Report 2023

Task 56

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Offshore Code Comparison Collaboration 7 (OC7)

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Task 56 is a new IEA Wind Task that was approved in October 2023 and set to run from January 2024 to December 2027. Its primary objective is to evaluate and enhance the predictive accuracy of modelling tools used in the design of offshore wind systems.

Additionally, the project aims to propose effective strategies to achieve the highest attainable accuracy in specific load predictions. The OC7 project will centre its efforts on tackling three pivotal facets of wind turbine design, which help to address the outstanding grand challenges in the wind energy sector. By conquering these challenges, the project aspires to pave the way for future wind power plants that will be capable of providing cost-effective electricity supply. Emphasis will be placed on the domain of floating wind systems, acknowledging the heightened uncertainties in this realm, while also recognising the significant potential for cost reduction.

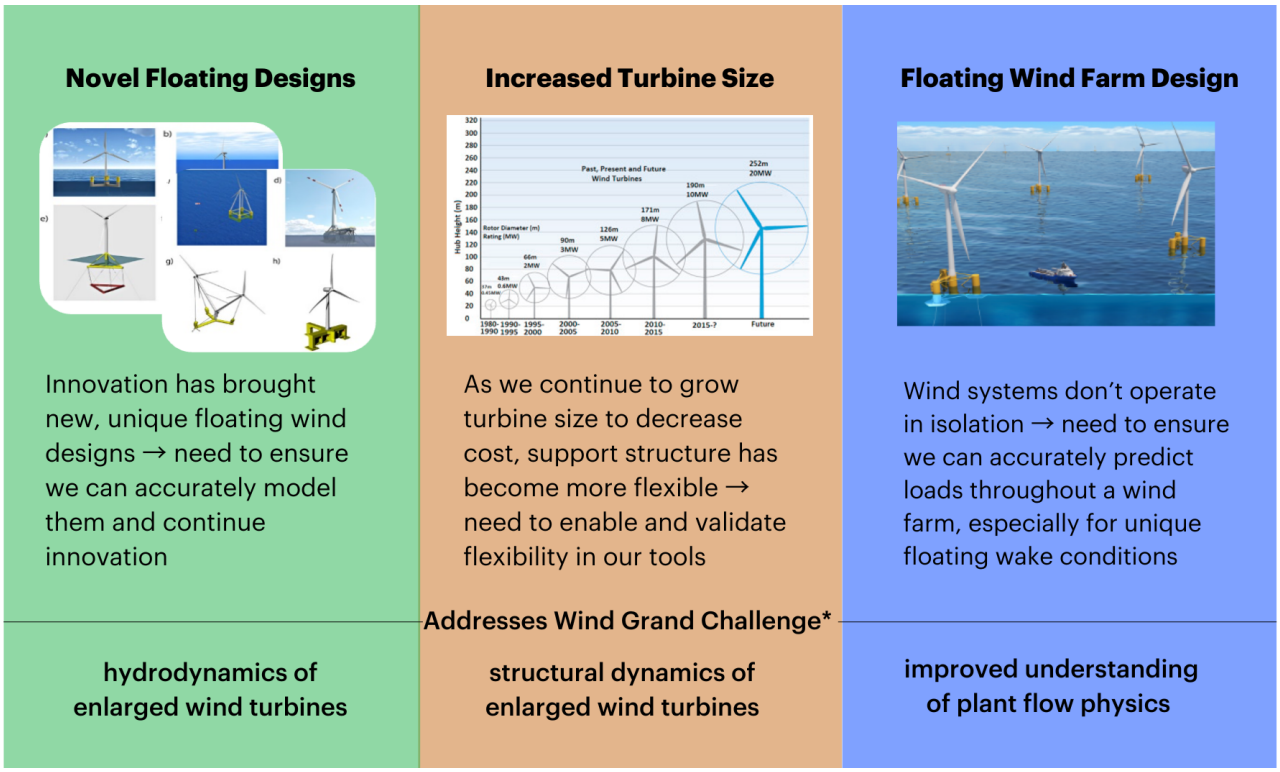

Figure 1: Key challenges to be addressed in the OC7 project for the advancement of floating wind turbine design.

The Task will address the following key challenges:

- The evolution of innovative designs for floating wind structures transcends the conventional oil and gas substructures that initially shaped our hydrodynamic modelling theory. Adapting our modelling methodologies to facilitate more precise hydrodynamic load forecasts across the expansive design spectrum under consideration, is therefore paramount.
- As we grow the dimensions of wind turbines and optimise their configurations to reduce costs, the inherent flexibility of the floating support structure becomes more pronounced. It is imperative to incorporate this structural flexibility into our design capabilities and rigorously assess its implications for predicting loads at the individual member level, while also assessing its impact on global dynamics.
- Shifting from the perspective of isolated turbines to the holistic functioning of wind farms is imperative. Anticipating loads for any turbine within a wind farm becomes a necessity, especially as turbines experience wake effects from neighbouring units. This is particularly pertinent for floating wind systems, where wake behaviour takes on distinct characteristics.

The Task will build off the success of the previous OC3-OC6 projects, which have been a recognised for their advancement of offshore wind energy design capabilities. Three fundamental work packages will be developed to align with the key challenges above.

WP 1. Hydrodynamic Viscous Loads – Validate the modelling accuracy of viscous load models across a variety of floating wind support structure design configurations and define suggested approaches for tuning hydrodynamic model coefficients based on measurement and/or CFD simulation results.

WP 2. Floater Structural Dynamics – Validate member-level loads within a floating substructure and assess the impact of flexibility on the global dynamics of the system.

WP 3. Floating Wind Farm Aerodynamics – Verify the wake behaviour and power performance for a floating wind farm, and the associated loads in the blades and tower at different locations in the farm.

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