



Quarterly report

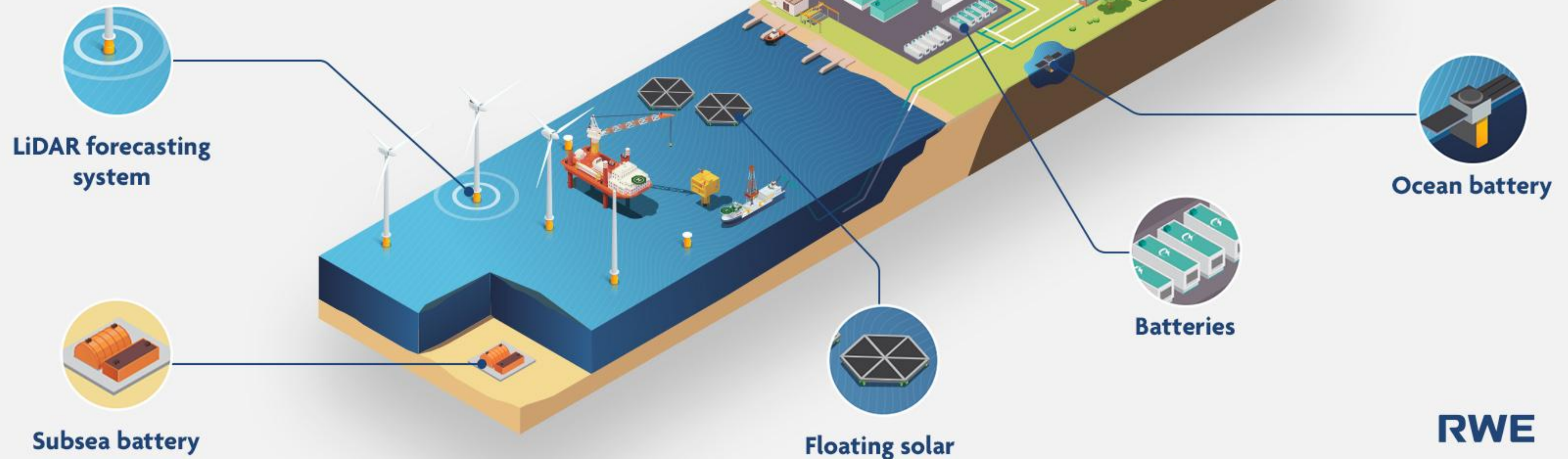
Q3 2025

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.



RWE



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.

The grid connection has been established by TenneT. The platform was installed over the summer and commissioned together with the OranjeWind project team.

In the past quarter, the unexploded ordnance (UXO) identification has taken off, preparing for the explosive's removal campaign by the Royal Navy. These campaigns are necessary to identify and remove items on the seabed (such as bombs from the second world war), which are laying in the cable routes or WTG locations.



Air Liquide takes the final investment decision to build ELYgator, a large-scale electrolyzer in the Netherlands

Air Liquide takes a major step forward in European decarbonization efforts with the final investment decision to launch the construction of ELYgator, a 200 MW electrolyzer project in Maasvlakte, in the Port of Rotterdam

Air Liquide will build, own and operate the electrolyzer, notably supplying TotalEnergies' industrial platform through a long-term contract. The ELYgator project will produce 23,000 tons of renewable hydrogen annually, serving industrial and heavy-duty mobility customers, reducing up to 300,000 tons of CO₂ emissions per year of operation.



[Read the full press release](#)



Dutch government awards grant for electrolyser project at Eemshaven

The Netherlands Enterprise Agency (RVO) has granted RWE a funding of €551 million for its 100-megawatt (nominal installed capacity) electrolysis project near the Magnum Power Station in Eemshaven in the north of the country. This has been awarded as part of the Sustainable Energy Production and Climate Transition Incentive Scheme (SDE++) run by the Dutch government.

RWE plans to power the electrolyser with green electricity generated by the OranjeWind offshore wind farm.



[Read the full press release](#)



Innovations at OranjeWind

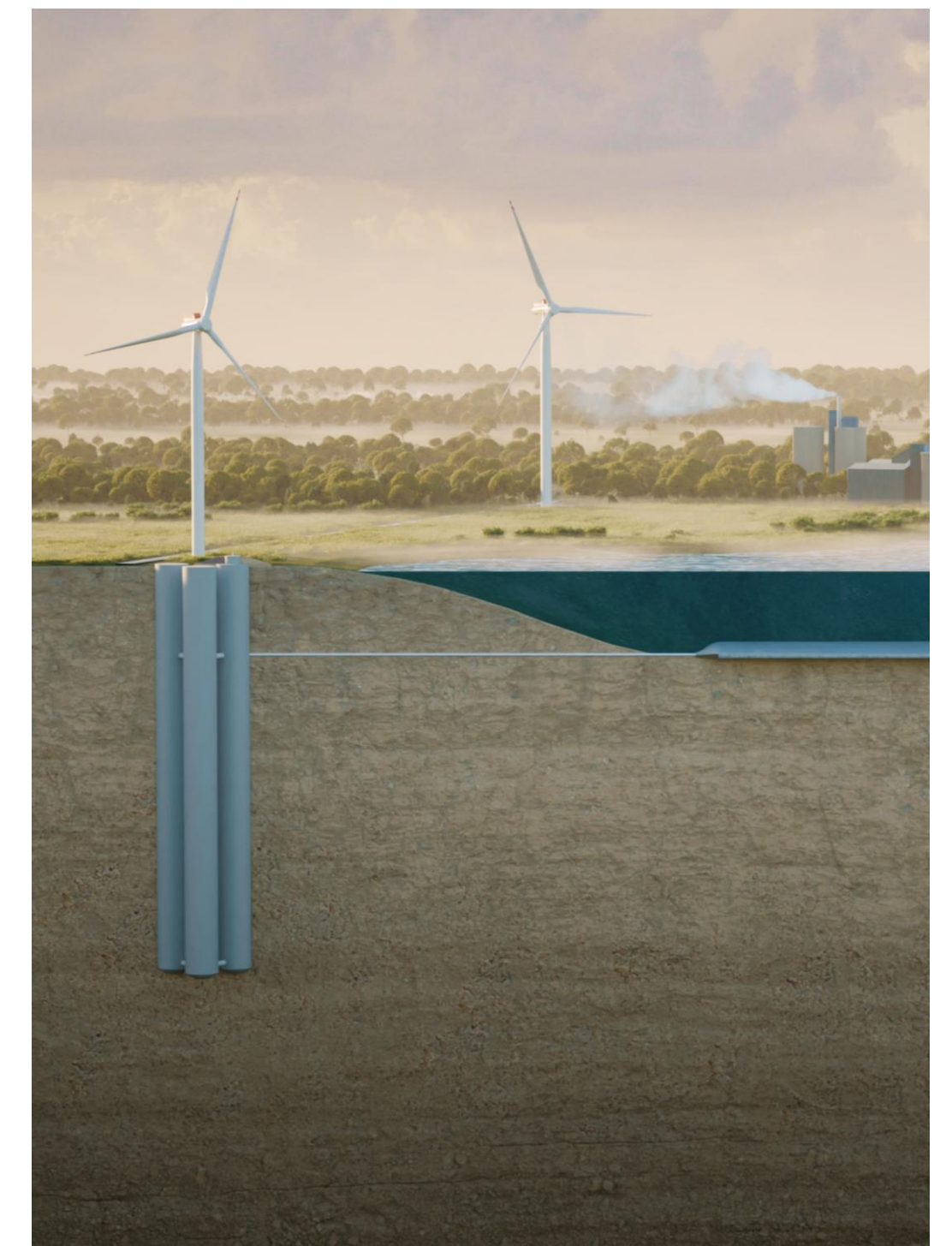
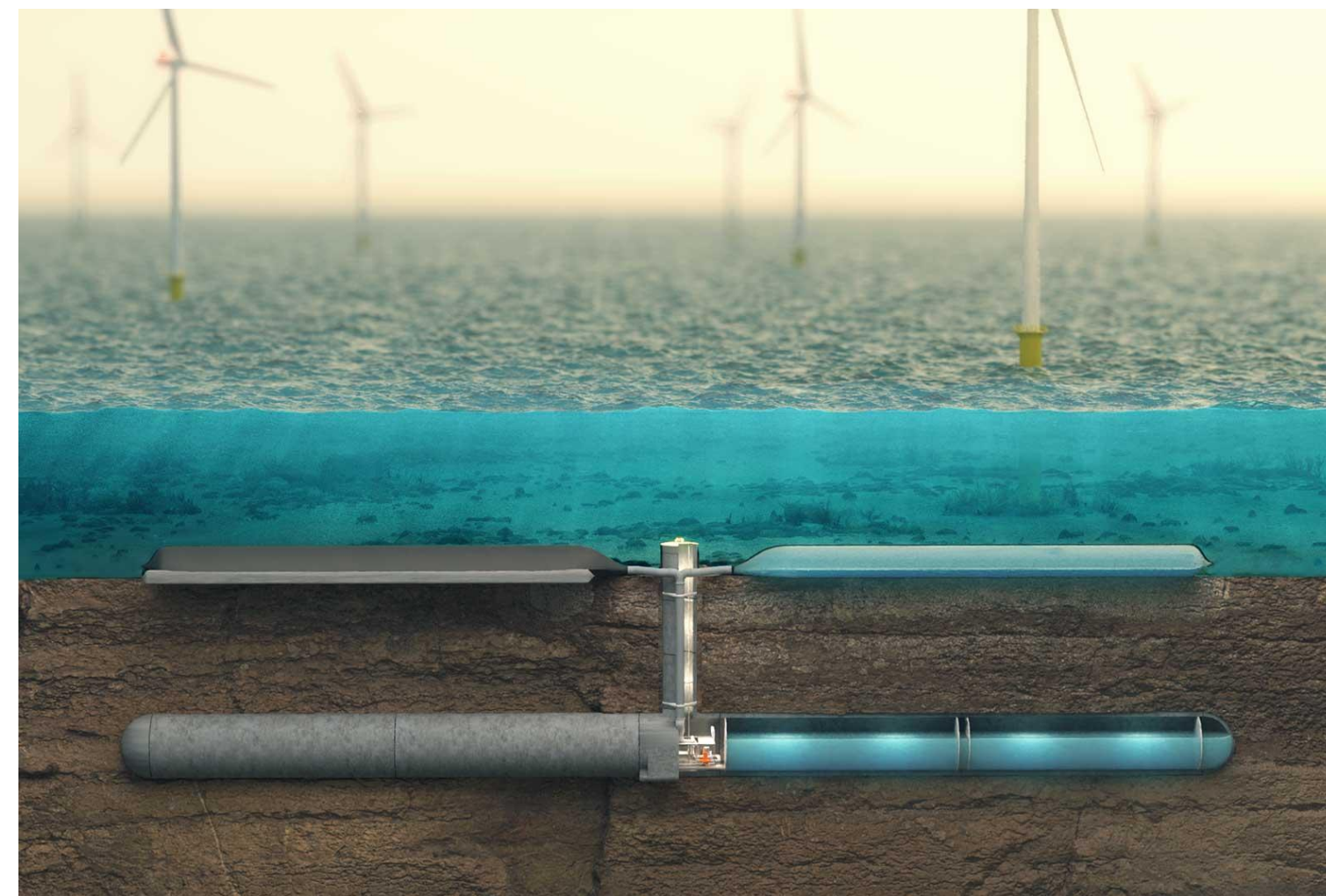
Subsea pumped hydro storage power plant (Ocean Grazer)

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 planned to develop a first demonstrator which should have been installed near an excavation lake in the Netherlands.

Status update

- **Ocean Grazer B.V. filed for bankruptcy on 01-07-2025**
- Developments for this innovation have been stopped.



Innovations at OranjeWind

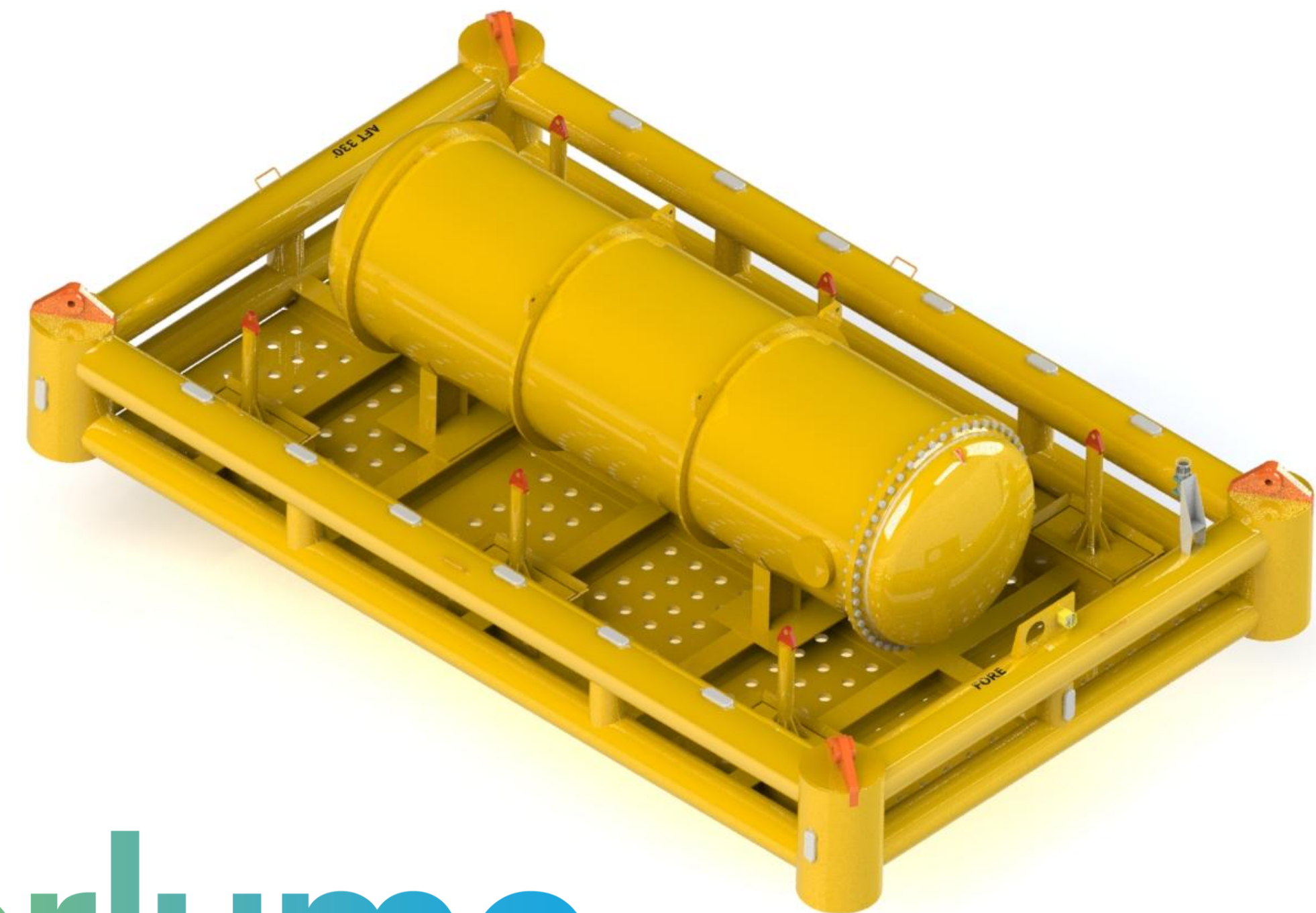
Intelligent Subsea Energy Storage (Verlume)

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 as 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 nearly ready
- The umbilical (including cable protection system) and cable routing into the turbine foundation has been designed.
- The high-level transport and installation concept of the battery has been developed.



verlume

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

- 2 LiDAR's at Amrumbank West were installed at the MAP (Main Access Platform) and are acquiring wind ramp data for developing "forward scanning" algorithms. These measurements are a predecessor for the campaigns at the OranjeWind project.
- The development and construction of the XXL LiDAR with a measurement range up to 30 km is ongoing and ready for its first onshore tests. After successful trials, it will also be installed in the OranjeWind wind farm.



Innovations at OranjeWind

Grid stabilizing battery

RWE is testing a 7.5 MW/11 MWh inertia battery with TenneT. 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 are intermittent and can have sudden fluctuations. As they take a bigger part of the electricity mix, 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. Testing will be done in collaboration with system operator TenneT to further develop the technical requirements and grid compliance procedures.

Status update

- Completed commissioning and grid compliance process.
- Started 2-year R&D period with TenneT and completed first set of tests.



OranjeWind Knowledge

Research, communication and dissemination



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

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 favorite podcast media.

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

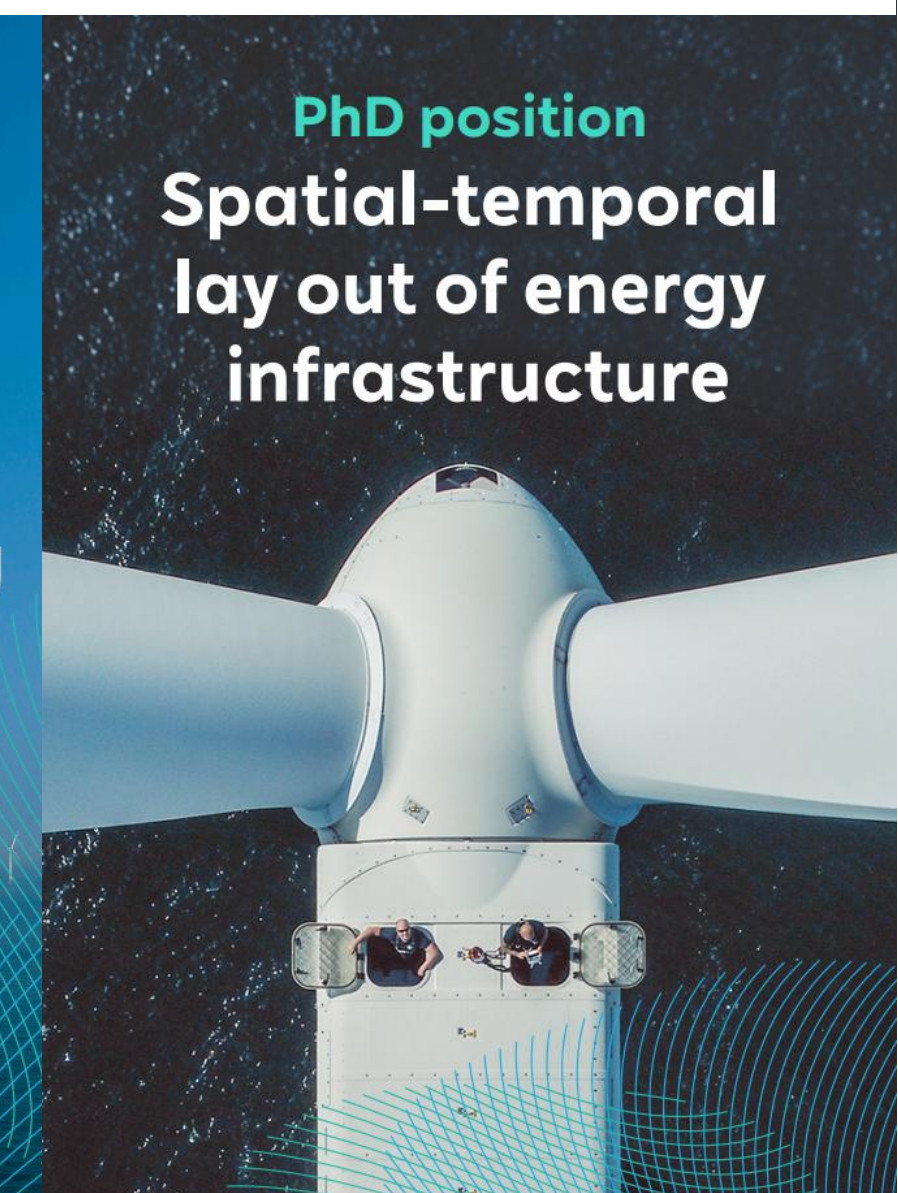
[Visit the OranjeWind Insights page](#) 



Generating knowledge

Research into system integration

Six PhD candidates at four Dutch universities will conduct research into system integration



OranjeWind PhD candidates visit Rampion offshore wind farm in the UK

On July 11th, the PhD candidates visited RWE's Rampion wind farm in the UK. For many, this was the first time visiting an offshore wind farm.

While working on topics related to offshore wind, it is important to grasp the scale and real-life implementations of offshore infrastructure. Therefore, it is valuable to witness offshore wind turbines first-hand and up close. This gives the researchers a feel and intuition on top of the in-depth theoretical knowledge they possess.



Meet our PhD candidates

Christos Pavlopoulos

- **Name:** Cristos Pavlopoulos
- **University:** Technical University of Eindhoven (TU/e)
- **Research topic:** System Integration of Offshore Wind Parks on Local/Regional Level
- **Start date:** 01/08/2025



How will your research contribute to the energy transition?

My research will support the energy transition by enabling the large-scale integration of offshore wind energy into regional electricity networks, a crucial component of decarbonizing Europe's power sector. With the development of a unified techno-economic framework that combines offshore wind energy generation, flexibility solutions, storage technologies, and ancillary services provision, my work will enable the identification of cost-effective and grid-reliable strategies for grid integration. System stability will be enhanced, resource utilization will be optimized, and additional revenue streams will be unlocked from ancillary services. Ultimately, my research will provide decision-making insights, accelerating offshore wind deployment, reducing curtailment, and facilitating a secure, renewable-based, and economically efficient system.



Meet our PhD candidates

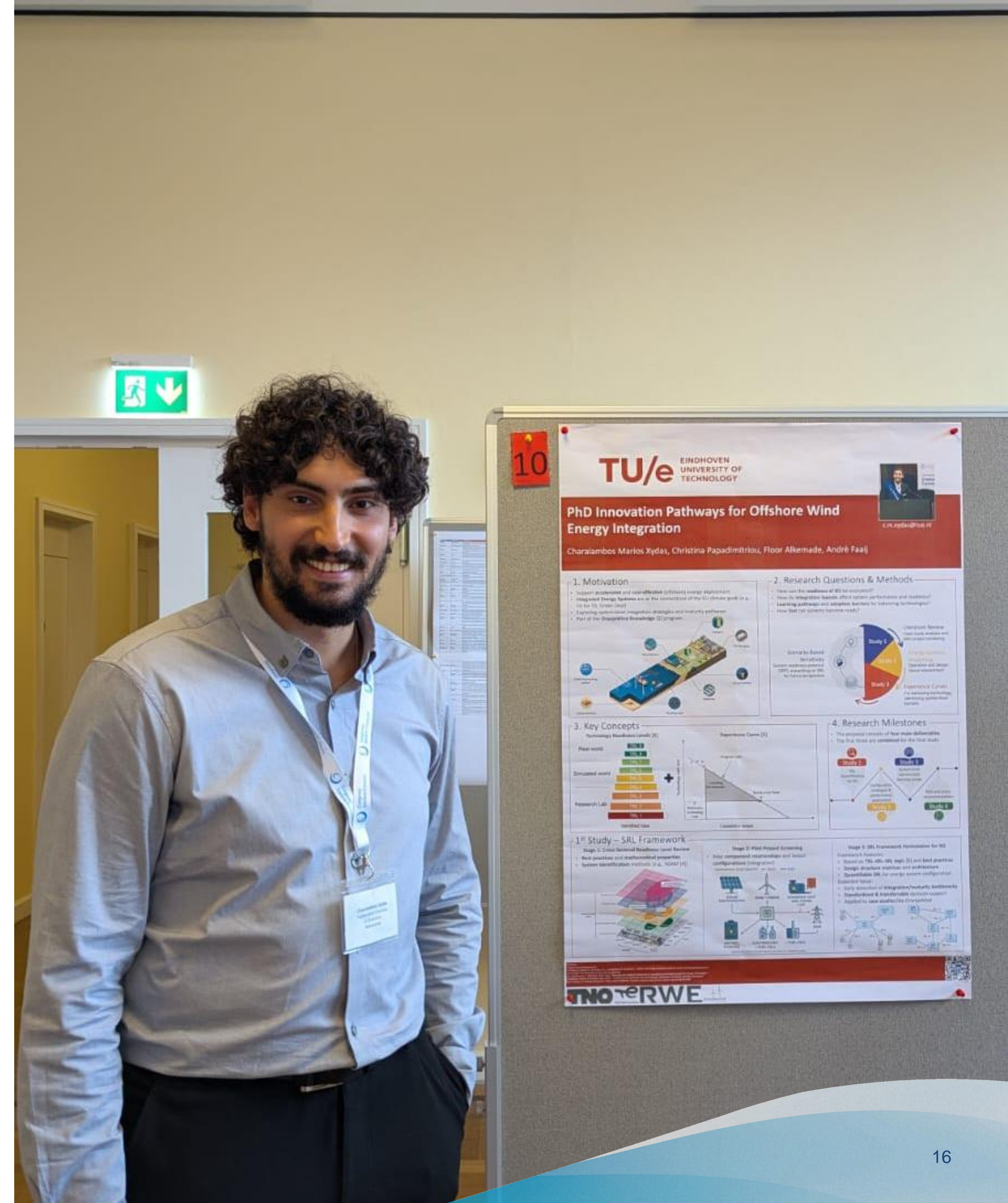
Charalambos M. Xydas

- **Name:** Charalambos M. Xydas
- **University:** Technical University of Eindhoven (TU/e)
- **Research topic:** Technological learning potentials and pathways of advanced offshore energy and balancing technologies
- **Start date:** 01/11/2024



How will your research contribute to the energy transition?

My research supports the energy transition by developing frameworks and tools to evaluate and accelerate the integration of offshore renewable energy and innovative balancing technologies. Quantifying readiness levels and highlighting system bottlenecks provides decision support for system developers and designers. Through system-level learning curve analysis and the introduction of a forward-looking maturity metric, the work identifies diffusion barriers, policy requirements, and pathways for cost reduction, scalability, and standardisation. The outcomes contribute to faster, more reliable, and cost-effective deployment of integrated energy systems, while reducing uncertainty and investment risk.



Meet our PhD candidates

Andreano Boris



- **Name:** Andreano Boris
- **University:** Technical University Delft
- **Research topic:** System integration with demand side and industrial transformation
- **Start date:** 01/04/2025

How will your research contribute to the energy transition?

The energy transition requires transformation not only on the supply side but also on the demand side. Because with increasing share of renewable energy, the challenge of supply–demand matching becomes apparent. On the demand side, the chemical industry is particularly significant, accounting for about 20% of the Netherlands' total energy use. My research focuses in analyzing the energy flexibility and demand patterns of the current and future chemical industry. This is essential for a successful integration of the chemical industry to the energy supply sector.



Meet our PhD candidates

Roos de Jonge

- **Name:** Roos de Jonge
- **University:** Utrecht University
- **Research topic:** Accelerating the build-out of the North Sea Energy System
- **Start date:** 06/01/2025



Universiteit Utrecht

How will your research contribute to the energy transition?

My research focuses on finding out how to make the offshore wind sector mature faster, so we can reach our climate targets in time. Having the right technology, including storage and other generation technologies, is fundamental to that. However, that is just one piece of the puzzle; an adequate supply chain, experienced personnel and standardization also play a role. Additionally, governments are an important player, which creates questions on policy certainty, flexibility in contracts, and national versus international regulation. My job is understanding what the problems are, how they strengthen each other, and how they might be solved.



Meet our PhD candidates

Lisa Behm

- **Name:** Lisa Behm
- **University:** Utrecht University
- **Research topic:** The North Sea Energy Transition: Modelling Infrastructure Constraints, Uncertainty, and Cross-Border Coordination
- **Start date:** 01/04/2025



Universiteit Utrecht

How will your research contribute to the energy transition?

My research aims to develop and apply a high-resolution, open, and extensible modelling framework for the North Sea energy system that links foundational topics—infrastructure constraints, uncertainty methods, and cross-border coordination—to guide policy planning and development towards 2050. In terms of expected impact, the research project delivers an open, policy-facing toolchain and a reproducible evidence base for: (i) routing and sizing offshore/hybrid interconnectors under realistic constraints; (ii) quantifying resilience premia for robust decarbonization pathways; (iii) prioritising cross-border projects with highest regional welfare under uncertainty; and (iv) informing governance design (cost-sharing, sequencing) for NSEC countries and ENTSO-e ONDP implementation.



Meet our PhD candidates

Viola Angesti

- **Name:** Viola Angesti
- **University:** Rijksuniversiteit Groningen
- **Research topic:** Spatiotemporal analysis of offshore energy grid layout in the North Sea
- **Start date:** 01/01/2025



How will your research contribute to the energy transition?

My PhD investigates how the offshore energy system in the North Sea can be planned and optimized across space and time. Many scenarios for North Sea integration present a perfectly optimized future, but they often overlook how to realistically get there, especially given the competing spatial claims in an already busy sea. I address this by diagnosing how countries plan and deploy assets, exploring future scenarios and potential ‘gamechangers’, and interlinking GIS with energy system modeling. Through this, my research complements traditional grid optimization by adding spatiotemporal dimensions that provide more grounded pathways toward integrated North Sea.



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. As of early 2025, TotalEnergies' gross renewable electricity generation installed capacity had reached 28 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, 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.