

Developing geological CO₂ storage for Europe in Norway: From Sleipner via Northern Lights to Large Scale Solution

Mr. Mats Fredriksson, Future Business, TDI, Equinor ASA

Equinor's Strategy

Net Zero by 2050



Equinor Low Carbon Portfolio

US Hub



Project name	Project type	Country
Northern Lights	CCS Infrastructure	NO
Northern Endurance Partnership	CCS Infrastructure	UK
Net Zero Teesside	Clean power	UK
Keadby 3	Clean Power	UK
H2H Saltend	Blue H2	UK
Keadby Hydrogen	Clean power	UK
Peterhead	Clean power	UK
Smeaheia	CCS Infrastructure	NO
H2M Eemshaven	Blue H2	NL
H2BE	Blue H2	BE
Clean Hydrogen to Europe	Blue H2	NO
Barents Blue	Blue ammonia	NO
Polaris	CCS Infrastructure	NO
Tri-State Energy Hub	Blue H2	US
NorthH2	Green H2	NL

Northern Europe Cluster



CCS scale up- building on 26 years of operational experience and Northern Lights

15-30 Mtpa

CO₂ transport and storage capacity by 2035

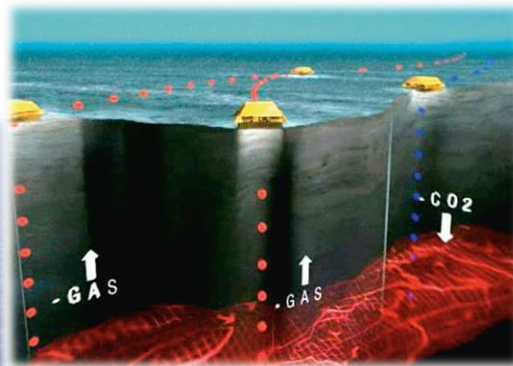
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SLEIPNER

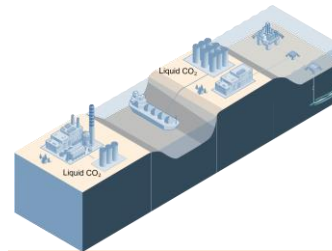


Credit: IKM, Pål Ørke.

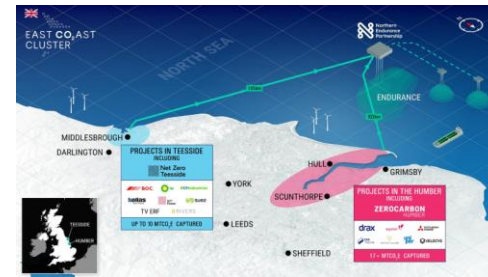
SNØHVIT



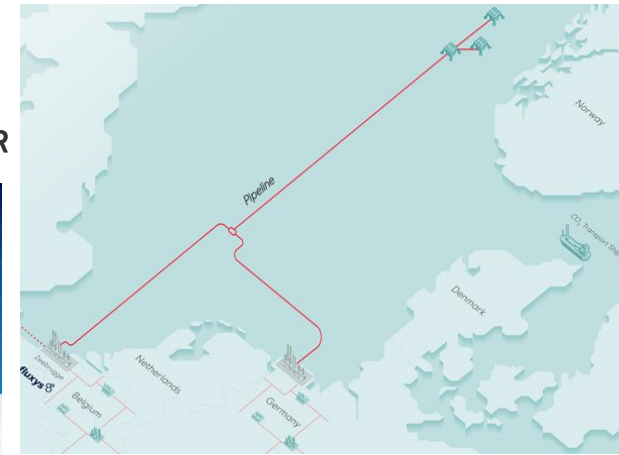
NORTHERN LIGHTS



EAST COAST CLUSTER



SMEAHEIA

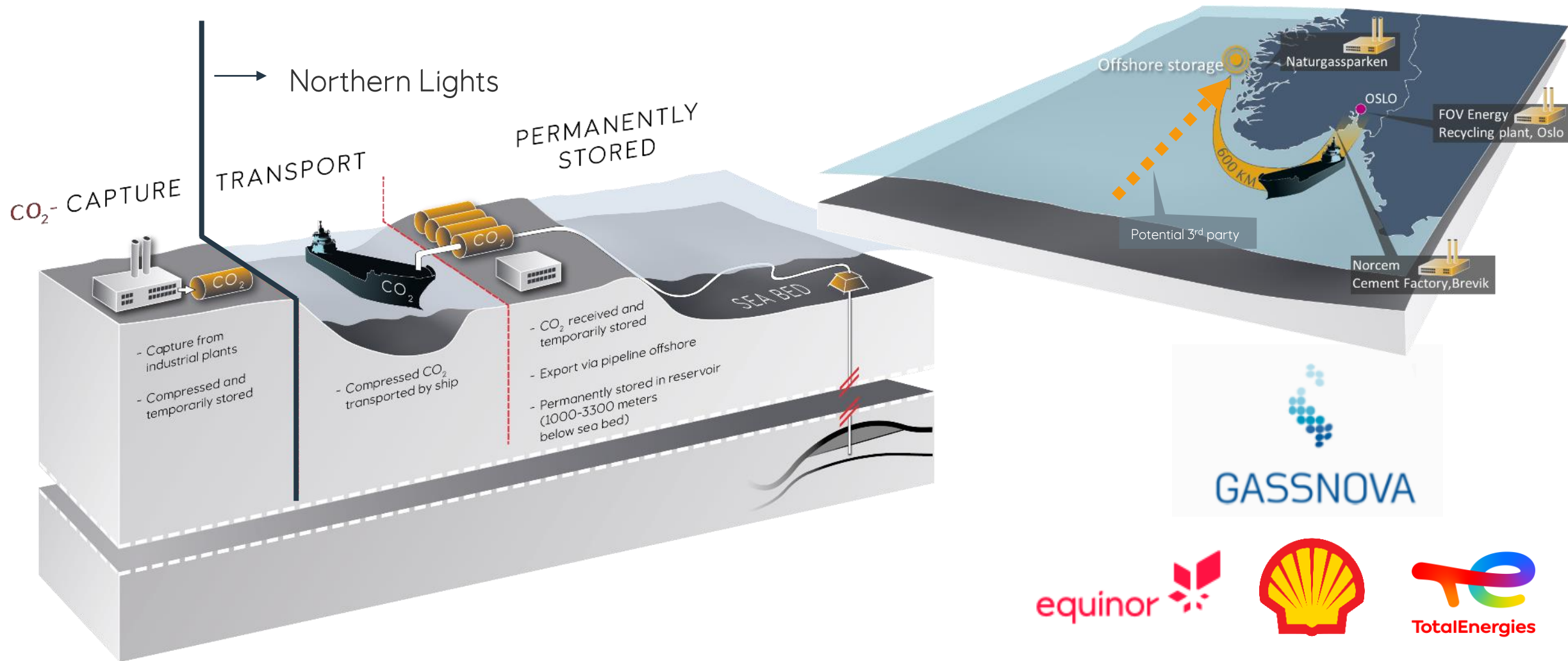


Costing Down by Scaling Up

Northern Lights – Market opener

Operation experience – technology works!

Northern Lights – the T&S part of Longship CCS value chain



Northern Lights site - Øygarden

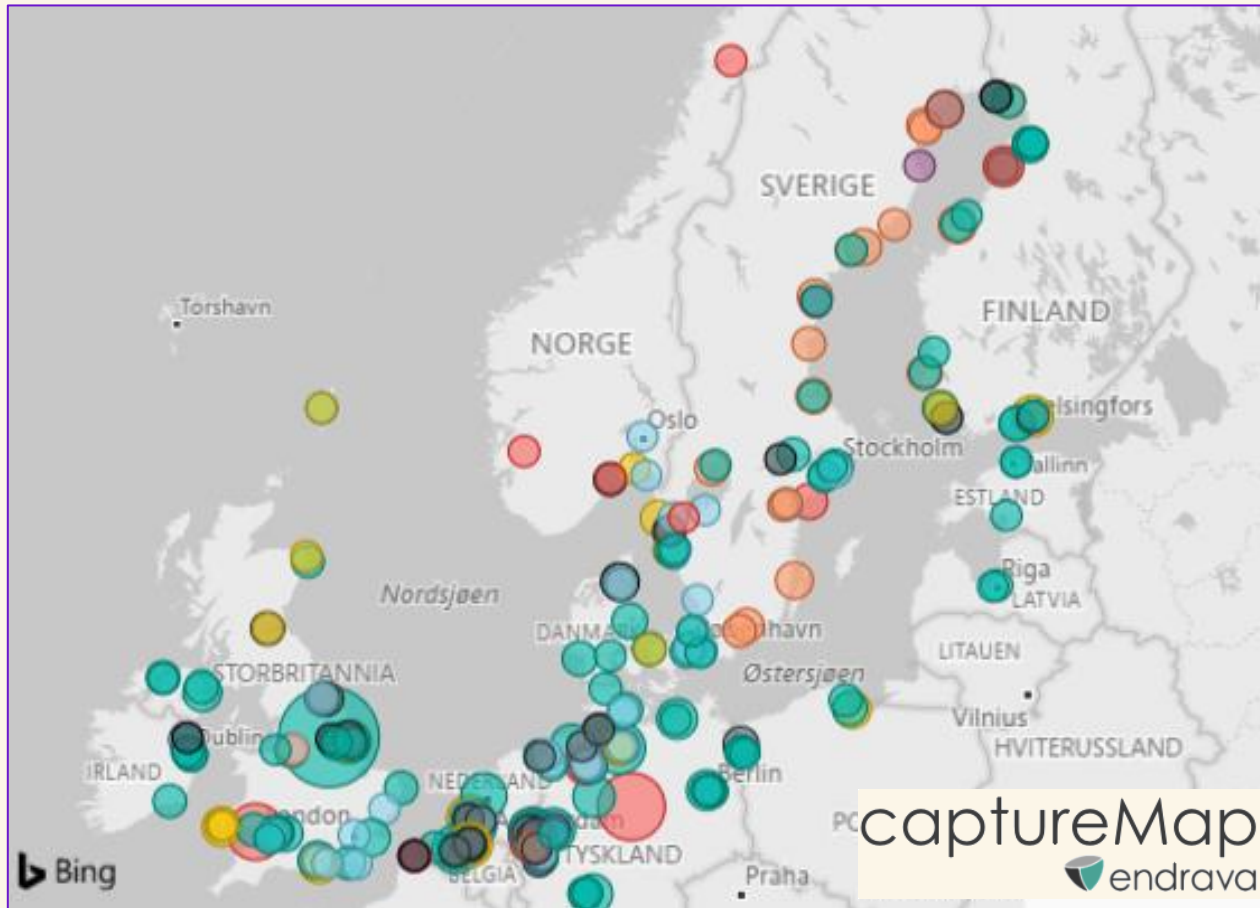
April 2022



Words into action
Theory into practise

Proven technology
building on 25 yrs of experience

Enables “open source” offer for CO₂ emitters to capture



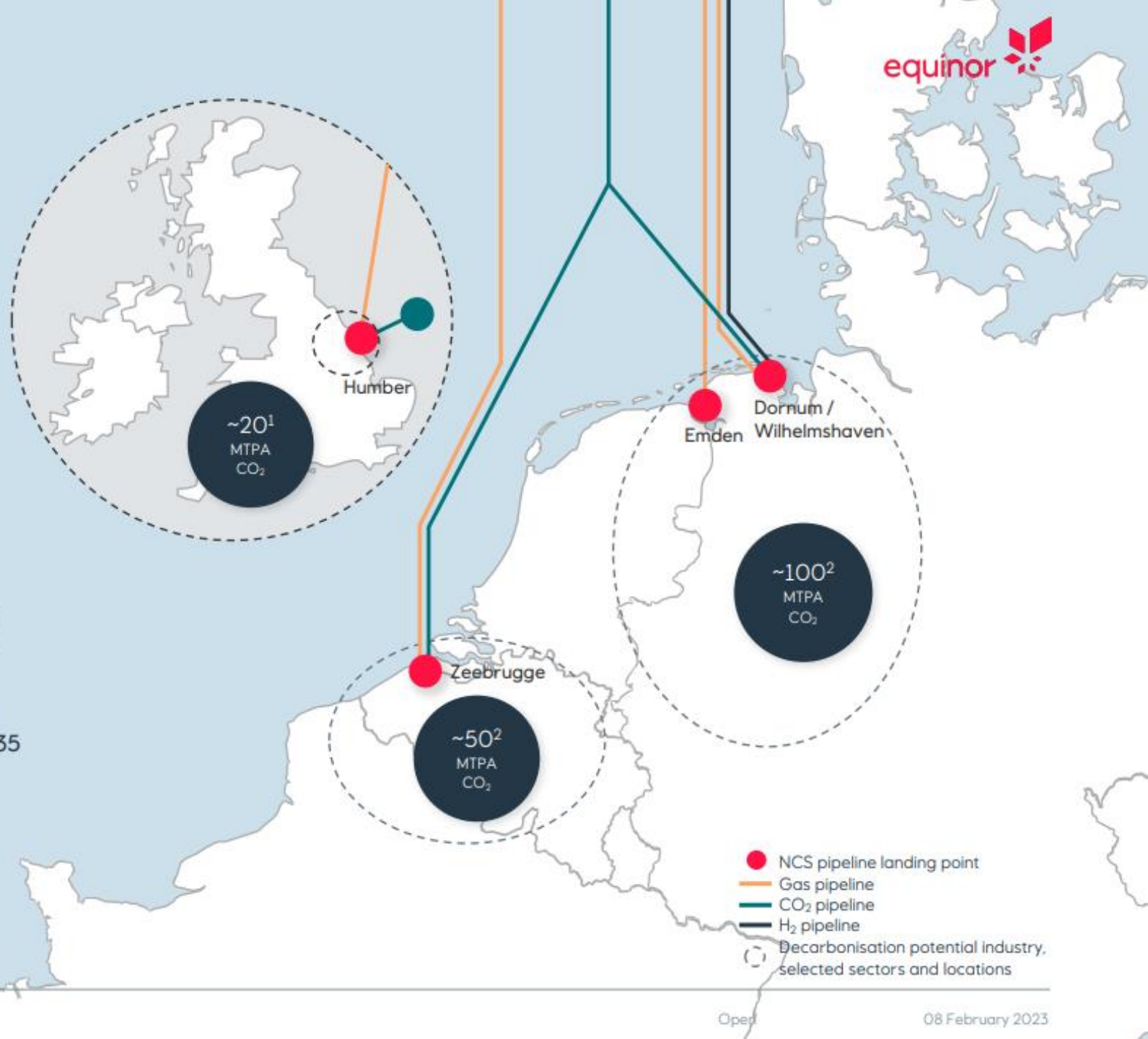
Large potential with long-life sectors:

- Hydrogen and power from natural gas
 - Waste incineration
 - Cement
 - Biomass and biofuel
 - Steel
 - Refinery
- *Northern Lights is relevant and within reach for about 350 facilities and 300 MTPA of these “most attractive candidates”*

A LEADER IN CARBON MANAGEMENT AND CLEAN HYDROGEN

Energy transition partner for Europe

Uniquely positioned to provide European industry with decarbonisation solutions



3-5

MAJOR INDUSTRIAL CLUSTERS

Clean hydrogen projects by 2035

15-30

MILLION TONNES / ANNUM

CO₂ transport and storage capacity by 2035

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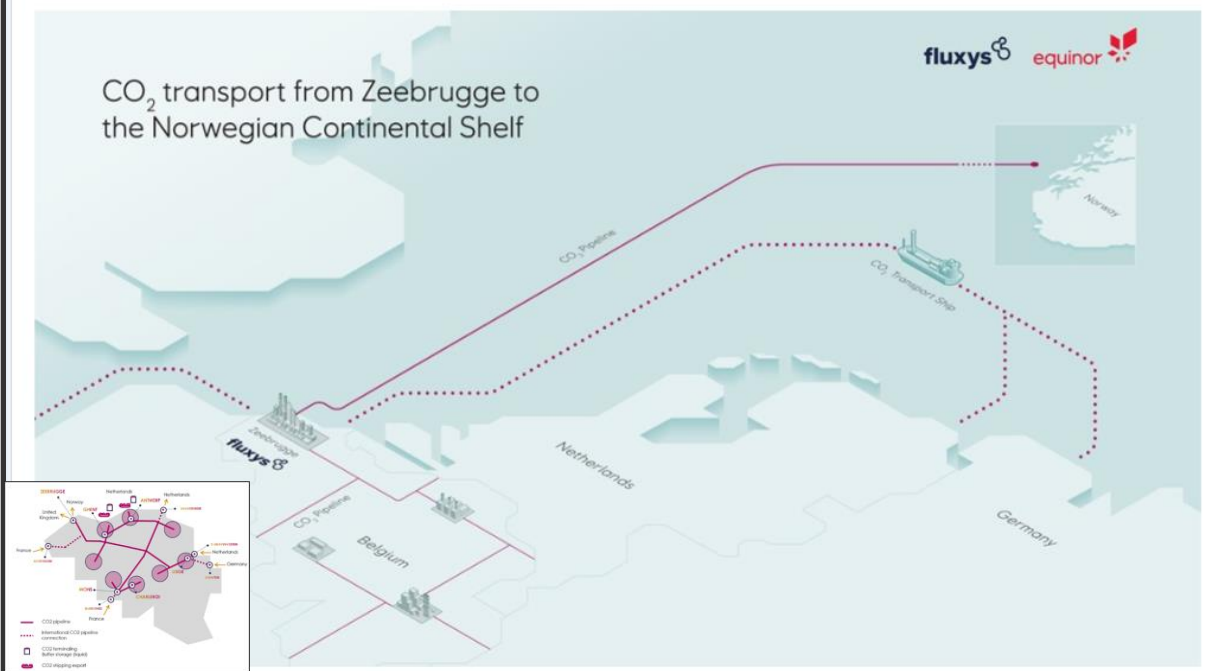
1. Humber Industrial Cluster Plan
2. The European Pollutant Release and Transfer Register, BCG

Scaling Up & Forming Strategic Alliances

Back > Fluxys and Equinor launch solution for large-scale decarbonisation in North-Western Europe

Fluxys and Equinor launch solution for large-scale decarbonisation in North-Western Europe

By Fredrik Jebsen Bråten - 29 Jun 2022 14:09



Equinor and Wintershall Dea partner up for large-scale CCS value chain in the North Sea

30 AUGUST 2022 08:00 (CEST)



Political support & industrial projects – building frameworks and business cases together

23.02.2022

Belgium and Norway sign energy cooperation: "Important step in forging North Sea coalition"



17.03.2022



The Region of Flanders and Norway join forces in the energy transition

Press release | Date: 17/03/2022

...they aspire to conclude a bilateral agreement within the framework of the London protocol before the end of the year, so that CO2 transport between Flanders and Norway can soon be a reality.

...Flanders and Norway share the same ambitions when it comes to hydrogen...implementing various joint projects. One such project is "H2BE" where Equinor, Engie and Fluxys are looking into the possibility of realizing a 1 gigawatt low carbon hydrogen production facility in the Ghent port area in Flanders.



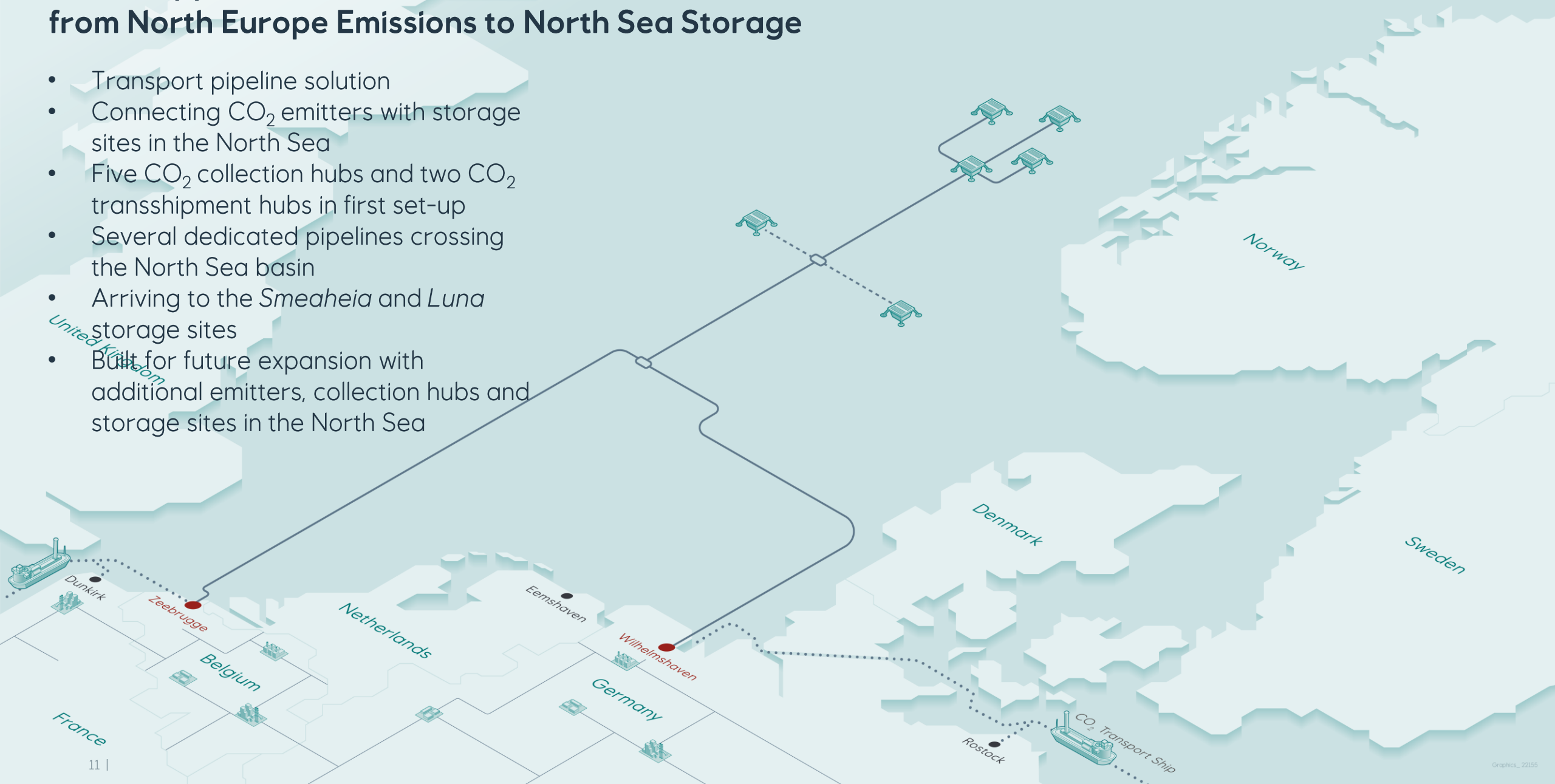
16.03.2022 **Energy cooperation between Germany and Norway**

Today's meeting between Federal Minister for Economic Affairs and Climate Action Dr. Robert Habeck and Prime Minister Jonas Gahr Støre, Minister of Trade and Industry Jan Christian Vestre and Minister of Petroleum and Energy Terje Aasland will further strengthen the close partnership between Germany and Norway in the areas of energy and climate policy and industrial transformation.

Chancellor Scholz and Prime Minister Støre agreed in January to strengthen German Norwegian cooperation around the energy transition and to establish a long-term and structured dialogue in the field of industry and energy. The goal is to achieve shared climate goals, create new green industries and jobs, and strengthen energy security. Today's meeting marks the beginning of this work

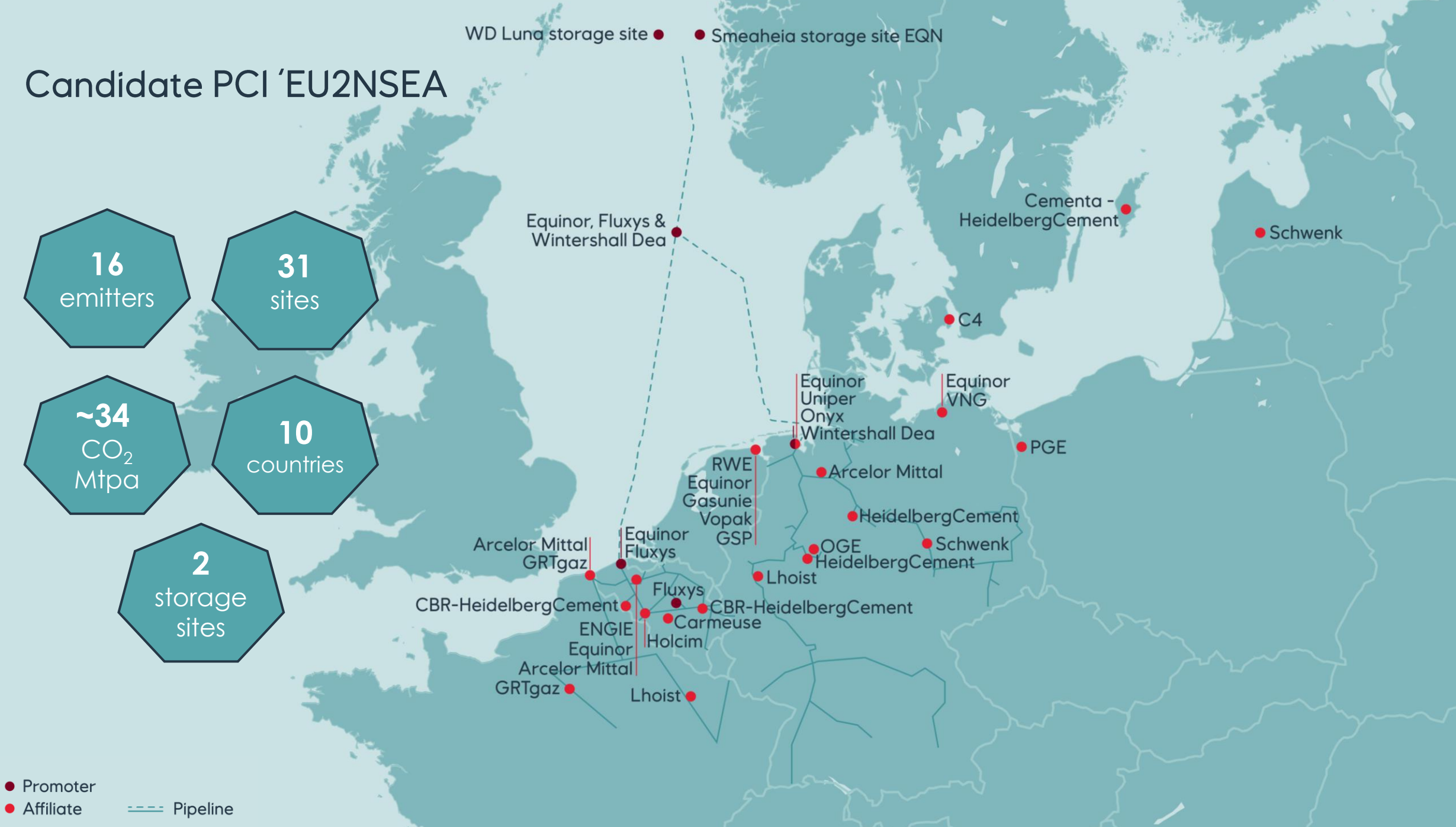
EU PCI application unites the CCS value chain - from North Europe Emissions to North Sea Storage

- Transport pipeline solution
- Connecting CO₂ emitters with storage sites in the North Sea
- Five CO₂ collection hubs and two CO₂ transshipment hubs in first set-up
- Several dedicated pipelines crossing the North Sea basin
- Arriving to the *Smeaheia* and *Luna* storage sites
- Built for future expansion with additional emitters, collection hubs and storage sites in the North Sea



Candidate PCI 'EU2NSEA

- 16 emitters
- 31 sites
- ~34 CO₂ Mtpa
- 10 countries
- 2 storage sites

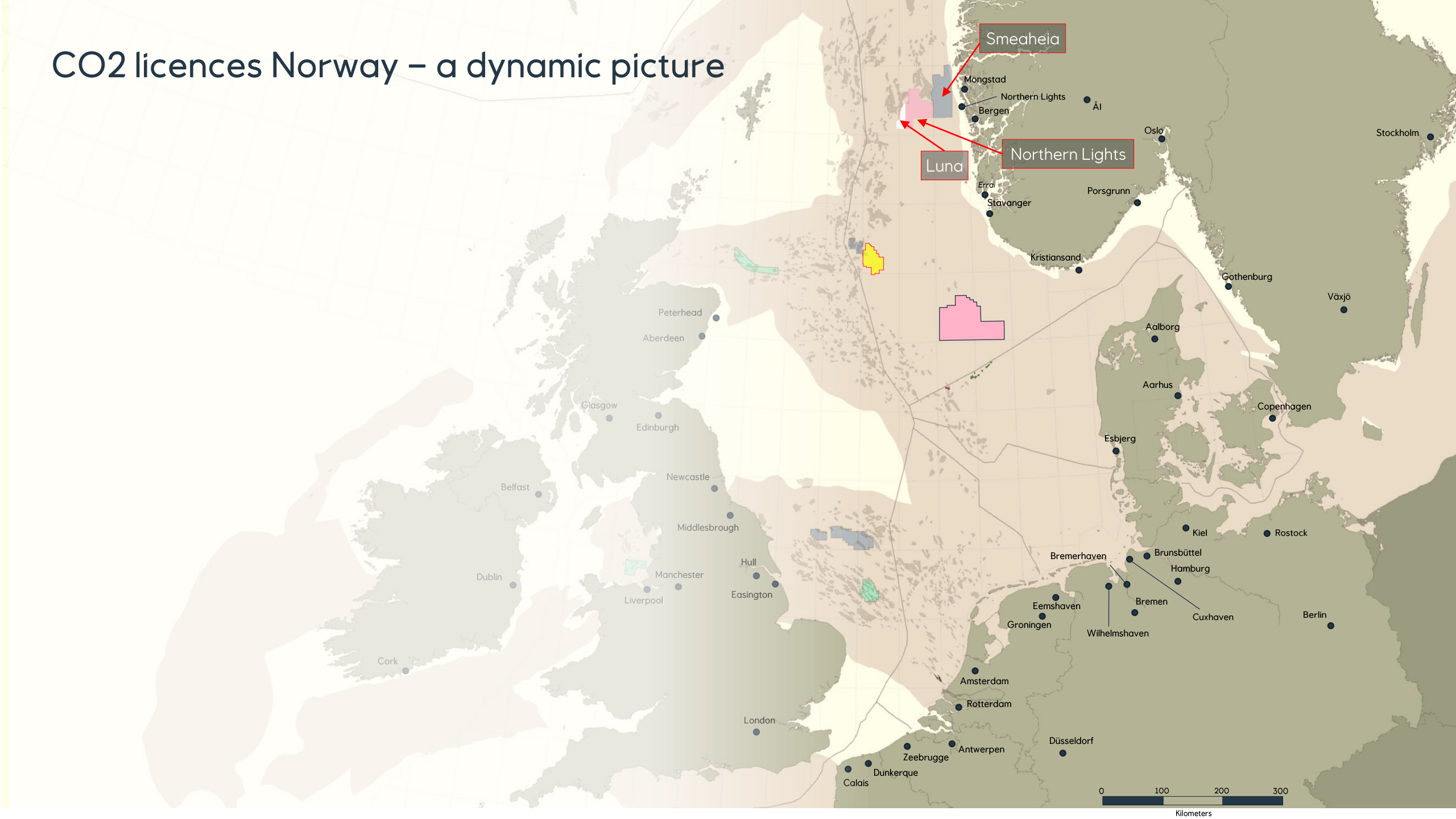


Potential volumes from European CO2 hubs 2030's

Dunkerque	Zeebrugge	Rotterdam	Eemshaven	Wilhelmshaven	Baltics
5– 15 Mtpa	10 – 25 Mtpa	5-10 Mtpa	10-15 Mtpa	10 – 30 Mtpa	15 - 30 Mtpa ?

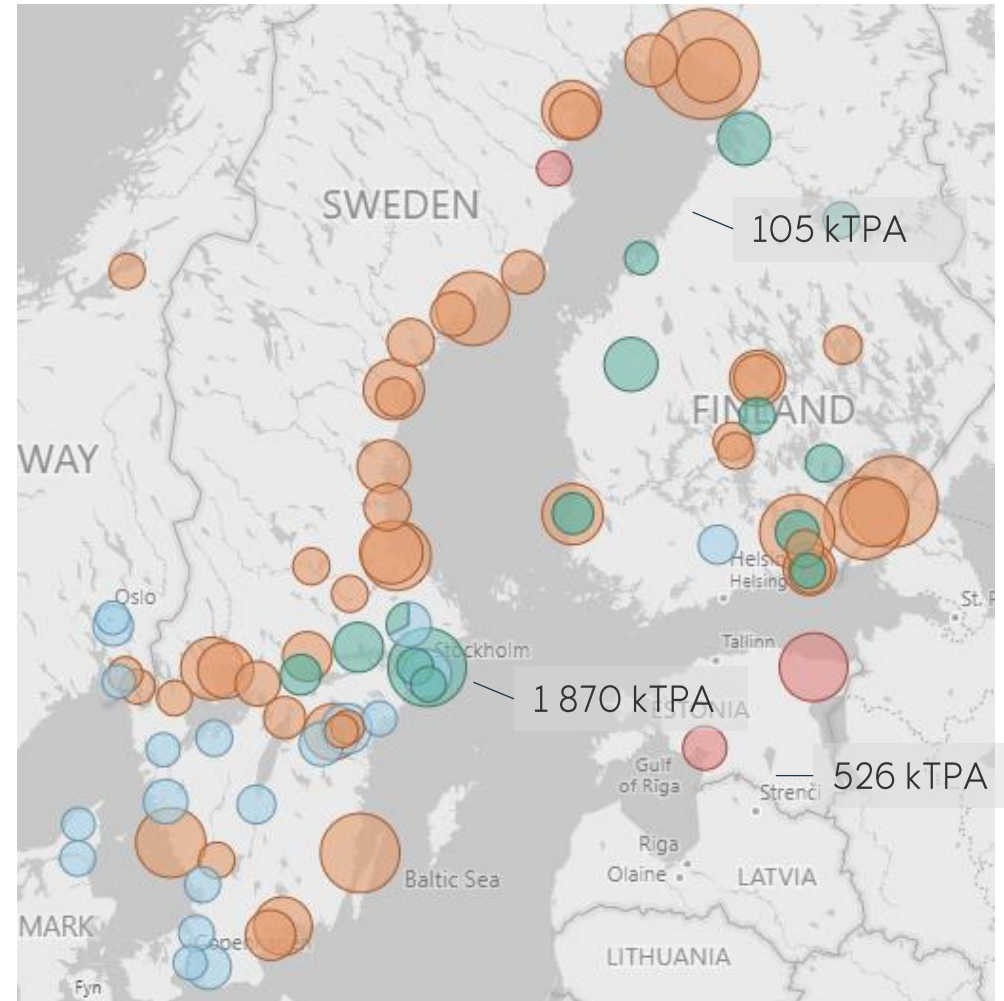


CO2 licences Norway – a dynamic picture



Nordic BECCS market potential ; + 50 mtpa bio-CO2

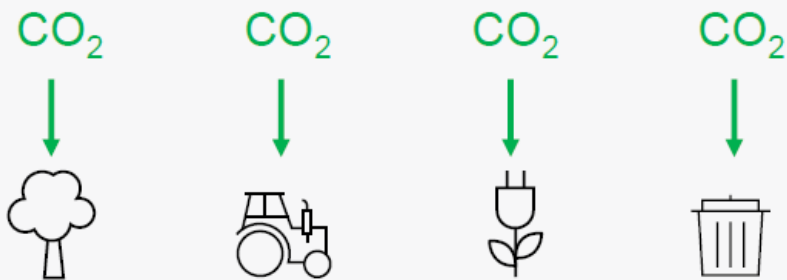
- BECCS opportunity for biomass industry
- Governments kick-start markets
 - Reversed auctions in Sweden (€3.6 bn)
- EU Innovation fund for negative emissions
- Storage providers develop capacity rapidly
- Nordic collaboration



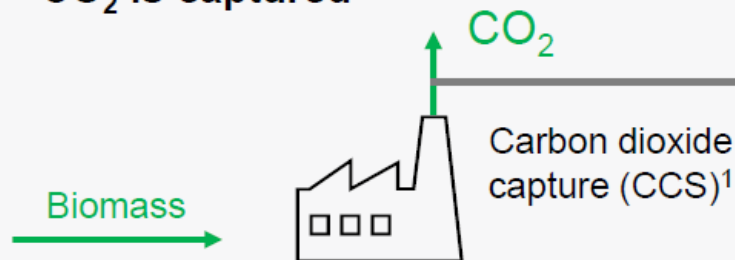
Source: CaptureMap by Endrava

Bio-CCS is a technique for capturing carbon emissions from biomass and sustainably storing it underground

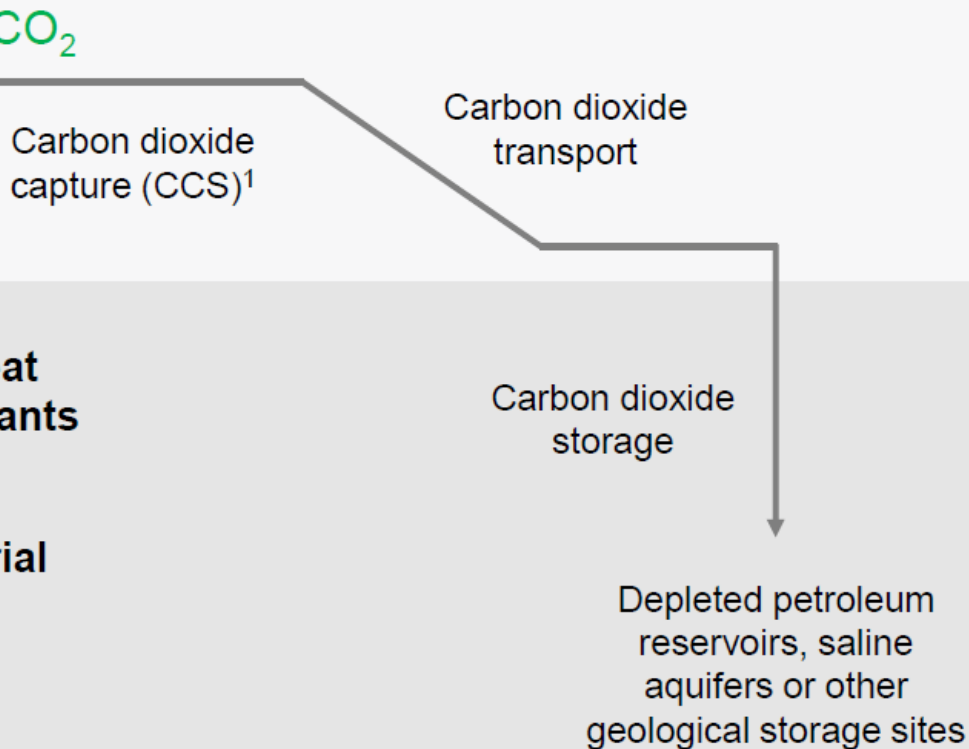
1) Biomass sequesters biogenic CO₂ from the atmosphere as it grows



2) Biomass is transported to facility where it is processed and biogenic CO₂ is captured



3) CO₂ is transported and stored underground



Forest residue

Biomass extracted from forests can be combusted to produce energy

Agricultural residue

Biomass resulting from crop production

Energy crops

Purpose-grown crops that are combusted

Bio waste

Waste produced in other industries and by society, which is treated thermally and combusted

- **Combined heat and power plants**
- **Paper mills**
- **Other industrial processing**

Explore BECCS opportunities in the Nordics



Verdane, Equinor and Södra announce Njord Carbon initiative to scale the permanent, engineered carbon removals value chain

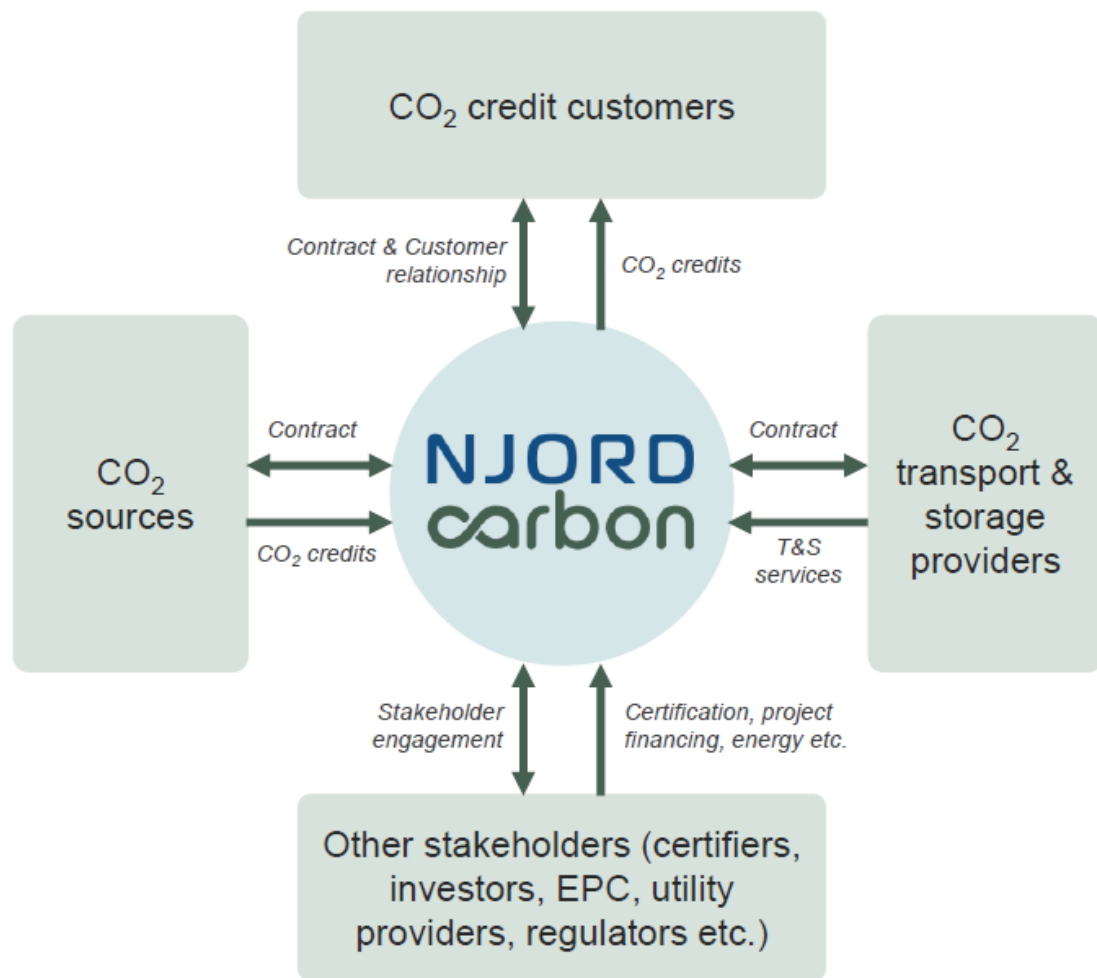
Even if the world succeeds in dramatically cutting its collective CO₂ emissions, there is an urgent need to remove billions of tonnes of CO₂ from the atmosphere. Verdane, the European specialist growth equity investor, has therefore joined forces with Södra, a globally leading forest industry group, and Equinor, an international energy company and global leader in permanent CO₂ storage, to develop an international initiative called Njord Carbon. Njord Carbon will aim to sustainably remove and permanently store biogenic carbon emissions. This technology is critical to limiting global warming to 1.5 degrees, according to recent IPCC and other reports. Njord Carbon will serve to provide highly durable and cost-efficient carbon dioxide removals at scale. It could also help accelerate the global market and infrastructure needed for bioenergy carbon capture and storage (BECCS) and other permanent carbon removal solutions at scale. Njord Carbon welcomes further partners committed to permanently engineered carbon emission removal.

Equinor and Verdane have signed a MoU to explore BECCS business opportunities



The Memorandum of Understanding (MoU) will explore the possibility to develop Bioenergy Carbon Capture & Storage (BECCS) business to create carbon removal credits from stored biogenic CO₂

Njord Carbon is created to address the chicken and the egg problem



Value chain business builder

- Addressing the “chicken and egg problem”
- Facilitating alignment of stakeholder interests



Commercial innovator

- Customer segmentation and go-to-market
- CDR product design and branding
- Pricing and contracting



Volume aggregator

- Scale in CO₂ capture projects and sale of carbon credits
- Scale in purchase of transport and storage



Competence hub

- Commercial and market dynamics
- Technology and EPC choices
- Regulatory and public funding
- Financial structuring



Financing partner