SubSEE 4D

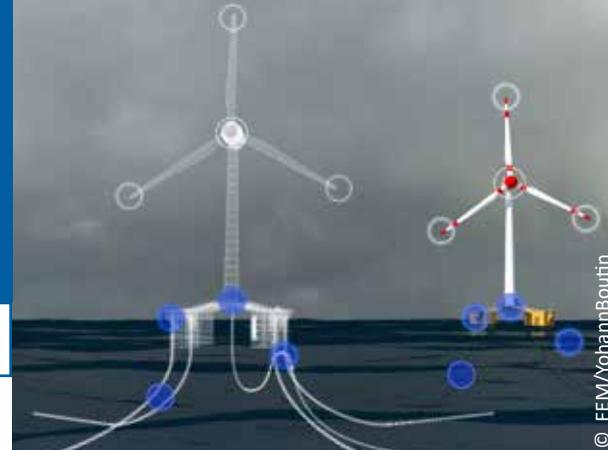## A digital twin to facilitate the operation of floating wind farms

DURATION: 24 months | LAUNCH: 2020 | Total 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.**

OBJECTIVES

To optimise and plan maintenance operations, but also making submerged systems more reliable, by developing a digital twin solution comprising two sub-modules:

- A mooring lines health monitoring software, developed by France Energies Marines, that will be offered to a floating wind farms operator for further customisation and deployment on a floating wind turbine pilot project,

- A subsea vision software, developed by Cervval, to provide an automated processing for the recognition and improvement of underwater vision.

EXPECTED RESULTS

- **Mooring lines health monitoring software** to be deployed in the framework of a floating wind turbine pilot project
- **Methodology for assessment of subsea components** dynamic models based on both physical and mathematical approaches.
- **In-laboratory images database** in different degraded conditions
- **Images database at sea** in real conditions
- **Digital twin demonstrator** based on a floating wind turbine design

TECHNOLOGIES

STAGES OF THE VALUE CHAIN

Design

Installation Construction

O&M

SCIENTIFIC CONTENT

- **Detection of anomalies on mooring system and calculation of remaining fatigue life time** for mooring components by using time domain simulations coupled with state-of-the-art numerical techniques
- **Methodology development** for mooring system critical parameters identifications and sensors deployment strategy
- **Development of an algorithm for images analysis** based on texture recognising in degraded visual conditions
- **In-laboratory images tests** with controlled visual conditions
- **Sea trials of images** on a static device in real condition including biofouling aspects

PARTNERS

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