



INNOVATION FUND

Driving clean innovative technologies towards the market

N2OWF – Nordsee Two Offshore Windfarm Innovation Project

The Innovation Fund is 100% funded by the EU Emissions Trading System



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Project summary

The N2OWF project will build and operate a first-of-its-kind offshore wind farm, with a capacity of 450 megawatts (MW), combined with on-site production, storage, and offtake of green hydrogen. The innovative technologies concern the wind turbine (each being approximately 15 MW), the foundations (amongst others, especially the installation of one-piece monopiles) and a hydrogen technology solution (a combination of a 4 MW electrolyser on the offshore substation and a service operation vessel running on around 80% green hydrogen) in the German North Sea. The project aims to achieve a 100% relative greenhouse gas (GHG) emission avoidance during the first ten years of operation compared to the reference scenario.

COORDINATOR

Nordsee Two GmbH

BENEFICIARY

Nordsee Two GmbH

LOCATION

North Sea, Germany

SECTOR

Wind energy: Offshore Wind

GHG EMISSION AVOIDANCE

3.2 Mt CO₂ eq

AMOUNT OF THE INNOVATION FUND GRANT

EUR 96 000 000

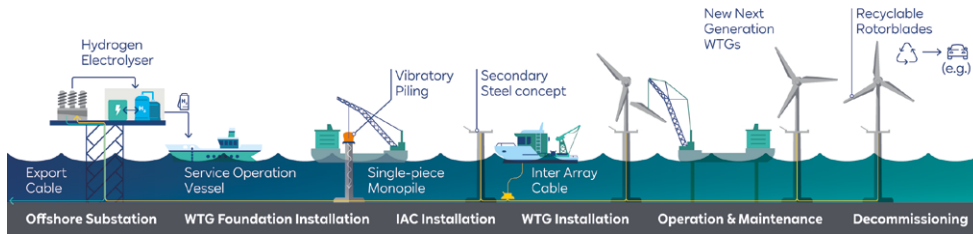
STARTING DATE

1 April 2022

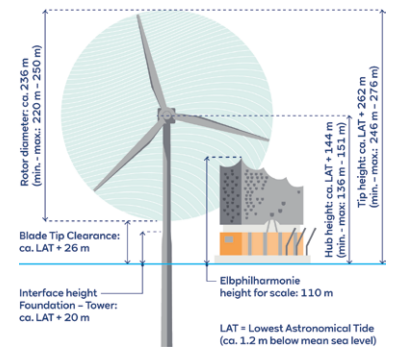
PLANNED DATE OF ENTRY INTO OPERATION

31 December 2026

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Overview of WTG with Foundation



First commercially deployed offshore electrolyser powered by next generation Wind Turbine Generators (WTGs)

By using next-generation WTGs, N2OWF will be able to decrease the required number of WTGs by 40% compared to WTG models used today. This will reduce the interconnecting cables and foundations required, the amount of steel for the foundations and the installation and commissioning time. The rotor diameter of the next generation of WTGs will be around 220-240m or more, compared to the 154-175m currently used. To visualize these huge figures: the Elbphilharmonie in Hamburg at its highest point could fit twice inside the diameter of the rotor. N2OWF will feed around 1 825 GWh per year of green electricity into the German grid. The amount produced will save 3.2 Mt CO₂ equivalent over the first ten years of operation and cover the electricity needs of around 400 000 households per year.

The project also plans to replace 80% of marine gas oil (MGO) and 100% of diesel, typically used to power vessels and the emergency generator respectively, with green hydrogen produced and stored on the offshore substation.

Contribution to a climate-neutral Europe by 2050

Through its increased production of clean and renewable energy, N2OWF will contribute to the European Green Deal, by helping to reduce greenhouse gas emissions and Europe's dependence on energy imports. It will support industries across the EU by coupling, for the first time, renewable energy sector and offshore green-fueled transport to achieve:

- Energy efficiency, by using electricity for the electrolyser directly offshore in times of oversupply, thereby relieving pressure on the grid and the German taxpayer;
- Circularity, by using desalinated water in the electrolysis process and demonstrating that green hydrogen can be produced without using scarce freshwater. N2OWF is also willing to use refurbished and reused main components where possible; and,
- Cost reduction, by combining the electrolysis process with offshore wind energy. Producing green hydrogen from electricity, which would otherwise be restricted, will reduce the operating expenses of green hydrogen by half.

Project technology transfer

The concepts demonstrated in N2OWF are then planned to be implemented for the subsequent Nordseecluster B areas N-3.5 (420 MW) and N-3.6 (480 MW), thus enabling the first scale-up of the demonstrated technologies and features at the same project site.

Furthermore, given that most suppliers of the WTGs, innovative foundations and hydrogen solutions required by N2OWF will be based in Europe, the project will contribute to strengthening European value chains. This will help to position the European economy at the forefront of technology development and implementation in this sector.