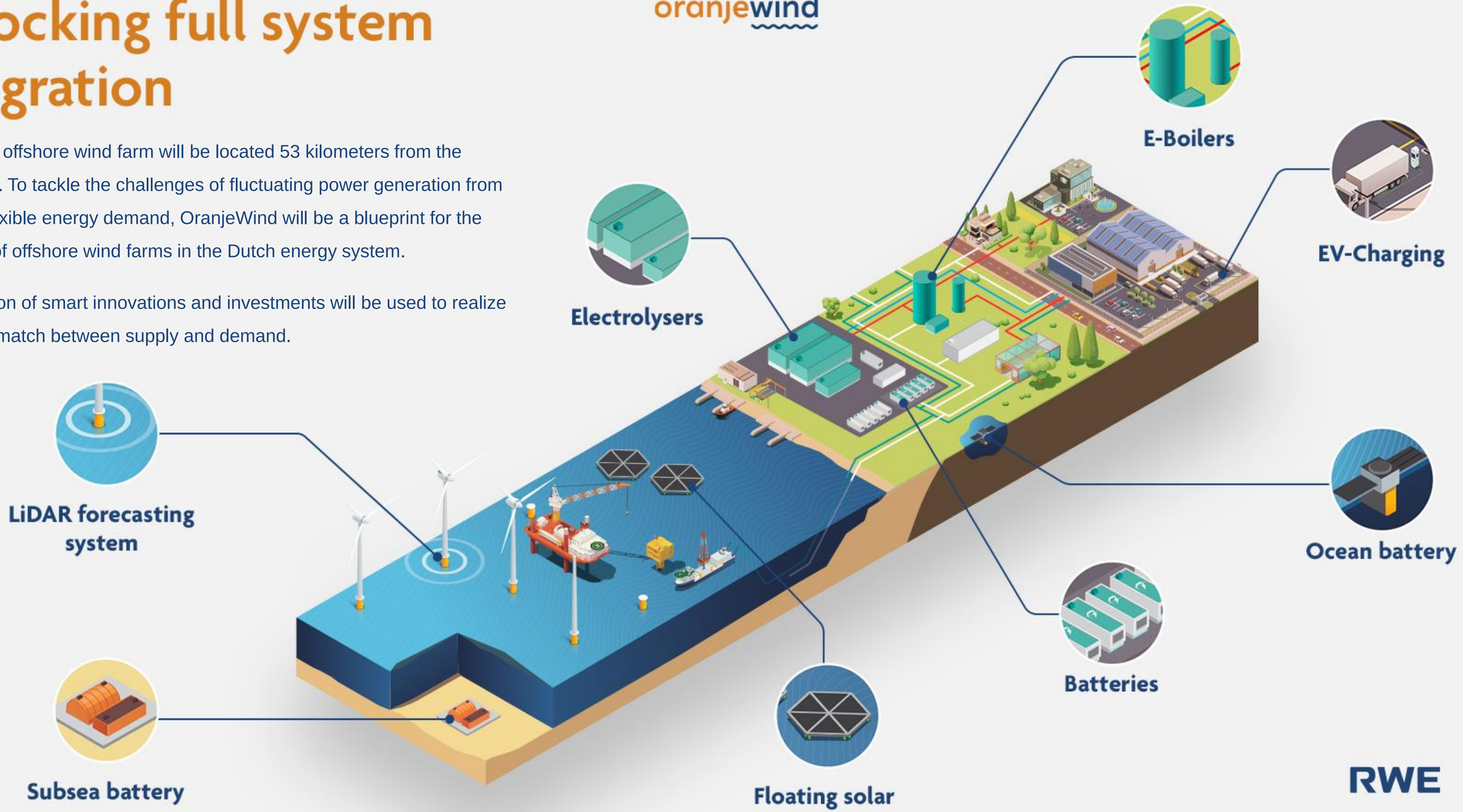
Quarterly report

Q4 2024

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.



OranjeWind chooses Den Helder as operations and maintenance base

The OranjeWind project has selected the port of Den Helder in the Dutch province of North Holland as the home base. Blue Port Centre, the former fish auction building, will serve as the onshore hub for the operation and maintenance teams of the wind farm. To this end, the project has signed a lease agreement with the co-operative association Blue Port Centre, the owner of the building.

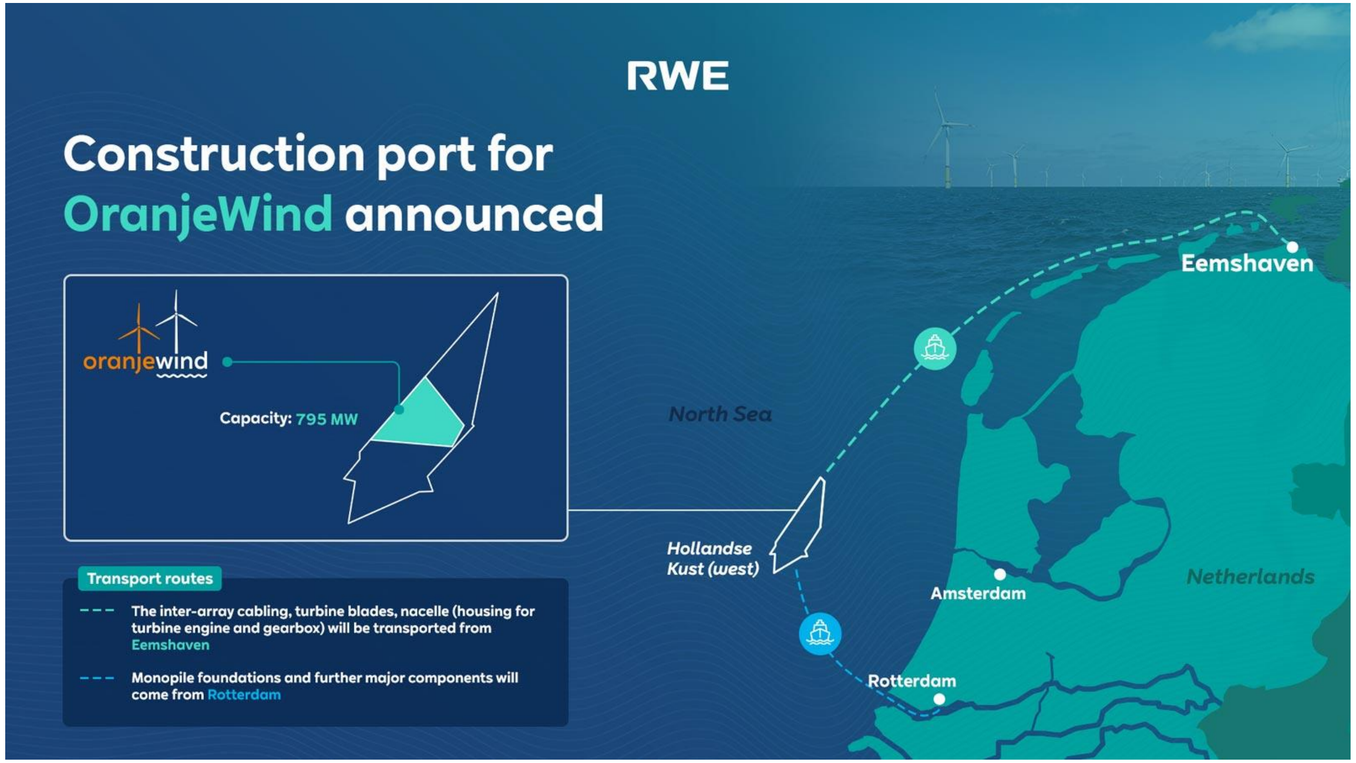
In 2026, the OranjeWind project will start using the Blue Port Centre at the port of Den Helder, with the building also being used during the construction phase of the wind farm.

Read the full press release

OranjeWind chooses Eemshaven as turbine assembly and construction base

RWE and TotalEnergies have selected the port of Eemshaven in the northern Dutch province of Groningen as the base for turbine assembly and construction work for their joint offshore wind project OranjeWind in the Dutch North Sea. To this end, the OranjeWind joint venture has signed an agreement with Buss Terminal Eemshaven.

Buss Terminal Eemshaven will facilitate the offloading, storage, handling and pre-assembly of major components of the turbines and the inter-array cabling for the OranjeWind wind farm. The monopile foundations will be transported directly to the offshore installation site from Sif's production facility at the Port of Rotterdam.



Read the full press release

RWE’s green hydrogen ambitions for Eemshaven region strengthened by plans for 100MW electrolyser

RWE has taken an important step in developing 100MW of green hydrogen production at Eemshaven, the Netherlands.

RWE has secured the necessary construction and environmental permits to build an electrolyser near the Magnum Power Station in Eemshaven in the north of the country. If built, the electrolyser will contribute to the onshore energy system integration plans for OranjeWind.

Impression version 2023

Read the full press release

Campaign for six PhD spots at top universities to devise new energy systems

A campaign to fill six PhD positions at four Dutch universities is underway: TU Delft, TU Eindhoven, Rijksuniversiteit Groningen and Universiteit Utrecht. Initiated and funded by RWE and coordinated by research organization TNO, this research aims to accelerate the deployment of offshore wind production and make energy systems work better together.

The six researchers will carry out closely linked research projects and share their findings through a platform so that the energy sector can benefit and develop a better energy system for the future. This research is part of the OranjeWind Knowledge program.

Read the full press release

Innovations at OranjeWind

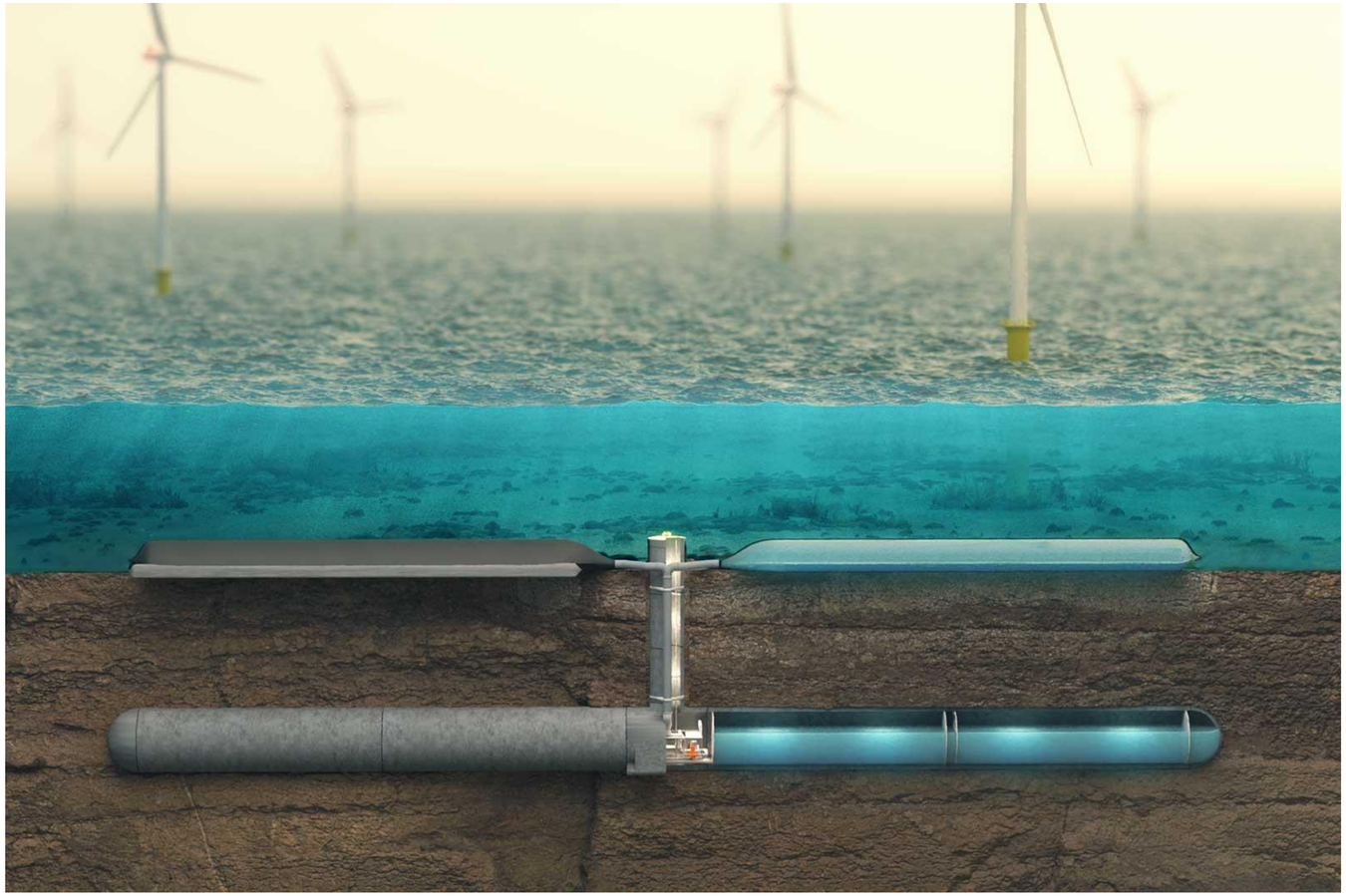
Subsea pumped hydro storage power plant (Ocean Grazer)

Ocean Grazer’s Ocean Battery is a concept for storing energy that is produced by offshore renewable sources. The concept is similar to pumped hydro storage (PHS).

For the OranjeWind project, Ocean Grazer will develop a first demonstrator which is going to be installed near an excavation lake in the Netherlands.

Status update

- Ocean Grazer has been preparing the permit application.
- Ocean Grazer had 4 optional concept designs and selected the drilled design with vertical shaft as the most promising option for the excavation lake.
- Ocean Grazer has been investigating the options to drill the vertical shaft and the power take off system.

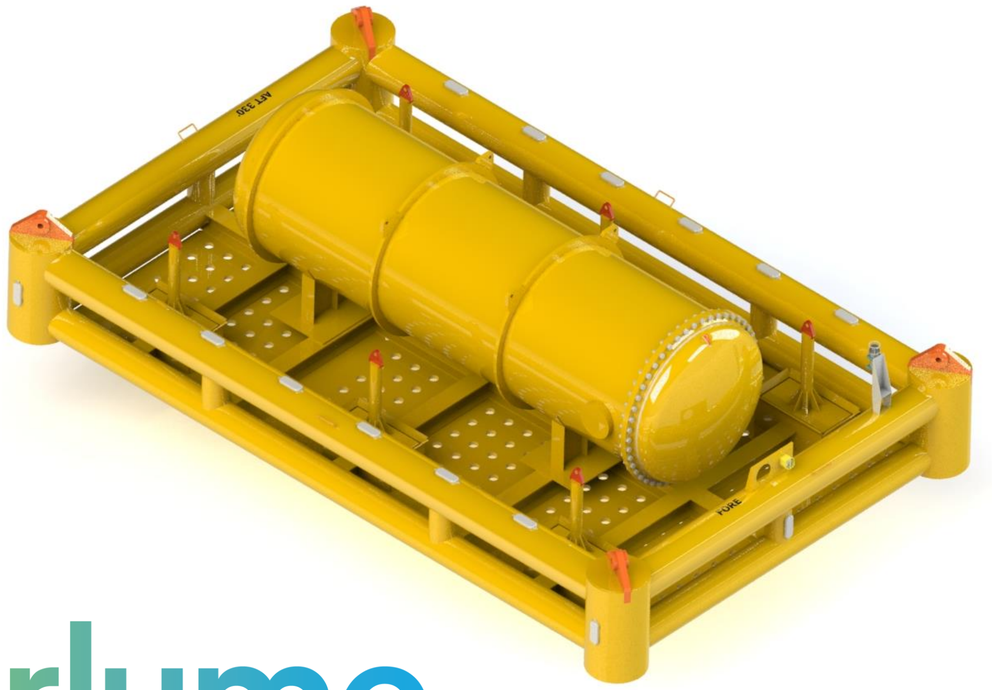


Innovations at OranjeWind

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 storge system. When successfully operated such technology could potentially be integrated in an offshore wind farm as part of the energy transition.



Status update

- The FEED (Front End Engineering Design) phase was completed in October and the detailed design has started in November.
- RWE and Verlume nearly completed the design of the battery enclosure with the seabed stability platform and the scour protection.
- RWE and Verlume agreed on the preferred installation process of the subsea elements and the umbilical

Innovations at OranjeWind

Floating solar (SolarDuck)

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.

RWE and SolarDuck are cooperating for the first pilot installation off the Dutch coast; Project Merganser.

Status update

- No significant updates this quarter.

Merganser

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

- The two LiDARs that were installed at the nacelles of 2 turbines at Amrumbank West, have been generating data which will be assessed prior to installing the LiDARs at the main access platforms of OranjeWind.
- RWE has been working on purchasing a prototype XXL LiDAR to run trials. If the trials are successful, this XXL LiDAR will be installed also in the OranjeWind wind farm.

Innovations at OranjeWind

Grid stabilizing battery

RWE is building a 7.5 MW/11 MWh inertia battery. With its ability to provide or absorb electricity within milliseconds, the system will help to safeguard the electricity grid. This function is called inertia.

Sustainable electricity sources can have sudden fluctuations depending on wind force. Our grid risks not being suited to handle these sudden fluctuations. This battery's technology can help with this issue, by quickly injecting power into the grid when there is a sudden drop in generation. This is called synthetic inertia. This technology is now being tested for the first time in the continental European grid. Transmission system operator TenneT will be a partner of the project to further develop its technical requirements and grid compliance procedures.

Status update

- Battery system in construction and entering commissioning phase
- Inertia testing scheduled to start in March 2025

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 Insights: Podcast & Masterclass series

Learn about system integration with OranjeWind Insights

A series of podcasts and masterclasses was launched, aiming to give insights in system integration. In the series we learn from experts in the energy transition, from organizations such as RVO, TNO and TenneT, about various challenges and potential solutions in system integration.

The podcasts are available online on our website and all your favourite podcast media.

The masterclasses can be joined in-person, online or on demand via the New Energy Academy website.

Visit the OranjeWind Insights page

RWE hosts ‘Pitchontbijt’ for start-ups

Nearly 100 visitors for ‘Pitchontbijt’ at RWE’s Amercentrale

Four start-ups were given the opportunity to pitch their innovation related to system integration at the Pitchontbijt hosted by RWE and iTanks, over a nice breakfast at the Amercentrale.

During this session, participants learned about system integration, innovations in energy storage and a vision for a future sustainable energy system. RWE aimed to show which challenges system integration brings and how they are working to solve these through OranjeWind and its innovations.

Arjan van der Stelt, Head of Knowledge Management & Change at RWE, gave a key-note speech, followed by pitches by the companies FLASC, Ocean Grazer, Verlume and AE-WaveHexapod. After the pitches there was time for networking.

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

As part of its ambition to get to net zero by 2050, TotalEnergies is building a world class cost-competitive portfolio combining renewables (solar, onshore and offshore wind) and flexible assets (CCGT, storage) to deliver clean firm power to its customers. By the end of 2024, TotalEnergies' gross renewable electricity generation installed capacity has reached over 24 GW. TotalEnergies will continue to expand this business to reach 35 GW in 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 and green gases, 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.