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Digital twin project set to make offshore wind power more reliable and secure

The EU's Federated Digital Twins for Wind-Offshore project develops a customizable digital twin for offshore wind farms. This innovation enhances energy reliability and security

A new EU project – Federated Digital Twins for Wind-Offshore (DTWO) – is developing a digital twin to simulate offshore wind power generation. Aimed at ensuring greater energy reliability and security, the digital twin will integrate existing models, simulation assets and real-time data. While

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there have been other commercial initiatives for digital twins of wind farms, this project is the first to introduce a customizable platform that enables users not to disclose sensitive commercial data.

Digital-twin technology involves creating a virtual replica of a physical object, person, or process. In this context, it pertains to offshore wind farms, enabling the simulation of real-world conditions to support science-based decision-making and minimize uncertainties. By using a digital model of entire wind farms, operators can better predict and deal with various scenarios such as approaching extreme weather events.

DTWO starts in June 2024 and will last for three years, combining the strengths of the world's largest manufacturer of offshore wind turbines Siemens Energy (in this case its division Siemens Gamesa), and the world's biggest offshore wind project developer (Orsted) with research centres (Fraunhofer Institute for Wind Energy Systems IWES, DHI and Technology and von Karman Institute for Fluid Dynamics), IT consulting and digital services provider (Softserve Poland Sp Zoo), academia (Technical University of Denmark and Gdańsk University of Technology), a science communication institution (Fondazione ICONS), an energy forecaster (Enfor As), the European Centre for Medium-Range Weather Forecasts and the Royal Netherlands Meteorological Institute.

The project is coordinated by the Technical University of Denmark. At the kick off meeting, the coordinator, professor Xiaoli Larsén, said that "*facing rapid and vast development in offshore wind energy, along with gaps in key scientific and technological components between past and present, our DTWO project aims to enhance the digital twin methodology to bridge these gaps and pave the way for future global development*". DTWO will build a software architecture integrating five modules: weather; inter and intra farm wakes; resource and turbulence; turbine health state and reliability predictions; grid interconnectivities and energy systems. Our federated, modular DTWO twin includes a software architecture with user-friendly data and tool hubs. "*DTWO enables a coordinated assessment of energy yield, wind turbine performance, and a sector-coupled energy market suitable for a large pan-European system*", added Larsén.

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