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D4.2 Public Definition of the Two LIFES50+ 10MW Floater Concepts

This report compiles the information of design results for substructures for DTU 10 MW floating wind turbine. The two concepts are public versions of a four-column semi-submersible (*NAUTILUS-10* floating substructure) and a semi-submersible by Olav Olsen (LIFES50+ OO-Star Wind Floater Semi 10MW), see Figure 1. The public versions have been defined by Olav Olsen, NAUTILUS S.L. and TECNALIA, University of Stuttgart and DTU for the purpose of physical model testing and numerical research in the LIFES50+ project. While the public concepts may have similarities with real commercial designs, the specifications of the public concepts can by no means be taken as confirmed values for any commercial design. It is expected, though, that the two public designs will be of benefit for wider research on floating wind turbines due to their open specification.

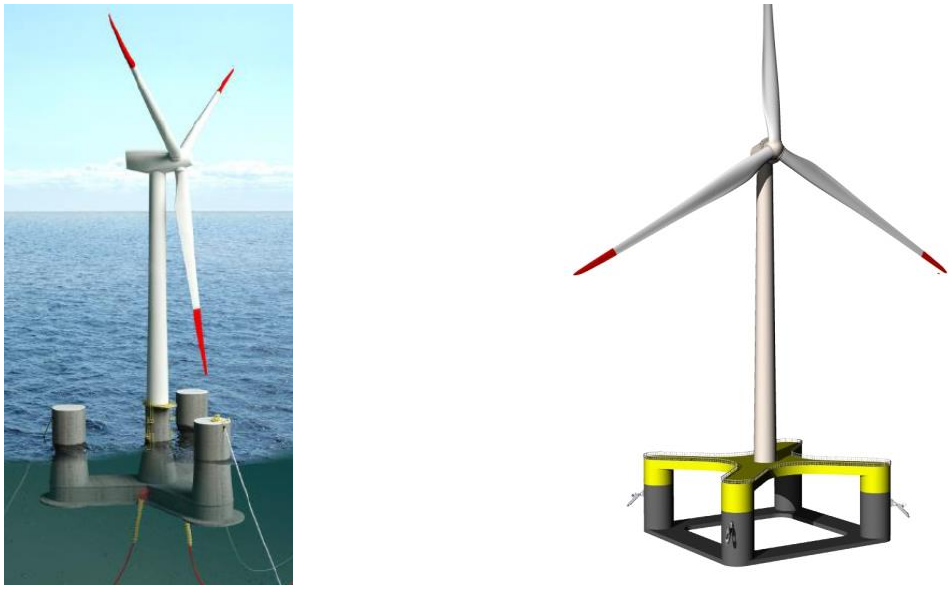

Figure 1: LIFES50+ OO-Star Wind Floater Semi 10MW (left); *NAUTILUS-DTU10* MW FOWT (right)

The concepts are defined for a water depth of 130m and were initially up-scaled from the existing substructure concepts for 5MW wind turbine of Olav Olsen and NAUTILUS. The focus lies on the definition of geometries, structural dynamic and basic hydrodynamic properties, which allow the reader to set up a numerical or experimental model. Further detail with respect to e.g. hydrodynamic coefficients will be addressed in future work of LIFES50+.

The report begins with a short introduction and a brief description of the DTU 10MW wind turbine. The detailed definition of two concepts follows in Chapter 3 (LIFES50+ OO-Star Wind Floater Semi 10MW) and Chapter 4 (*NAUTILUS-DTU10* MW FOWT) respectively. For each concept, the description is comprised of properties of tower, platform structure, hydrodynamics, mooring system and control system.

The resulting designs will be tested with a down scaled model in WP3 in both wave tank (SINTEF) and wind tunnel (POLIMI). Based on the description of this deliverable, two numerical FAST models will be developed. The FAST models will be released as deliverable D4.5 of LIFES50+. Additionally, high fidelity models for investigation of advanced load effects will be established and the results of the experimental model tests will be used for the validation of these numerical models.