# Europe launches pioneering vessel to sequester millions of tonnes of CO2 beneath North Sea



Europe's ambition to tackle climate change has gained significant momentum with the advent of an innovative maritime vessel specifically designed to transport and sequester carbon dioxide beneath the North Sea. This initiative, spearheaded by the Greensand project, aims to bury 400,000 tonnes of CO2 annually in its first phase, with aspirations to escalate this capacity to 8 million tonnes by 2030.

Launched in a ceremony on May 14, 2025, at the Royal Niestern Sander shipyard in the Netherlands, this vessel marks a pivotal advancement in carbon capture and storage (CCS) technology. Unlike traditional cargo ships, it is engineered to transport liquefied CO2 extracted from industrial emissions to permanently designated geological storage sites beneath Danish waters. This initiative is not merely a theoretical exercise but a fully operational industrial solution, having secured final investment approval in December 2024.

The technical complexities associated with transporting CO2 are considerable. To facilitate transport, CO2 must be liquefied at -50°C and compressed to 7 bars, necessitating sophisticated isothermal reinforced tanks alongside advanced thermal regulation systems. The shipyard applied extensive knowledge accrued from constructing methane and chemical carriers to overcome challenges like preventing acidic CO2 corrosion and ensuring cargo stability in turbulent seas.

Denmark is strategically positioned as Europe's carbon storage leader, leveraging its abundance of well-mapped depleted oil reservoirs and progressive energy policies. The Danish public has demonstrated a notable acceptance of carbon storage technologies, which has streamlined administrative processes and paved the way for robust partnerships. The CO2 will be injected at the Nini West platform, utilising geological formations known to have safely contained petroleum for millions of years, thereby fostering confidence in their capability for effective CO2 containment.

Greensand is part of a larger framework of carbon capture and storage initiatives emerging across the continent. With over €140 million in investments from the private sector and public European funding, this project encompasses not just the specialized vessel but also port facilities and long-term storage monitoring systems. It is complemented by efforts such as TotalEnergies’ Northern Lights project, which is successfully storing CO2 at depths of 2,600 meters beneath the seabed off Norway’s coast. The Northern Lights initiative is expected to increase its storage capacity to over 5 million tonnes annually by 2028, highlighting the accelerating pace of CCS developments in the region.

The growth of carbon capture infrastructure in Europe also features other noteworthy projects, including Norway’s Longship and the UK's Northern Endurance, which also aim to bolster the continent’s ability to mitigate greenhouse gas emissions. What sets Greensand apart is its dedicated land-to-sea carbon transportation model, reflecting a significant innovation in the sector.

This evolving strategy underscores a paradigm shift in carbon management—conceptualising CO2 as a product that can not only be captured but also effectively transported and sequestered. The initial goal of 400,000 tonnes annually may seem modest against the backdrop of Europe’s total emissions, yet it represents a critical stepping stone towards the ambitious 2030 target of 8 million tonnes. Should these initiatives succeed, Europe could cement its role as a global front-runner in carbon capture technology, potentially transforming traditional fossil-fuel infrastructures into vital assets for addressing climate change while simultaneously fostering economic activity.

As the Greensand vessel embarks on its operational journey, it encapsulates a pragmatic European response to climate challenges—utilising existing maritime expertise, repurposing geological assets, and crafting innovative solutions for efficient carbon management. The implications of such pioneering initiatives not only signify a proactive approach to climate action but also herald a new chapter in the pursuit of sustainable industrial practices across Europe and beyond.

## Reference Map:

* Paragraph 1 – [[1]](https://farmingdale-observer.com/2025/05/24/what-if-europe-held-the-solution-to-all-our-co2-emission-problems-this-sea-giant-will-allow-for-burying-400000-m%C2%B3-of-gas-every-year/), [[2]](https://www.reuters.com/sustainability/climate-energy/britains-ineos-partners-invest-co2-storage-off-denmark-2024-12-10/)
* Paragraph 2 – [[1]](https://farmingdale-observer.com/2025/05/24/what-if-europe-held-the-solution-to-all-our-co2-emission-problems-this-sea-giant-will-allow-for-burying-400000-m%C2%B3-of-gas-every-year/), [[2]](https://www.reuters.com/sustainability/climate-energy/britains-ineos-partners-invest-co2-storage-off-denmark-2024-12-10/)
* Paragraph 3 – [[2]](https://www.reuters.com/sustainability/climate-energy/britains-ineos-partners-invest-co2-storage-off-denmark-2024-12-10/), [[5]](https://www.ineos.com/news/ineos-group/ineos-led-consortium-announces-breakthrough-in-carbon-capture-and-storage/)
* Paragraph 4 – [[3]](https://www.reuters.com/sustainability/climate-energy/shell-equinor-totalenergies-open-norwegian-co2-storage-facility-2024-09-26/), [[4]](https://totalenergies.com/news/press-releases/norway-totalenergies-and-partners-launch-2nd-phase-northern-lights-ccs-project)
* Paragraph 5 – [[1]](https://farmingdale-observer.com/2025/05/24/what-if-europe-held-the-solution-to-all-our-co2-emission-problems-this-sea-giant-will-allow-for-burying-400000-m%C2%B3-of-gas-every-year/), [[6]](https://www.equinor.com/energy/northern-lights)
* Paragraph 6 – [[1]](https://farmingdale-observer.com/2025/05/24/what-if-europe-held-the-solution-to-all-our-co2-emission-problems-this-sea-giant-will-allow-for-burying-400000-m%C2%B3-of-gas-every-year/), [[7]](https://pilot.greensandfuture.com/en/first-carbon-storage)
* Paragraph 7 – [[1]](https://farmingdale-observer.com/2025/05/24/what-if-europe-held-the-solution-to-all-our-co2-emission-problems-this-sea-giant-will-allow-for-burying-400000-m%C2%B3-of-gas-every-year/)

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## Bibliography

1. <https://farmingdale-observer.com/2025/05/24/what-if-europe-held-the-solution-to-all-our-co2-emission-problems-this-sea-giant-will-allow-for-burying-400000-m%C2%B3-of-gas-every-year/> - Please view link - unable to able to access data
2. <https://www.reuters.com/sustainability/climate-energy/britains-ineos-partners-invest-co2-storage-off-denmark-2024-12-10/> - In December 2024, British chemicals group INEOS and its partners decided to invest in a CO₂ storage project off the coast of Denmark, potentially becoming the first operational CO₂ storage facility in the EU. Known as the Greensand Future project, it aims to inject up to 400,000 tonnes of CO₂ annually, starting from late 2025 or early 2026, into a depleted oilfield. The project follows similar initiatives in the North Sea, such as Norway's $621 million Northern Lights and the Netherlands' $1.3 billion Porthos projects. Supported by a $197 million grant from the Danish government, INEOS' partners include Harbour Energy and Nordsoefonden. The project plans to reuse existing wells, reducing costs, and could expand capacity to store up to 8 million tonnes of CO₂ per year by 2030.
3. <https://www.reuters.com/sustainability/climate-energy/shell-equinor-totalenergies-open-norwegian-co2-storage-facility-2024-09-26/> - In September 2024, Shell, Equinor, and TotalEnergies completed their CO₂ storage project on Norway's west coast, with the first deliveries anticipated in 2025. This project, part of Norway's Longship initiative launched in 2020, aims to demonstrate the viability of carbon capture and storage (CCS) for reducing CO₂ emissions. The Northern Lights site comprises 12 onshore metal tanks capable of temporarily storing 7,500 cubic meters of CO₂, which will then be permanently stored via a 110-kilometer pipeline at a depth of 2,600 meters below sea level. The first phase of the project can inject 1.5 million metric tons of CO₂ per year, with planned expansions targeting an additional 3.5 million tons annually. Initial CO₂ shipments will come from Heidelberg Materials' Brevik cement plant, with other agreements in place for Yara and Orsted starting in 2025 and 2026, respectively.
4. <https://totalenergies.com/news/press-releases/norway-totalenergies-and-partners-launch-2nd-phase-northern-lights-ccs-project> - In March 2025, TotalEnergies and its partners, Equinor and Shell, announced the Final Investment Decision (FID) of the second phase of the Northern Lights development, which will increase the project transport and storage capacity from 1.5 million to more than 5 million tons of CO₂ per year from 2028. The first phase of Northern Lights is completed and ready to receive CO₂ from industrial emitters. Operations are expected to start this summer, with the first CO₂ transportation by ship from Heidelberg Materials’ cement factory in Brevik, Norway and its injection and permanent storage into a reservoir 2,600 meters below the seabed, off the coast of Øygarden, western Norway.
5. <https://www.ineos.com/news/ineos-group/ineos-led-consortium-announces-breakthrough-in-carbon-capture-and-storage/> - In October 2024, a breakthrough in Carbon Capture and Storage (CCS) was announced in Denmark, as the first full-scale Carbon Storage in the EU became a reality, marking a critical step to mitigate climate change by achieving the storage volumes necessary to support Danish and European climate targets. INEOS, the day-to-day operator, with its partners Harbour Energy and Nordsøfonden, made a Final Investment Decision (FID) into the first commercial phase ‘Greensand Future’ with storage operations set to begin at the end of 2025/early 2026. This decision paves the way for expected investments of more than $150 million across the Greensand CCS value chain. Greensand has entered commercial agreements throughout the entire supply chain, from CO₂ emitters, to logistics, storage and shipping, backed by the funding necessary to make final injection and permanent storage a reality for Denmark and Europe.
6. <https://www.equinor.com/energy/northern-lights> - Northern Lights is the world’s first cross-border CO₂ transport and storage facility, and is now complete and ready to receive and store CO₂. In March 2025, the owners of Northern Lights announced a phase two of the groundbreaking CCS-project. NOK 7.5 billion will be invested to increase the total injection capacity from 1.5 to a minimum of 5 million tonnes of CO₂ per year. The facilities have been completed in 2024 and are ready to receive and store CO₂. The CO₂ receiving terminal will be located at the premises of Energiparken industrial area in the municipality of Øygarden in Western Norway.
7. <https://pilot.greensandfuture.com/en/first-carbon-storage> - From when the CO₂ is captured in Antwerp, transported by ship to Esbjerg, and finally stored in the depleted Nini West oil field in the North Sea, paving the way for the development of an international CCS value chain. This marks the culmination of the project’s pilot phase. The Final Investment Decision (FID) for a full-scale project is planned for the first half of 2024. In full scale, Project Greensand can store up to 1.5 million tonnes of CO₂ per year in 2025/2026 and potentially up to 8 million tonnes of CO₂ per year in 2030. In February 2023, leading consortium partners INEOS and Wintershall Dea received the necessary storage license from the Danish authorities.