Quarterly report

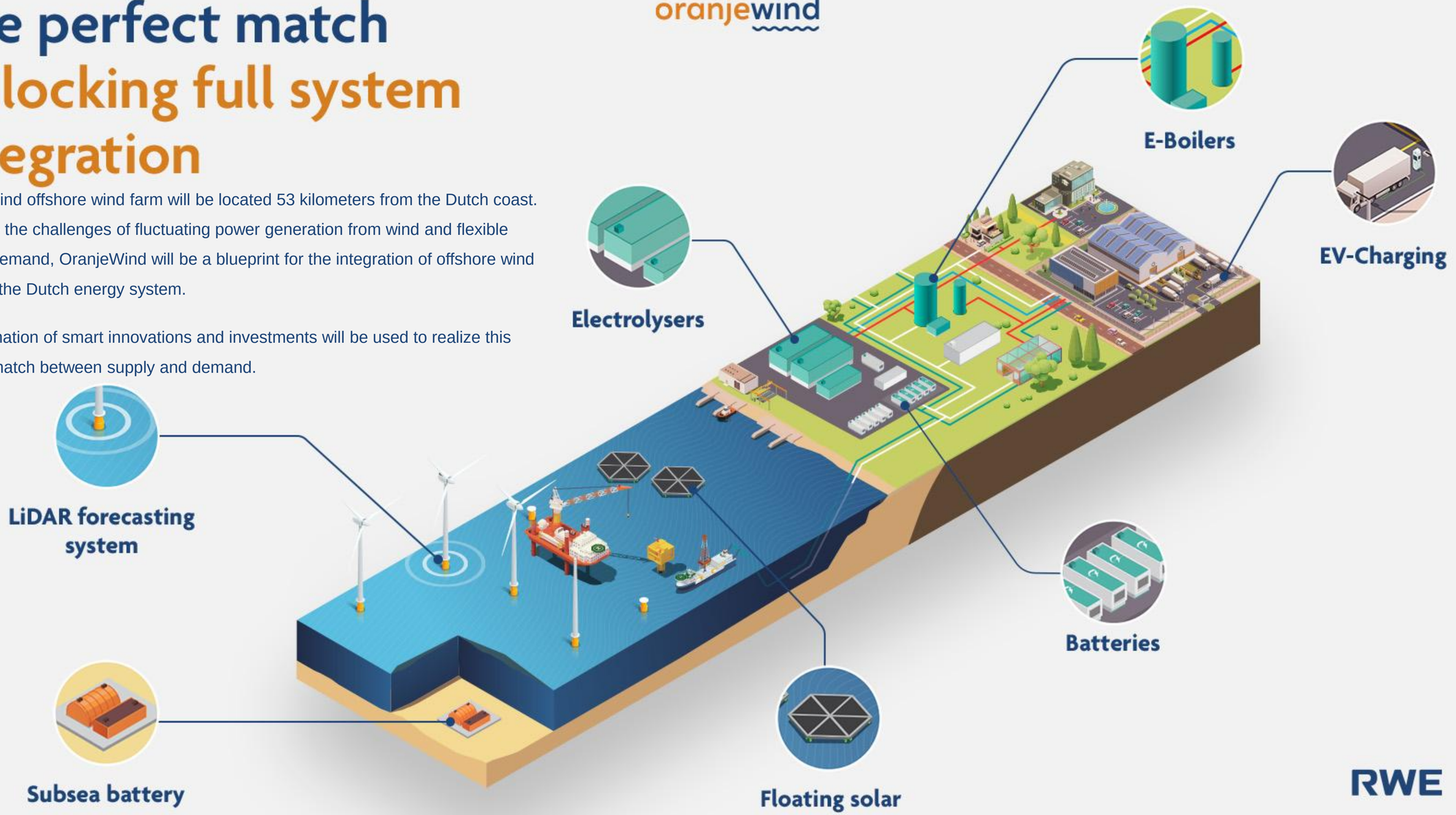
Q4 2025

The perfect match

Unlocking full system integration

OranjeWind offshore wind farm will be located 53 kilometers from the Dutch coast. To tackle the challenges of fluctuating power generation from wind and flexible energy demand, OranjeWind will be a blueprint for the integration of offshore wind farms in the Dutch energy system.

A combination of smart innovations and investments will be used to realize this perfect match between supply and demand.



What’s happening with the wind farm?
Offshore construction update

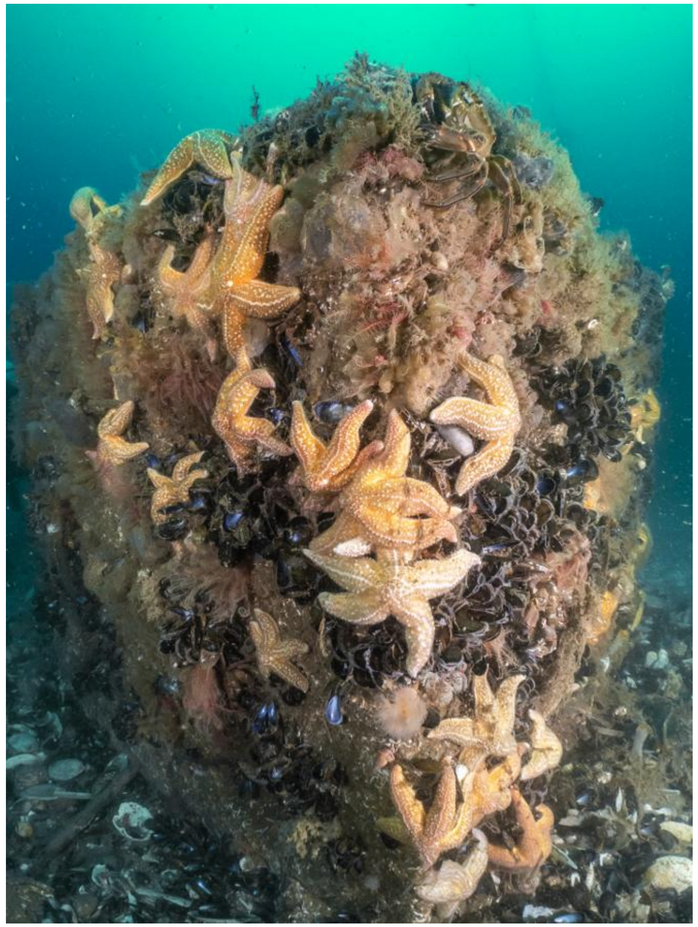
Preparations for the production of the wind farm components, such as cables, foundations and turbines, are well underway.

Grid operator TenneT has received the grid readiness certificate for OranjeWind's electricity connection to the high-voltage grid from DNV. This means the connection required to bring the electricity generated by OranjeWind ashore meets all the necessary standards and is ready for use.

In the past quarter, meetings were held with Coastguard and KNRM to discuss and align on safety procedures. Also, the unexploded ordnance (UXO) identification campaign ended and one out of three UXO’s has been cleared.

RWE and TotalEnergies collaborate with ARC marine

RWE and TotalEnergies have signed an agreement with ARC marine for the supply of 66 innovative Reef cubes® at a section of the future offshore wind farm OranjeWind, in the Dutch North Sea. Installation of the foundations of OranjeWind will start in 2026. Once the construction of the offshore wind farm is completed, the 66 Reef cubes® will be placed at 11 turbine foundations. This will be one of the biggest deployments of artificial reef structures at a wind farm in the North Sea to date. With this nature-inclusive project, the companies aim to further enhance the provision of habitats for marine life and research local biodiversity.

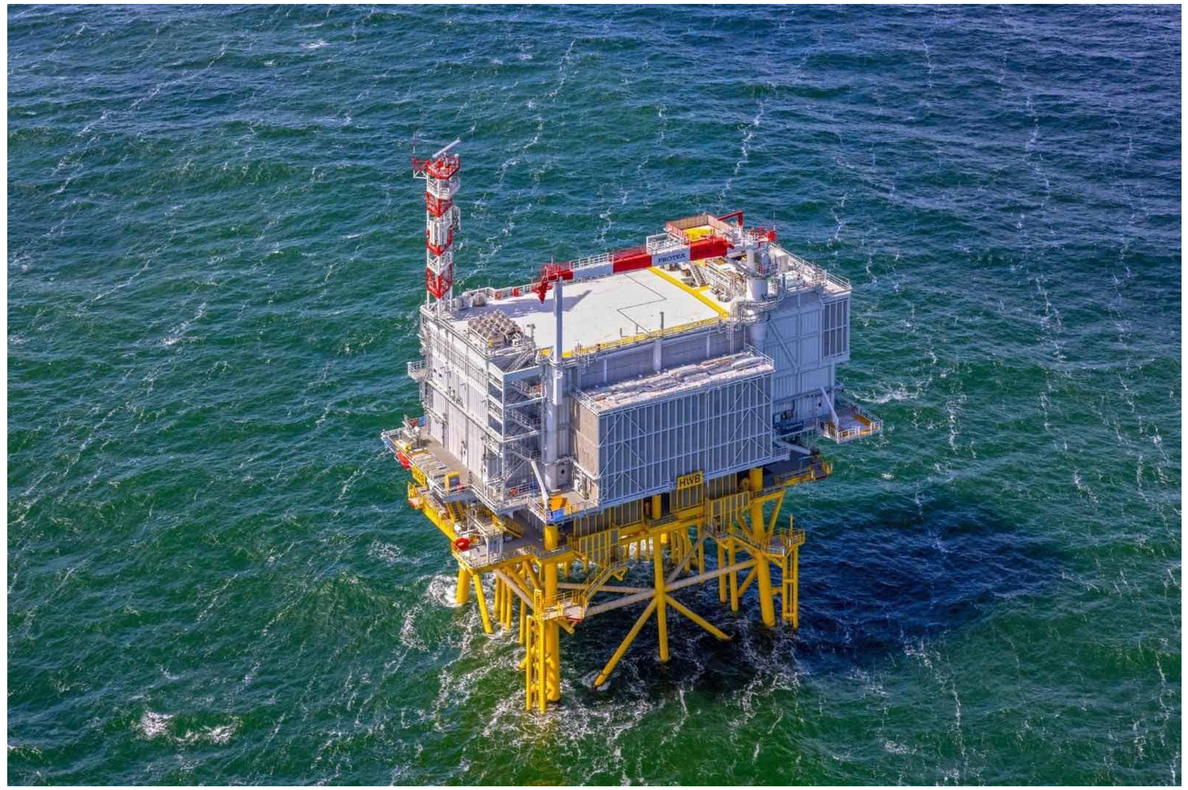


Read the full press release

Offshore Grid Connection OranjeWind ready

Grid operator TenneT has received the grid readiness certificate for OranjeWind's electricity connection to the high-voltage grid from DNV. This means the connection required to bring the electricity generated by OranjeWind ashore meets all the necessary standards and is ready for use.

Earlier this year, the offshore substation HKW Beta for OranjeWind was successfully installed at sea. Also, the export cables and interlink cable to the sister offshore substation HKW Alpha were connected and set in operation by TenneT.



Read the full press release

OranjeWind becomes partner Phynix project Eemshaven

OranjeWind, through its OranjeWind Knowledge program, is launching a collaboration with the Phynix project. Researchers and students from educational institutions in the Groningen region will have the opportunity to gain practical experience for at least two years at the Phynix platform in Eemshaven, which is designed for producing hydrogen at sea. At the same time, they will be able to collect and utilize operational data and insights for their research and educational projects.

Read the full press release

Innovations at OranjeWind

Intelligent Subsea Energy Storage (Verlume)

Verlume is bringing multi-purpose storage solutions offshore through a subsea lithium-ion battery with integrated intelligent energy management. Ultimately, this technology may contribute to a more balanced power output by shaving the peak power production offshore. Additionally, the storage solution may provide multiple offshore services, such charging of hybrid or fully electric service vessels and providing residency for Autonomous Underwater Vehicles (AUVs).

For the OranjeWind project, the goal is to further mature this technology aiming installation of a small version of such a subsea storage system. When successfully operated such technology could potentially be integrated in an offshore wind farm as part of the energy transition.

Status update

- The detailed design is ready, and construction of the Orah device has started
- The transport and installation concept of the battery concluded to install the battery as close to the turbine as possible which resulted in a redesign of the scour protection of the turbine.

Innovations at OranjeWind

Floating solar

Offshore floating solar technology can be part of the solution to increasing land scarcity for the generation of renewable energy. The integration of offshore floating solar into an offshore wind farm can lead to a more efficient use of ocean space for energy generation and allow for synergies in construction and maintenance of the multi-source renewable energy plant. This could result in a more balanced production profile due to the complementary nature of wind and solar resources.

Status update

- No updates since previous quarter

Innovations at OranjeWind

LiDAR power forecasting (ForWind – Oldenburg University)

The innovative power forecasting methodology based on LiDAR (Light Detection And Ranging) accurately forecasts sudden changes in power production caused by wind ramp events - strong variations of wind speed over a short period of time. These may cause sudden and strong changes in power leading to a significant and unexpected drop or increase of energy supply to the grid. If not forecasted accurately, these can result in critical grid imbalances and hamper the further implementation of wind energy. With OranjeWind, we aim to demonstrate and further develop this innovative technology.

Status update

- One of the 2 LiDAR’s at Amrumbank West is still acquiring wind ramp data for developing “forward scanning” algorithms. These measurements are a predecessor for the campaigns at the OranjeWind project. The second LiDAR was brought back to shore for major overhaul.
- The development of the XXL LiDAR with a measurement range up to 30 km was finished and the onshore testing has started end of November.

Innovations at OranjeWind

OranjeWind aims to achieve the perfect match between green electricity supply and demand. The project balances the intermittent power generation of offshore wind with a variety of innovative flexible demand assets such as batteries, e-boilers and electrolysers.

With these investments and innovations, OranjeWind serves as the blueprint for the future offshore wind farm.

Status update

- No updates since previous quarter

Inertia battery Moerdijk

OranjeWind Knowledge

Research, communication and dissemination

oranjewind

Generating Knowledge

- Collecting **In-house expertise**
- **Learning** from OranjeWind
- Facilitating **research**
- Stimulating **innovations**

Sharing Knowledge

- **Initiating and joining** learning communities
- **Hosting on-site** demonstrations and events
- **Developing** workshops, webinars and teaching material
- **Contributing to** education of the future workforce
- **Publishing in** scientific journals and conferences

RWE TotalEnergies

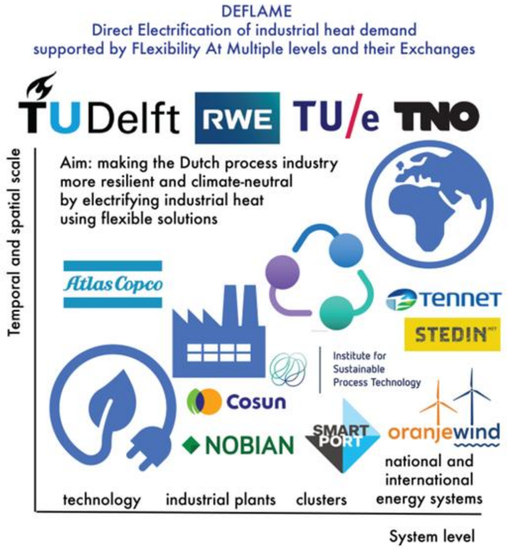
OranjeWind Knowlegde
Knowlegde creation

- OranjeWind joined the Phynix (Baseload Power Hub) project as contributing partner. The collaboration with Phynix will yield valuable new knowledge about offshore hydrogen production and enable ongoing research to be enhanced with operational data from the hydrogen storage and production platform. Offshore green hydrogen is seen as one of the potential key technologies for Europe's energy transition, with the North Sea playing a central role (see also page 6)

- The first publications of our 6 PhDs in our OranjeWind research programme will be submitted for publishing to scientific journals in Q1 2026. The Academic Reflection Board with experts in the field of energy research is installed and will ensure the highest academic level for the OranjeWind research projects.

- Next to the 6 fulltime PhDs for the OranjeWind project, research is being carried out in the OESTER, DEFLAME, MODES, PHYNIX projects and RWE is contributing partner in the research proposals for CO2URAGE and North Sea Energy 6. Acquisition for further research projects is ongoing.


Phynix Eemshaven



Visit the OranjeWind Insights page

OranjeWind Knowledge
Knowledge Dissemination

- The dissemination year for OranjeWind knowledge closed with over 600 in-person, and over 1300 online knowledge transfers about system integration of offshore wind to a broad target audience.
- On the 4th of December, all partners kicked off the KETEN in Eemshaven. This project with partners in industry and education aims to deliver extensive learning materials on the topics of grid scale batteries and hydrogen mobility. RWE is responsible for the topic grid scale batteries, with the aim of increasing professionalism, agility and safety for employees involved in handling large battery energy systems.
- On the 20th of November, OranjeWind invited all vocational (MBO) schools that have wind energy in their curriculum (or those planning to include it) to the Eemshaven. The group received an impressive tour of the TKF factory where the sea cables for OranjeWind are produced. During the day the status of offshore wind education was also extensively discussed in a lively exchange of knowledge, inspiration, and ideas.
- On the 16th of October, 17 top master students in the field of energy visited our Utrecht office to learn about the integrated energy system, and their potential role in it.

MBO schools visit Eemshaven


Student visit Utrecht Office

Visit the OranjeWind Insights page

About RWE

RWE is leading the way to a clean energy world. With its investment and growth strategy Growing Green, RWE is contributing significantly to the success of the energy transition and the decarbonisation of the energy system. Around 20,000 employees work for the company in almost 30 countries worldwide. RWE is already one of the leading companies in the field of renewable energy. RWE is investing billions of euros in expanding its generation portfolio, in particular in offshore and onshore wind, solar energy and batteries. It is perfectly complemented by its global energy trading business. RWE is decarbonising its business in line with the 1.5-degree reduction pathway and will phase out coal by 2030. RWE will be net zero by 2040. Fully in line with the company's purpose - Our energy for a sustainable life.

TotalEnergies and electricity

TotalEnergies is building a competitive portfolio that combines renewables (solar, onshore wind, offshore wind) and flexible assets (CCGT, storage) to deliver clean firm power to its customers. As of the end of October 2025, TotalEnergies has more than 32 GW of installed gross renewable electricity generation capacity and aims to reach 35 GW by the end of 2025, and more than 100 TWh of net electricity production by 2030.

About TotalEnergies

TotalEnergies is a global integrated energy company that produces and markets energies: oil and biofuels, natural gas, biogas and low-carbon hydrogen, renewables and electricity. Our more than 100,000 employees are committed to provide as many people as possible with energy that is more reliable, more affordable and more sustainable. Active in about 120 countries, TotalEnergies places sustainability at the heart of its strategy, its projects and its operations.