



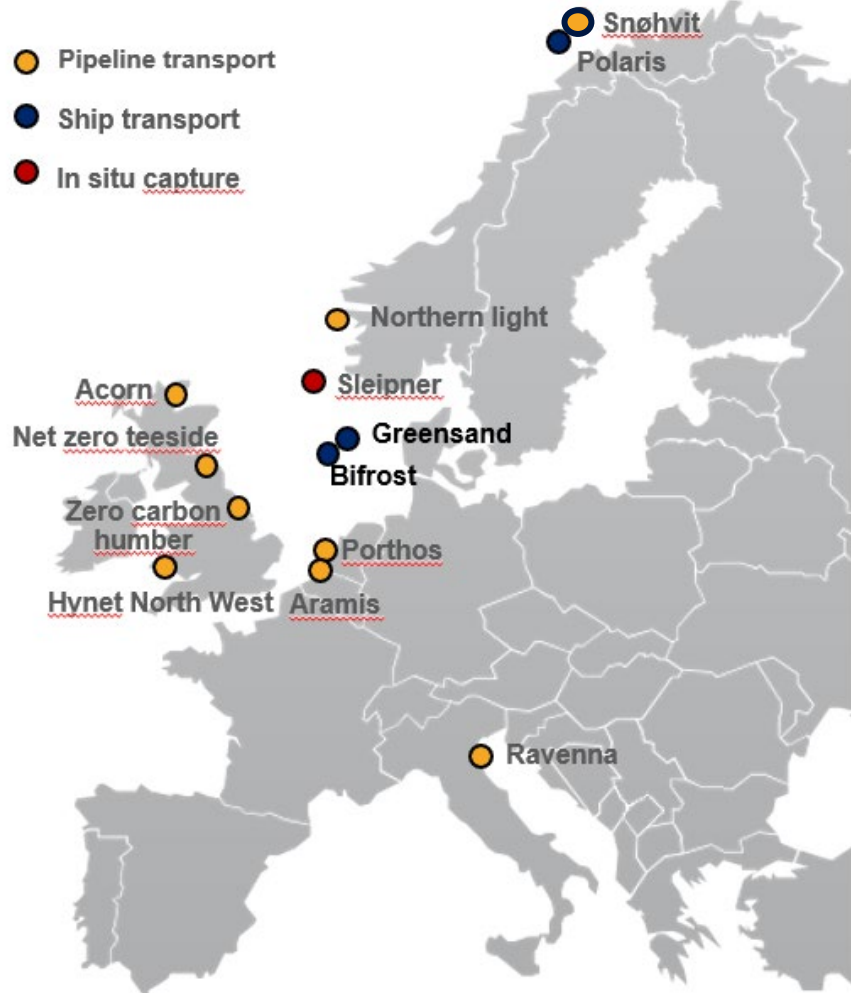
Greensand CO2 Transport and Storage Project Status and CO2 footprint of CCS value chain

INEOS Energy and Wintershall Dea

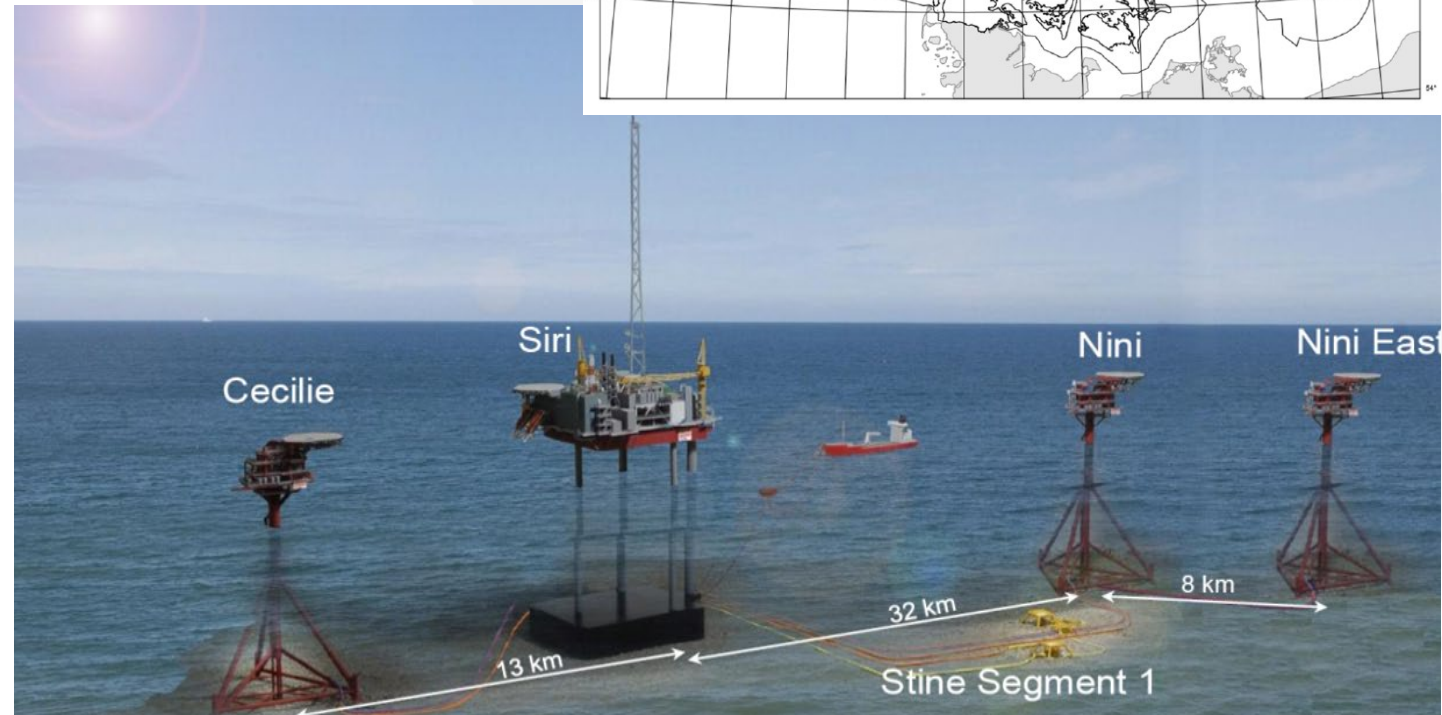
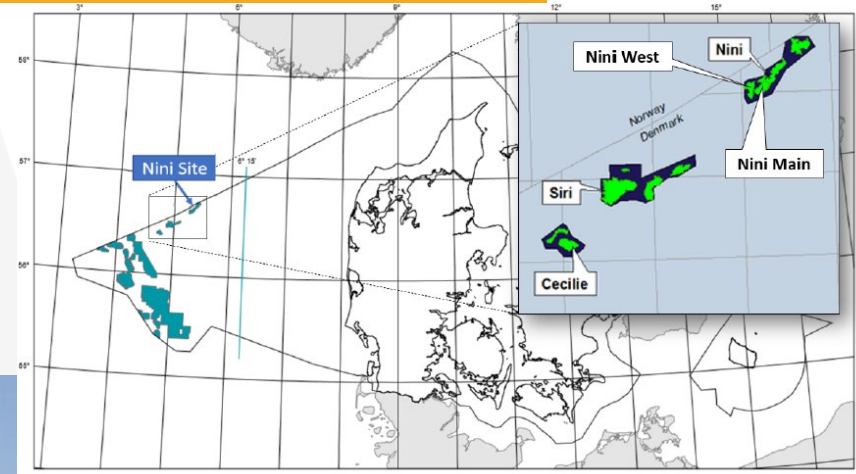
June 14th, 2022, Copenhagen

By Søren Reinhold Poulsen, Greensand Project Director

Greensand in the European CCUS landscape (Current!)



Turning Siri Oil and Gas hub into a CO2 storage hub

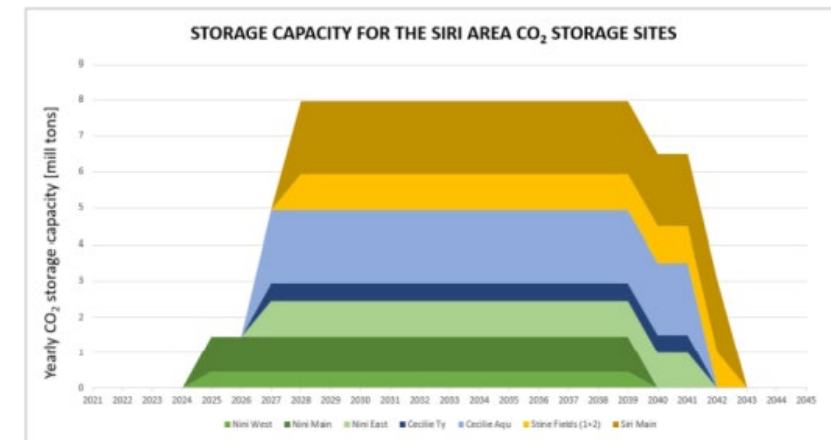
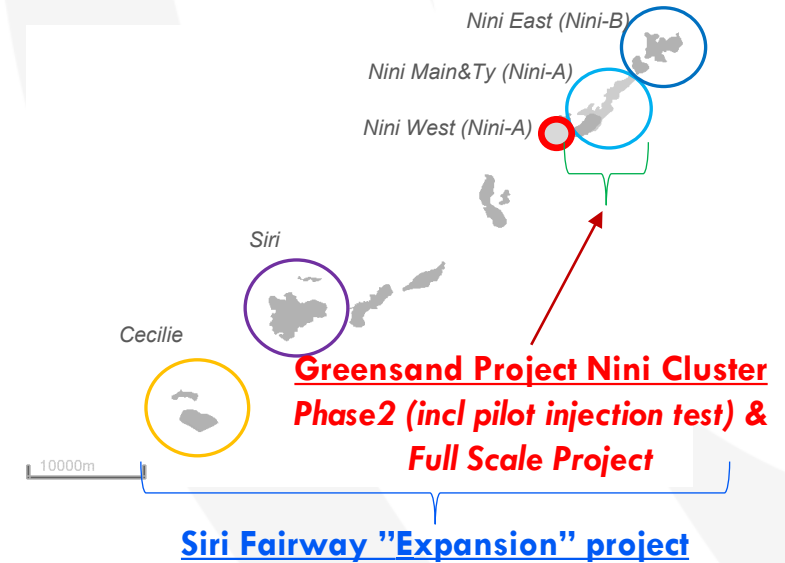


Greensand Project – Transport and Storage of CO₂

Overview



- Use of Siri Area for CO₂ storage
INEOS has experience and huge data set from exploration and production activities in Siri Area over more than 20 years
- Initial Greensand work focused on CO₂ storage in Nini West
- Nini Full scale project includes Nini Main & West
- Expansion project includes remaining Siri area suitable reservoirs

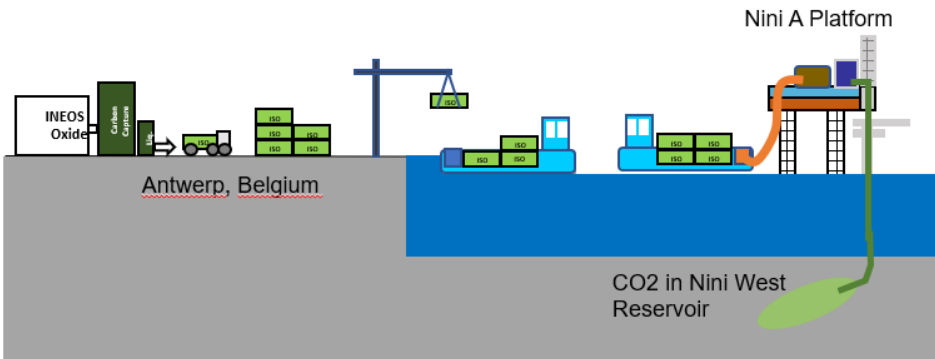


Greensand Project

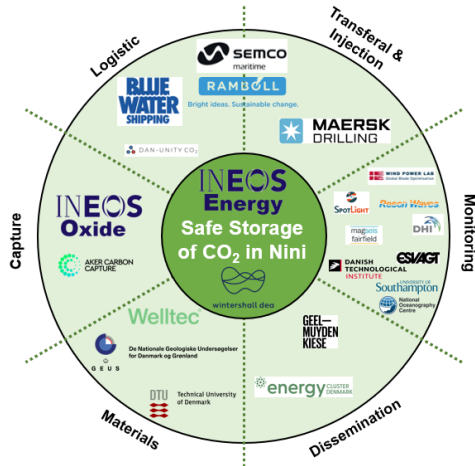
Phase 2 – Pilot CO2 injection trial, monitoring testing and further maturation

EUDP
 Det Energiteknologiske Udviklings- og Demonstrationsprogram
 Government funding of 197 MMDKK received from EUDP in Dec 2021 to support **Phase 2** activities in 2022/23

Pilot Injection Sequence



Strong Phase 2 Consortium of 23 Companies



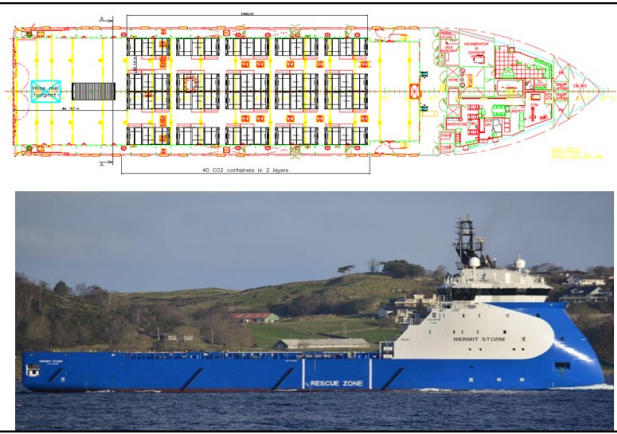
Key activities:

- Pilot injection
 - Logistical set-up
 - CO2 Transfer solution
 - 12,000 MT CO2 (food grade quality) injected in Nini West test well
- Full scale maturation
 - Further reservoir modelling and lab testing
 - Well design
 - CO2 carrier ship design
 - Monitoring tools deployed and tested
 - DnVGL Site Endorsement CoC

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Storage Capacity
Phase 1	[Bar]											
Phase 2 - Pilot (Nini West) - Offshore injection period			[Bar]									
Full Scale (Nini West/Main)			[Bar]				Start Storage					Up to 1.5 MTPA
Siri Fairway Expansion Project								[Bar]				Up to 8 MTPA

Greensand Project

Phase 2 injection pilot – securing the equipment and planning



Nini Platform



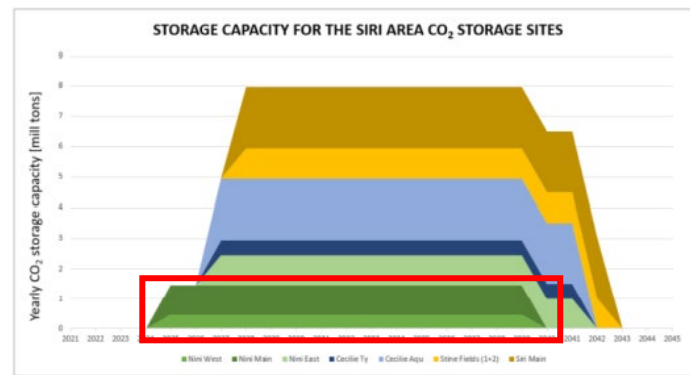
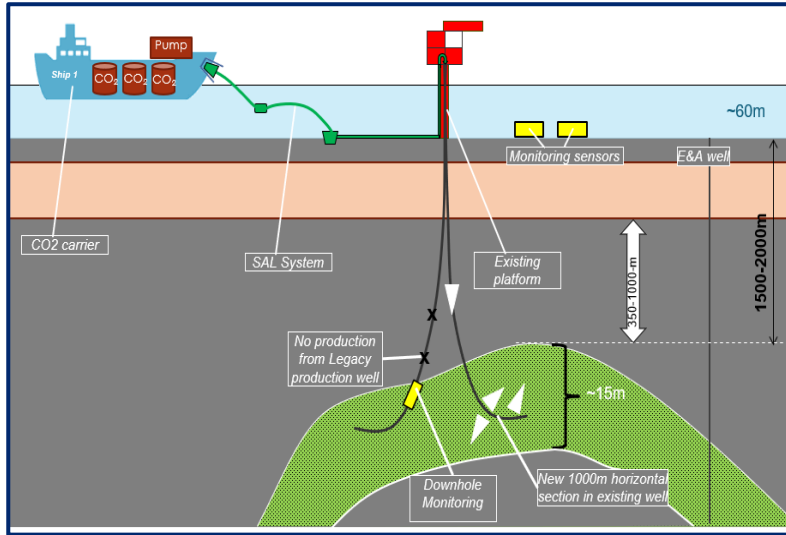
Liquid CO2 storage tanks in Antwerp. 2500 MT @ 16 barg and -20 deg C

Parameter	Value
Liquid CO ₂ conditions	-31°C @ 14 bar to -40°C @ 10 bar (initial vs empty conditions)
Payload	19.6 t
Holding time	30 to 50 days

Greensand Full Scale Project

Starting with a 1.5 MTPA capacity

Full Scale (Nini West/Main) Conceptual Set-up



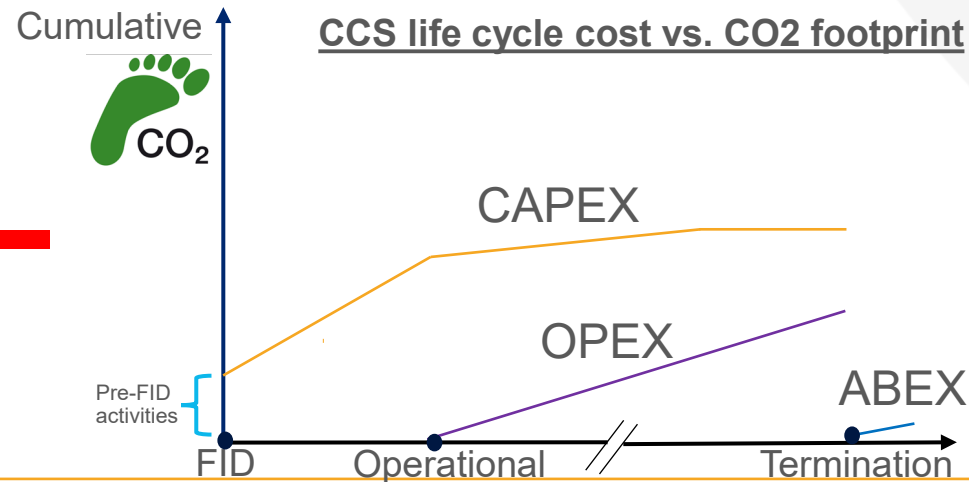
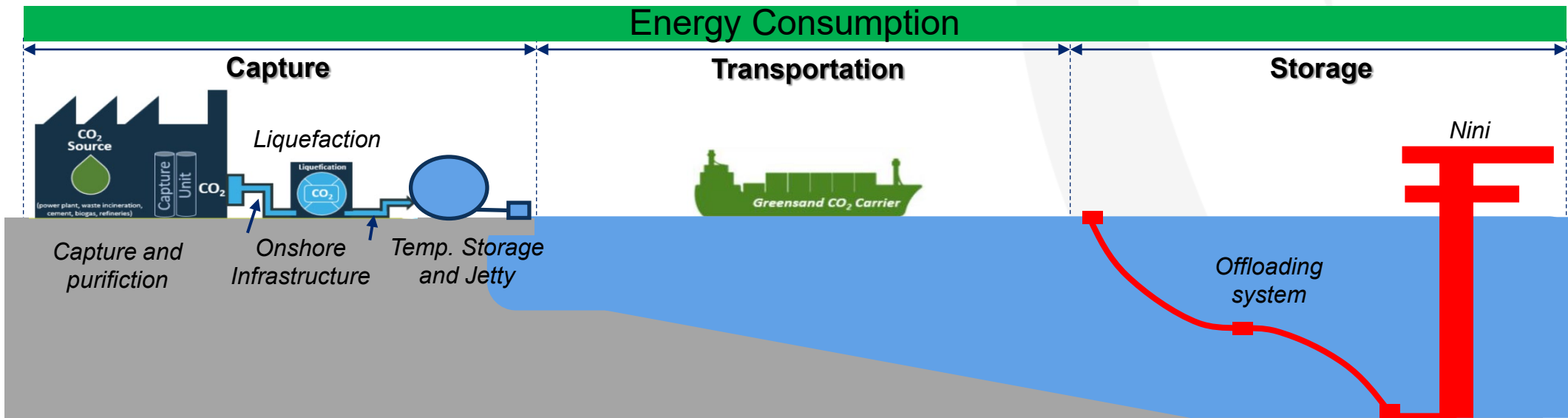
Key activities:

- Mature Nini Main reservoirs
- Mature Development concept
 - Ship design
 - Offloading/Transfer system
 - CO2 injection wells
 - Monitoring set-up
- Establish logistical & commercial model
- Authority approvals
- DnV Storage Site & Site Development CoC's

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Storage Capacity
Phase 1	█											Up to 1.5 MTPA
Phase 2 - Pilot (Nini West) - Offshore injection period		█										
Full Scale (Nini West/Main)			█				Start Storage					
Siri Fairway Expansion Project				FID	█							

Greensand Full Scale Project

CCS value chain CO2 footprint considerations



This is the effective CO₂ footprint reduction - will become a competition parameter in the CCS game going forward

Greensand Project – CO2 footprint of Full scale project

Emission assessment study (Industrial PhD project 2021-2024)

- Emission assessment done from a Life Cycle perspective (applying LCA methodology ISO14040/44)
- PhD project (Maersk Drilling, INEOS/WDEA and DTU Environment)..
- Collaborate with relevant Greensand partners and relevant stakeholders to gain necessary insight into processes and data gathering

- PhD study timeline:



Optimisation of the full CCS value chain

Collaboration across the entire value chain is a pre-requisite for success

- Lack of common understanding across sections today.
 - Intersections and linkage between processes need to be outlined and assessed (emission quantification and optimization).
 - Large number of stakeholders included today in developing this new industry value chain.
- Few studies assessing the emission footprint of the entire CCS value chain
 - Infrastructure depends on CO2 requirements – e.g. CO2 Pressure, Temp, Specs throughout
 - CCS value chain uniqueness vs. areas of standardization
- Greensand full scale project working as a case study. Feed results into network of partners and academia

Greensand Project

Thank you for your attention