



PROVENCE
GRAND LARGE

Plus loin en mer,
plus proche des gens



Provence Grand Large

From WTG integration on floaters up to the commissioning of the wind farm

Christine de Jouët
November 20th, 2024

Project supported by



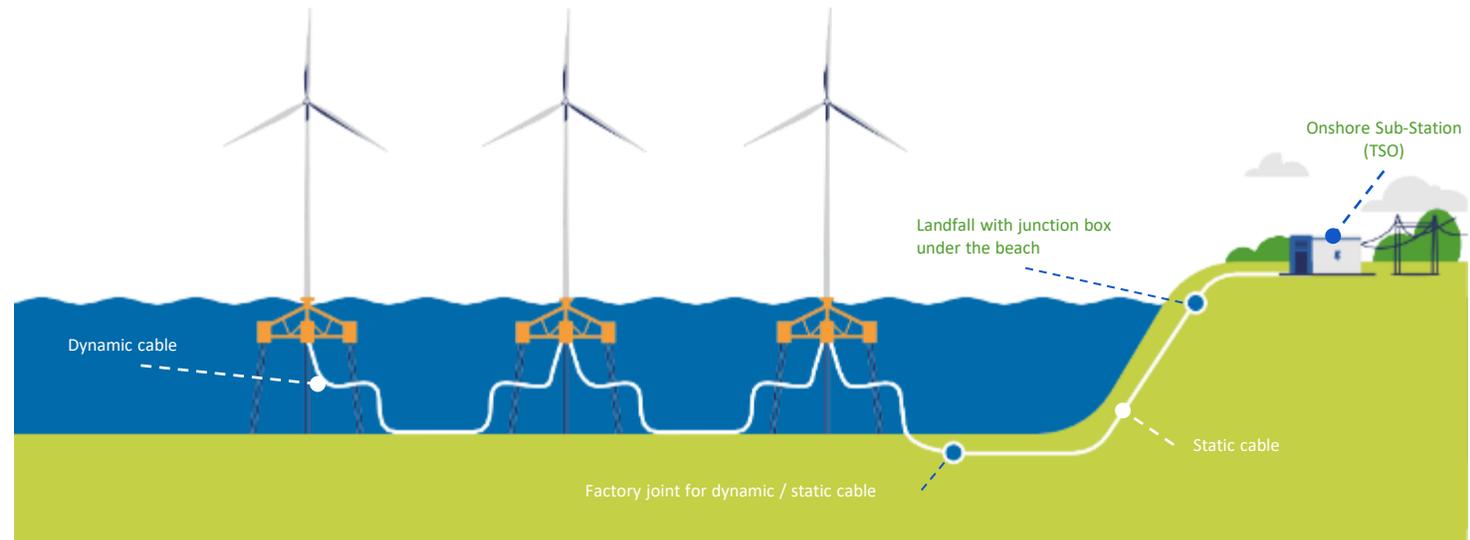
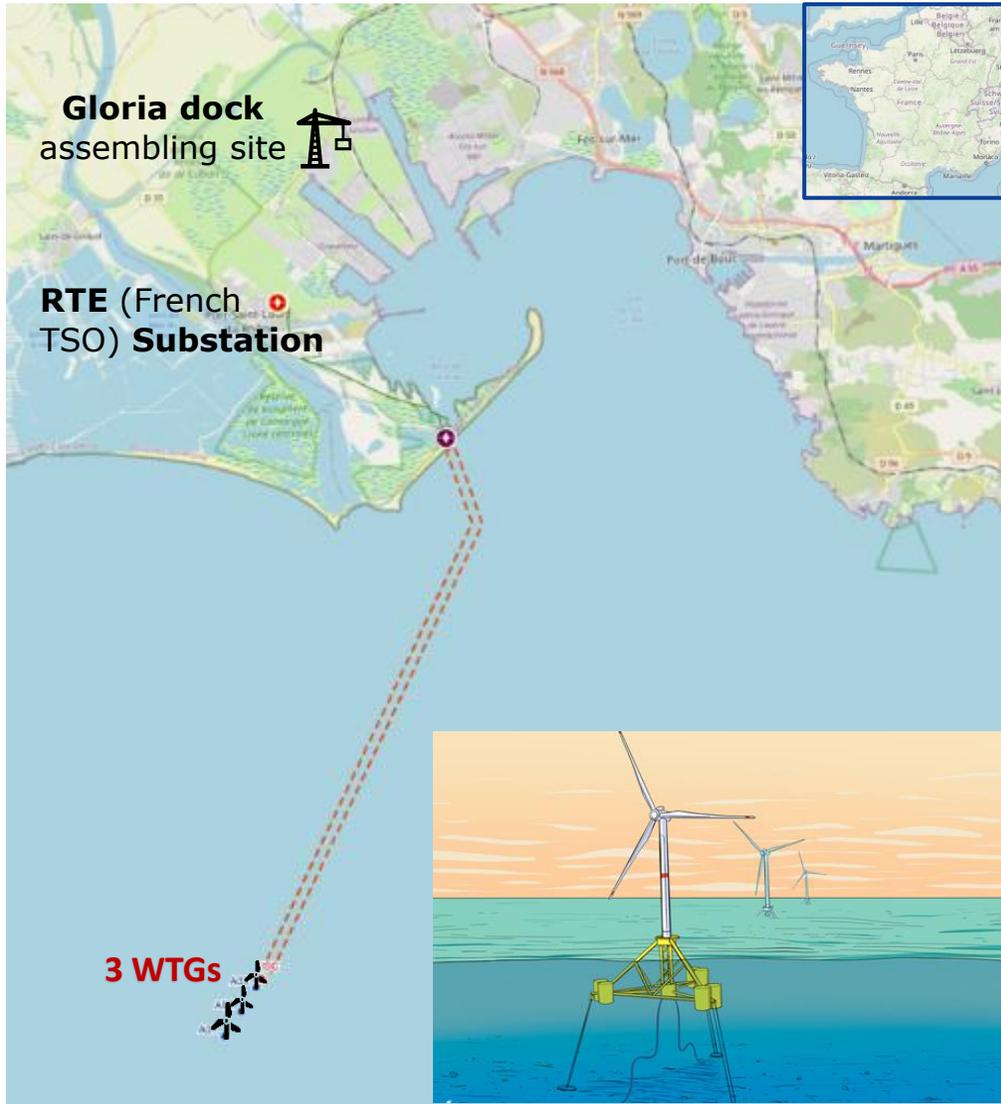
Labels



Provence Grand Large: a pilot project of 3 floating wind turbines

Project description:

- **17 km** from Port-Saint-Louis-du-Rhône (close to Marseille)
- Installed power : **25 MW**
- Water depth : **100 m**
- Average wind speed: **10 m/s**
- Turbines: Siemens Gamesa / **8.4 MW direct-drive**
- Floaters: SBM Offshore / **Tension Leg Platforms**
- Grid: Prysmian / **66kV – dynamic cables** – direct link to shore
- **19km** of offshore export cable and **9km** of onshore cable



A marshalling harbour requires robust preparation

- ✓ **WTG integration at quay (vs. offshore) leads to technical requirements specific to floating wind** as harbour must be ready for:
 - **WTG integration**, which requires a **massive onshore crane** to lift nacelles (~500t for current WTG) up to ~150m height
 - **Berthing of a few units** to allow some storage and potential pre-commissioning, which is likely to require **harbour upgrades**, for quay reinforcement and bollard upgrades.
- ✓ **In addition, a marshalling harbour is a living quarter**, implanted in a pre-existing industrial hub, which requires robust organisation:
 - The marshalling harbour requires **facilities** with offices, canteen and access to all necessities.
 - Unlike fixed offshore wind, **many parties** are potentially involved in the operation (FSS, WTG, harbour), which creates **interfaces**.
 - All harbour activities generate **co-activities** to be carefully planned.



Summary of harbor operations, located in the same area in Fos-sur-Mer



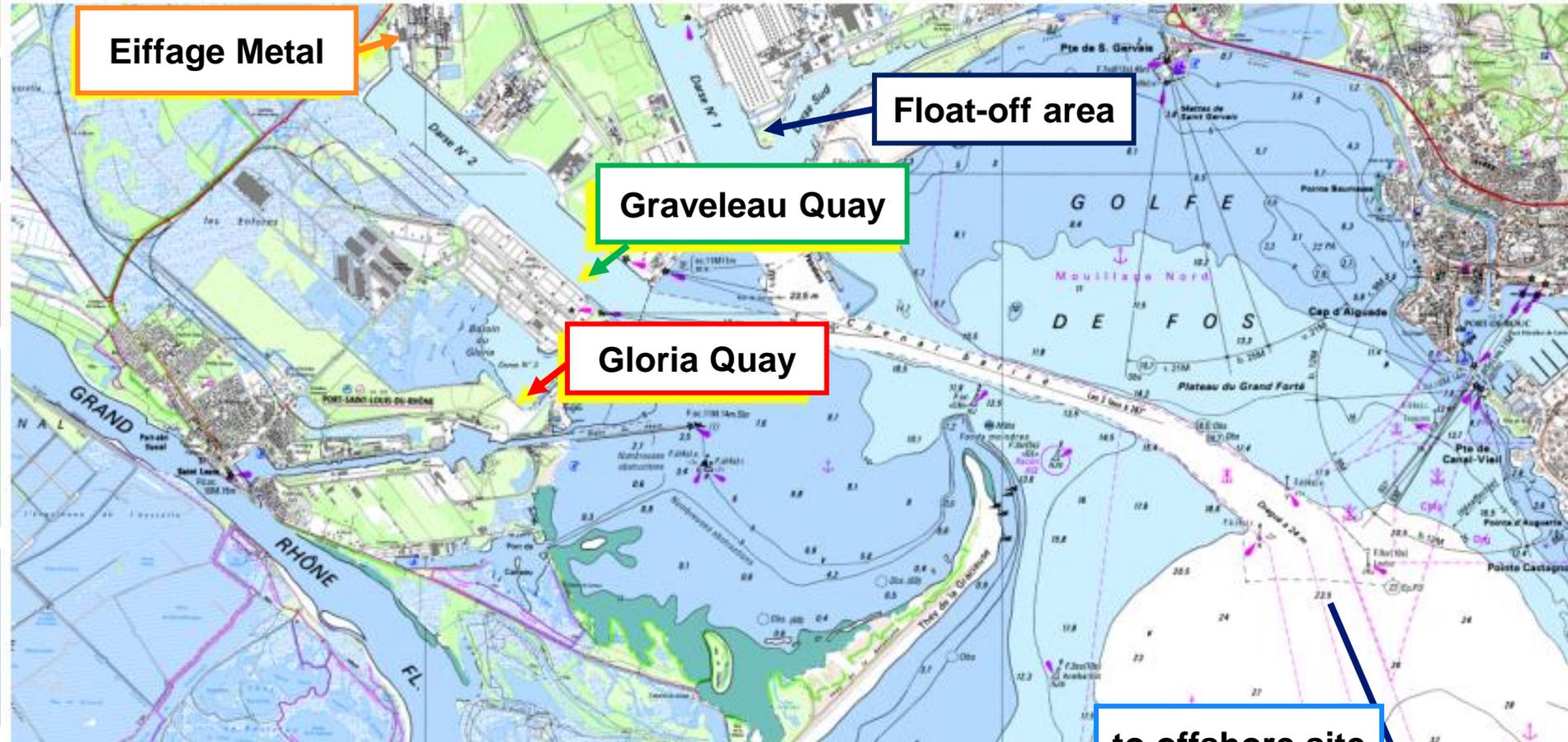
- Assembly Site**
- 1 Final assembly
- 2 Load-out on barge

- Deep/ wide area**
- 3 Float-off

- Marshalling Harbour**
- 4 WTG integration

- Storage Quay**
- 5 Storage
- 6 Pre-commissioning

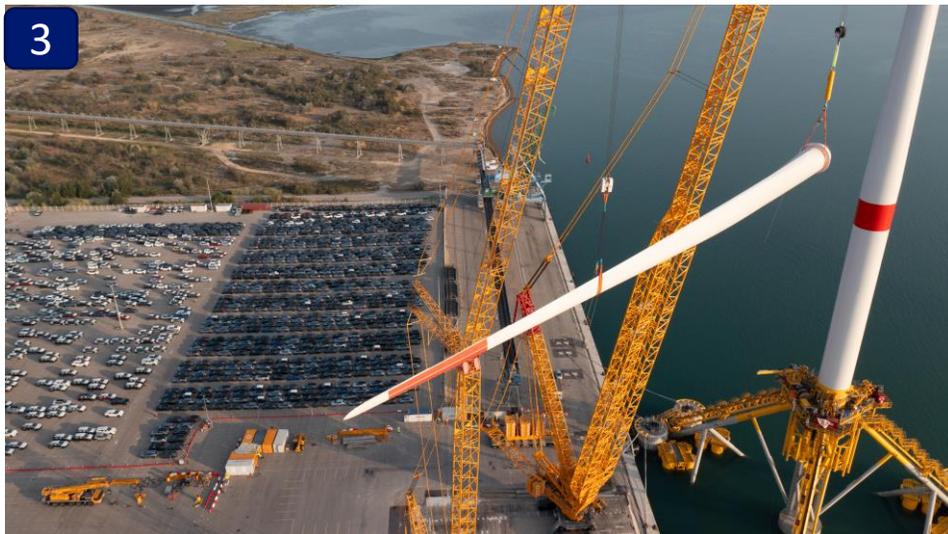
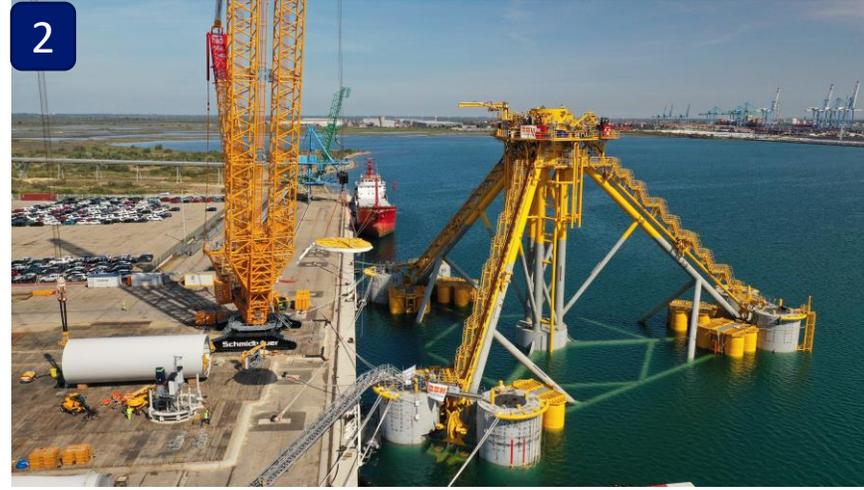
- to offshore site**
- 7 Towing
- 8 Hook-up



to offshore site

Harbor operations

- ✓ April 2023: **WTG components stored** at Gloria quay [1]
- ✓ May 2023: **FSS mooring** at quay and installation of Temporary Buoyancy Modules [2]
- ✓ June 2023: **Start of WTG integration** [3]



Harbor operations

- ✓ July 2023: **Start of WTG pre-commissioning** [4]
- ✓ September 2023: **FSS towing** [5, 6]



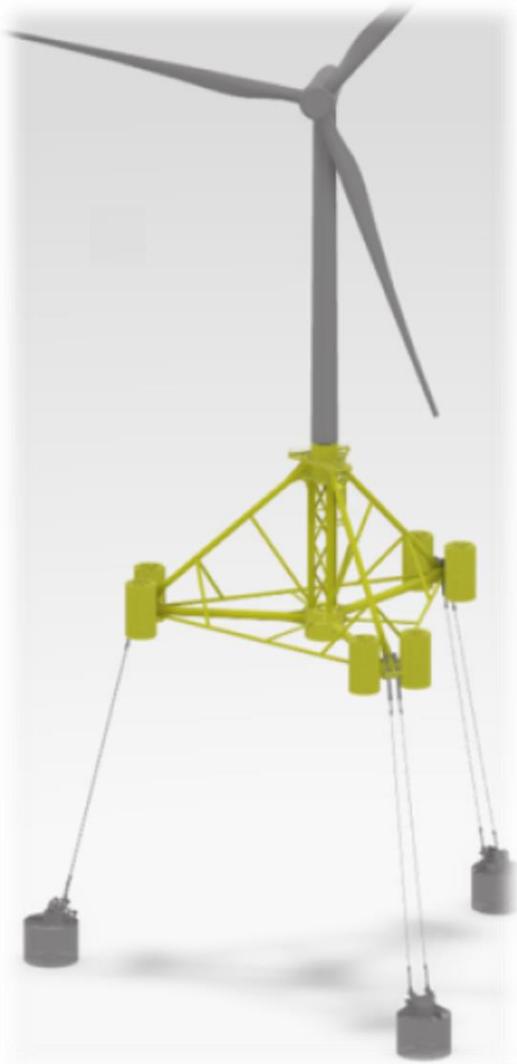
Offshore operations

- ✓ September 2023: FSS installation with Normand Installer ship and 3 tugs



Normand Installer – SBM ship

Meanwhile during the WTG integration: suction anchors installation in summer 2023

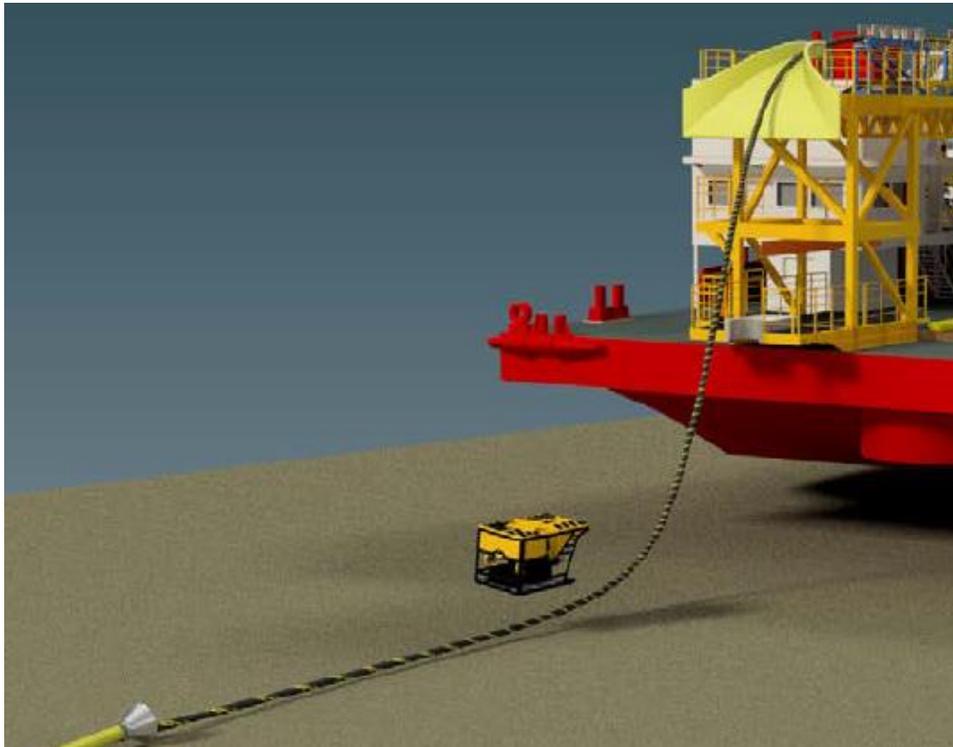


Normand Installer – SBM ship

Autumn 2023: export cable and inter array cables (IAC) installation



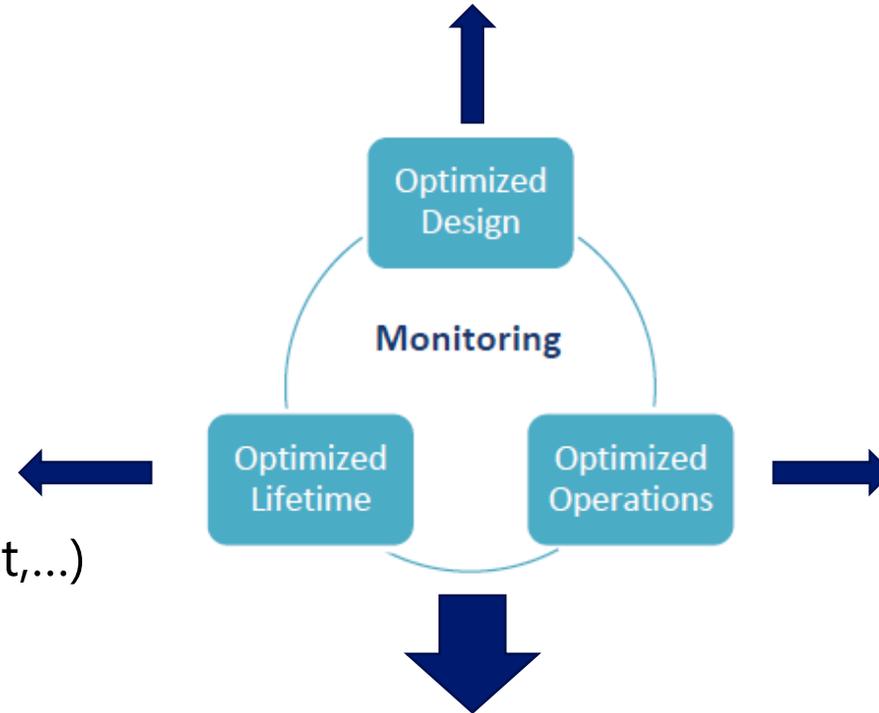
- ATALANTI + TRENCHER MK3 + Atom ROV for the export cable laying and IAC installation
- ARGO: post-layout inspection and burial of the export cable



- 19 km length
- Pull-in operation through 0.75km HDD
- Free-laying of Export cable
- Water Depth = [6m – 100m]

SCADA development: Supervisory Control And Data Acquisition

Data leads to knowledge and insights that can be valorized into new designs



Data to identify any risks or hazards that may compromise the safety of the installation, allowing mitigation measures.

Asset performance management

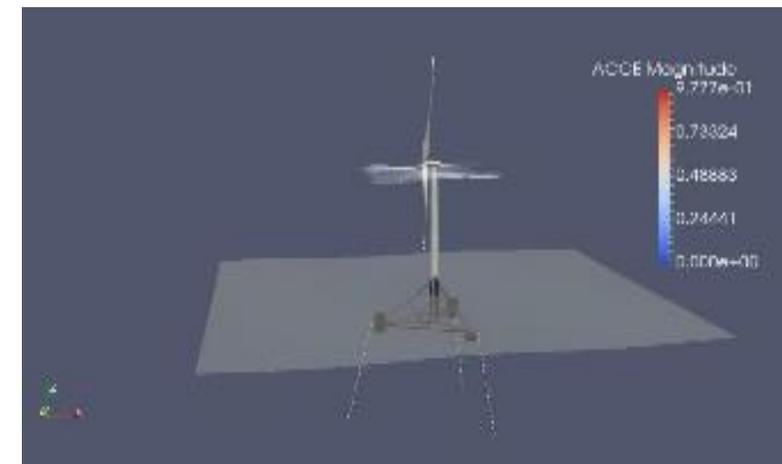
- Real-time monitoring in order to check the floating wind turbine performances
- Predictive maintenance (Monitoring allows for early detection of any structural issues which can be addressed before major problems)

Data to evaluate stresses and remaining useful lifetime

- Asset Value
- Lifetime Extension
- WTG upgrade (power boost,...)

Investigation on digital twin

- Virtual replica of a physical asset
- Objective:
 - to allow real-time monitoring and analysis of various parameters. By integrating data from sensors, weather forecasts, and other sources, the digital twin provides accurate and up-to-date information on the performance of the asset
 - To allow proactive maintenance and troubleshooting, as well as the optimization of energy production
 - To provide support for new design investigations in order to reduce costs and improve overall performance





Thank you for
your attention!

Project supported by:

