**WP3: Base design (IST, all partners), M1-M24**

The main objectives of WP3 are

* Define relevant sites, floaters, and design criteria.
* Identify technology gaps in the design and analysis of FOWFs.
* Evaluate LCOE for conventional and optimized mooring/cable designs for FOWFs.

**Task 3.1: Site and floater definition (IST, CHALMERS, DHI, DNV, NKT), M1 – M2**

Propose locations and floaters from the existing analysis or by performing extra analysis following the study in [4, 5]. Review the mooring system and components relevant to the project. Summarize mooring material (chain types, synthetic ropes), floaters, clump weights, and power cables including their bending stiffeners. The floaters will accommodate DTU’s 15WM turbine.

At least two sites with different water depths in Europe and the US should be identified. If the selected floaters do not fit the purpose, design modification will be proposed.

**Task 3.2: Design basis and technology gap analysis (DTU, CHALMERS, DHI, DNV, IST), M1 – M3**

Establish design environmental conditions for the design of the novel shared mooring system tailored to floating offshore wind farms. Define design criteria according to IEA and DNV. Perform technology gap analysis to indicate future research areas that should be focused on.

**Task 3.3: Quasi-static mooring design (IST, CHALMERS, RTU), M1 – M9**

Quasi-static mooring design (with catenary and taut) for a single turbine. Initial mooring configurations will be determined considering different numbers, diameters, and lengths of the mooring lines.

A practical mooring design procedure will be applied for the selected floater and site. Firstly, the static analysis will be performed for the configurations with different numbers, diameters, lengths, and material of mooring cables with different pre-tensions on fairlead. The restoring force vs floater excursion relations will be established. Based on these configurations from the static analysis, a quasi-static analysis is carried out in the frequency domain and a preliminary design is conducted according to DNV rules. The mean offset induced by wind, current and wave drift force and the maximum offset induced by wave loads can be used to estimate the maximum tension on the cable.

An iterative procedure will be used to obtain the best options following the design requirements identified in Task 3.2.

**Task 3.4: Design comparison (IST, CHALMERS, DTU, RTU), M6 – M18**

Design and compare different shared mooring systems, their components, and the cable system, following the approach in [9, 10]. Make a comparative study of different mooring and anchor configurations. The tools developed in WP2 will be used for LCOE comparison. Key parameters affecting the efficiency and robustness of mooring/cable systems with low LCOE will be identified.

**Task 3.5: Fully coupled dynamic analysis (IST, CHALMERS, DTU, RTU), M12 – M36**

Perform fully coupled dynamic analysis for the selected shared mooring systems of the floater using SIMA and consider the dynamic stiffness of the fibre ropes identified in WP4, following the DNV procedures. The maximum offset and mooring tensions will be calculated in the operational and survival conditions based on the environmental data (wind, current and waves) in the sites identified in **Task 3.1**. Irregular wave analyses with default seed number were used to identify the critical load cases in terms of tension, offset, etc. The critical load cases will be then analysed with 20/30 seeds, and the most probable maximum (MPM) of offset and tension will be calculated using DNV formula. Both intact and one-line broken cases will be considered. These values will be used for checking the mooring strength and floater offset and further confirm the design. Necessary modifications on the design would be made.

Reduced-order models for components, e.g. mooring and cable, developed in **WP5**, will also be applied in Ansys/Aqwa using co-simulation. The final numerical models should have been validated in **WP6** using model tests from **WP7**.