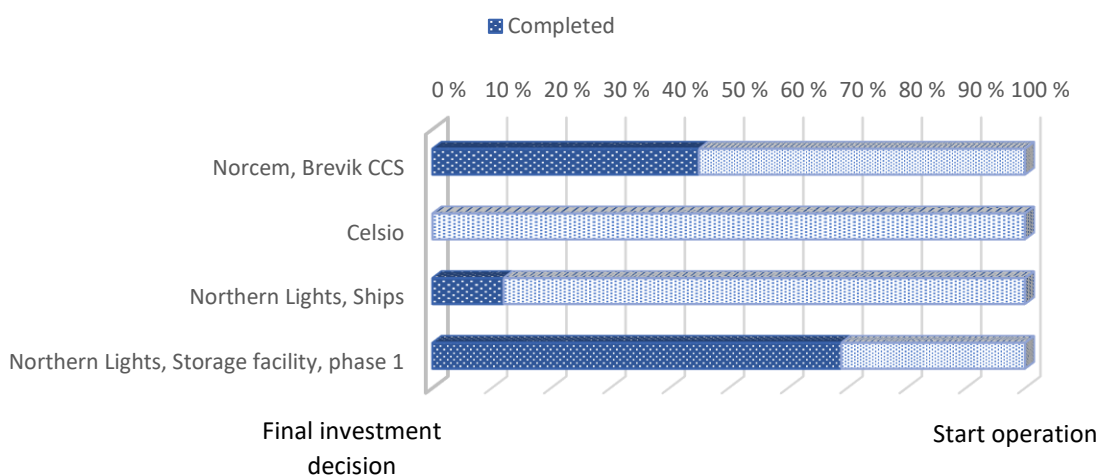


Status, Longship 16.12.2022

Highlights

- Construction of the Northern Lights CO₂ transport and storage infrastructure and Norcem's and Celsio's CO₂ capture plants is progressing. Brevik CCS is 45% completed, Northern Lights storage facility is 69% completed and Celsio's CO₂ capture project at the waste-to-energy plant in Oslo started in August.
- Overall progress of Longship's construction phase:



Background – about Longship

- The CCS project Longship, partly funded by the Norwegian government, includes the capture, transport and storage of CO₂.
- A carbon capture facility is currently being built at the Norcem's cement plant in Brevik, Norway, by Heidelberg Materials. According to plan, the facility will capture approximately 400,000 tonnes of CO₂ from late 2024.
- Celsio has also started building a carbon capture facility and will, according to plan, capture approximately 400,000 tonnes of CO₂ annually from its waste-to-energy plant in Oslo from 2026.
- Northern Lights is currently developing a solution for the transport and storage of CO₂. The CO₂ will be transported by ship from the various emission sources to a receiving facility near Bergen, before being transported by pipeline for permanent storage in a reservoir located 2600 metres below the seabed.

- Several measures are needed to enable European countries to achieve carbon neutrality. Longship will help the hard-to-abate industries reduce their CO₂ emissions and make carbon negative emissions possible.

Roles in Longship

- **Ministry of Petroleum and Energy** – Responsible for Norway’s CCS policy and Longship on behalf of the Norwegian government
- **Ministry of Foreign Affairs** – Coordinates Norway’s foreign service and embassies
- **Gassnova** – State owned company following up Longship on behalf of the Ministry of Petroleum and Energy
- **Northern Lights** – Transport and storage company receiving carbon from Norcem and potentially Celsio, and aiming to receive carbon from multiple sources
- **Brevik CCS – Norcem, Heidelberg Materials** – Capture site under construction at the cement plant in Brevik
- **Hafslund Oslo Celsio** – Capture project under construction at the waste-to-energy plant in Oslo

Status Northern Lights

- Construction of the Northern Lights CO₂ storage facility is **69%** completed (2022.10.31) and on schedule to start operations in 2024 as planned.
- At the receiving terminal, construction of the visitor centre is completed and was opened in October by the Norwegian prime minister Jonas Gahr Støre. Fabrication and installation of the onshore plant is ongoing.
- Northern Lights concluded the drilling operations for a CO₂ injection well and a contingent injection well in October. Preliminary results confirm the storage capacity of at least 5 million tonnes CO₂ per annum. The first offshore CO₂ injection well was drilled already in 2020.
- Fabrication of CO₂ pipeline is ongoing. The umbilical is completed and installed.
- Dalian Shipbuilding Industry Co., Ltd. (DSIC) is building two ships dedicated for CO₂ transport for the Northern Lights. The ships are now **12%** completed (2022.10.31) and the first ship will be delivered in 2024.
- Yara and Northern Lights have signed the world’s first commercial agreement on cross border CO₂ transport and storage. From early 2025, 800,000 tonnes of CO₂ will according to the agreement be captured from Yara’s ammonia and fertiliser plant in Sluiskil in the Netherlands and transported and stored by Northern Lights. With that, the first phase of Northern Lights is fully booked. There are plans to apply for permission to expand capacity.
- Northern Lights is, together with partners in several European countries, recognized as Project of Common Interest (PCI) by the European Commission and has received CEF funding for a phase 2 study. The Phase 2 onshore and jetty FEED studies are ongoing and an investment decision for Phase 2 will be concluded by Q1 2023. In phase 2 the capacity of the storage site will increase from 1,5 million tonnes a year to 5 million tonnes a year.
- Four potential customers to Northern Lights passed selection for Innovation Fund support in the first round (2021) and funds for these projects are allocated by EU. Three potential new

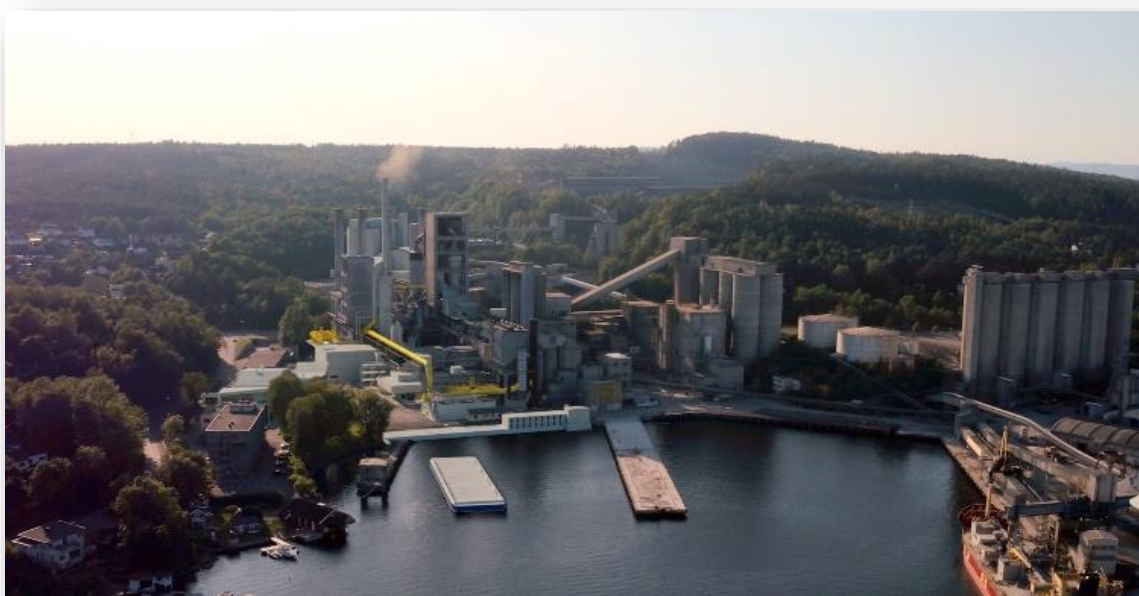
customers passed the selection in Innovation Fund's second round in July this year. Maturing commercial agreements between potential customers and Northern Lights is continuing. Northern Lights is also in dialogue with customers not relying on funding from the EU Innovation Fund.



Northern Lights' CO₂ receiving terminal in Øygarden.

Status Norcem

- Overall accumulated actual progress is **45%** for the Brevik CCS Project (2022.10.31).
- Generally, Brevik CCS is progressing well, but the project organisation expresses some concern about delays from subcontractors, due to the global disturbances in crucial supply chains caused by covid-19 and the war in Ukraine, leading to major uncertainties in supply of critical materials, equipment, and logistics.
- Norcem's updated cost estimates from October 2021 show that Norcem is expected to exceed the maximum budget in the subsidy agreement between the state. In accordance with the state aid agreement, the parties are obliged to jointly seek an agreed solution for financing the cost overrun and the project. The negotiation between the parties is ongoing and in the meantime the project is progressing as planned. Brevik CCS has experienced vast interest internally and externally. Heidelberg Materials now has several emerging projects in other countries, mainly in Europe and North America. Brevik CCS is the frontrunner both within the company and within the industry.



Norcem's plant will be transformed with a new capture plant on site.

Status Celsio

- On June 29th the Minister of Petroleum and Energy Terje Aasland signed the support agreement that ensures the realization of carbon capture at Hafslund Oslo Celsios (Celsio) waste incineration plant at Klemetrud in Oslo. The agreement marks that the Norwegian state, Oslo Municipality and Celsio's owners; Hafslund Eco, Infranode and HitecVision, now will realize the world's first carbon capture and storage plant on waste incineration.
- Celsio's carbon capture project started the civil works, blasting and ground works on site in August this year. The main focus for the project in October has been detail engineering by Technip for the process plant and continued blasting of the rock hill by Anlegg Øst.
- According to the current plan, construction of the capture plant will be finished in 2025 and the plant will be capturing 400 000 tonnes of CO₂ from 2026.

- In March 2022 Fortum signed an agreement to sell its 50 % ownership in the waste-to-energy and thermal energy company to an investor consortium comprising Hafslund, Infranode and HitecVision. Following the transaction, Hafslund (owned by the Municipality of Oslo) became the majority owner with 60 per cent ownership in Hafslund Oslo Celsio, while Infranode and HitecVision will have significant minority position of 20 per cent each.



Hafslund Oslo Celsio's CO₂ capture plant will be capturing 400 000 tonnes of CO₂ from 2026.

CO₂ storage in Norway

- In total three exploration licenses to store CO₂ are awarded in Norway pursuant the CO₂ Storage Regulations in addition to Northern Lights' exploitation permit. Another area for CO₂ storage on the Norwegian continental shelf was announced by the MPE in November 2022.
 - In October 2022 two companies - Wintershall Dea Norge AS og CapeOmega AS - have been offered exploration license for CO₂ storage in an acreage in the Norwegian part of the North Sea.
 - In April 2022 three companies were offered exploration licenses to store CO₂ in two areas on the Norwegian Continental Shelf. The area in the North Sea was offered to Equinor ASA, and the area in Barents Sea was offered to a group including Equinor ASA, Horisont Energi AS and Vår Energi AS.
 - Northern Lights was awarded an exopration permit for the storage part of Longship in 2019.

Resources

- [Langskip – Et prosjekt for CO₂-håndtering som omfatter fangst, transport og lagring av CO₂ \(regjeringen.no\)](https://www.regjeringen.no)
- [Spørsmål og svar om Langskip-prosjektet - regjeringen.no](https://www.regjeringen.no)

- [Tidslinje for Langskip \(CCS\) - regjeringen.no](https://www.regjeringen.no)
- [Full-scale CCS project in Norway - Longship | Reaching the climate goals \(ccsnorway.com\)](https://ccsnorway.com)
- [Northern Lights \(norlights.com\)](https://norlights.com)
- Time-lapse video: [Time-lapse construction of the Northern Lights CO2 transport and storage infrastructure 2021 - YouTube](https://www.youtube.com/watch?v=...)
- <https://www.norcem.no/no/CCS>
- <https://www.celsio.no/karbonfangst-ccs/>

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