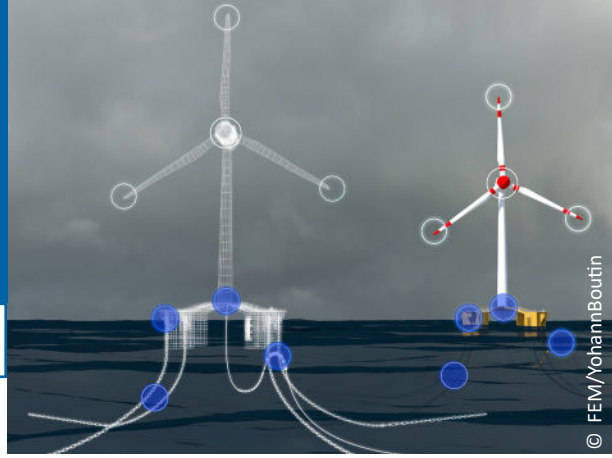
SUBSEE 4D

A digital twin to facilitate the operation of floating wind farms

DURATION: 36 months (2020-2023) | **BUDGET:** €730K



CONTEXT

Despite a significant offshore experience coming from the O&G industry, several specificities of offshore renewable energy systems induce uncertainties of their subsea dynamics. Today, as any emerging technology, the efforts are focused on the system efficiency and robustness as part of the design stage. Very few works are dedicated to the in-service follow-up and the maintenance strategy which represent a critical point both technically and financially for the very next commercial farms. **The development of a numerical tool to optimise submerged systems and reduce uncertainties on fatigue life would facilitate the operation of floating wind farms.**

OBJECTIVE

To optimise and plan maintenance operations, as well as making submerged systems more reliable, by developing a digital twin solution including software for in-service monitoring of mooring lines, developed by France Energies Marines, which will be offered to a floating wind farm operator for further customisation and deployment on a pilot project

MAIN ACHIEVEMENTS

- Creation and deployment of in-service monitoring software for floating offshore wind turbine in operation
- Numerical modelling of the real system using a global numerical model
- Implementation of sensors deployment strategy for structural integrity monitoring
- Development of mathematical tools based on machine learning approaches for anomaly prediction and classification

CONCLUSION

SUBSEE 4D has developed a digital twin solution to facilitate the operation of floating offshore wind turbines. This tool is based on a numerical representation using a simulation model and machine learning approaches.

TECHNOLOGIES

STAGES OF THE VALUE CHAIN

Design | Installation Construction | O&M

OUTPUT RESOURCES

- **Representative numerical model** of a floating offshore wind turbine
- **Database** of system dynamic responses obtained using an aeroservo-hydro-elastic numerical model
- **Neural networks** for offshore wind turbine motion prediction
- **Automatic classifier** for detecting and classifying anomalies in the system

PARTNERS

SUPPORTS