst som abonnement

Akers karbonfangstselskap lanserer en ny forretningsmodell. Samtidig begynner inntektene å øke betydelig.

### UK government approves BP-led East Coast CCS cluster

HIGHLIGHTS  
COP26 kick-starting round of industrial CCS projects  
Shell, TotalEnergies, Eni, Equinor, Harbour working on UK CCS  
East Coast Cluster to begin operating by mid-2020s

Dutch government to provide €2.1bn Porthos CCS subsidy

Denmark's CCS consortium aims to store up to 8m tonnes/year of CO<sub>2</sub> by 2030

### Stockholm Exergi ett stort steg närmare bio-CCS

Publicerad: 17 november 2021, 11:25

BP, Eni, Equinor, Shell and Total team up to develop North Sea carbon capture infrastructure

Europa geeft miljoenen subsidies voor Antwerpse CO<sub>2</sub>-afvang

Neste to receive €88M from EU toward green hydrogen and carbon capture & storage at Porvoo; SHARC  
18 November 2021

# What is needed going forward?



Public and  
political support



Countries to  
invest in CCS to  
reach economies  
of scale and bring  
down costs



Predictability in  
the regulatory  
framework



More countries to  
ratify the  
amendment to the  
London Protocol  
to allow for export  
of CO<sub>2</sub> for sub-  
seabed geological  
storage





Norwegian Ministry  
of Petroleum and Energy