

D1.6 – Upscaling procedure

The first stage of the project was focused on the concepts design, which was driven by the information required for the concepts evaluation. The first step was to define the design basis: the wind turbine model and the load cases for the three selected sites. The second step was the design of the four concepts, considering not only the substructures and the moorings, but also the manufacturing, assembly, installation, operations and maintenance (O&M) and decommissioning for a 500MW wind farm.

Each design topic had a specific subtask, such as structural design, mooring design, dynamic simulations or Wind Turbine Generator (WTG) controller. The results were collected in three deliverables, restricted to the project consortium as they contained confidential information related to the design:

- D1.3 Concepts design. The deliverable summarizes the concepts design, including a design briefs summary, the main dimensions and features of each concept and for each site.
- D1.4 Wind turbine controller adapted to each concept. A first section summarizes the reference controller for the WTG and the controller ‘tuning’. Then, controller adaptation to each concept is described, to finish with new control strategies.
- D1.5 Marine operations. The deliverable compiles the information about concepts manufacturing, installation strategy, O&M and decommissioning for each of the sites.

D1.6 is a public summary of the design activities and design validation carried out in the project. A workshop was scheduled to include, as part of the deliverable, a discussion about the challenges found during the design for a 10MW wind turbine, as well as considerations for the design of floating structures for large wind turbines. It was hosted by Politecnico di Milano on the 13th June 2017. All project partners and a member of the external advisory group took part in the discussion which concluded in some highlights for the design of floating structures for 10 MW range wind turbines.

- The same design procedures and modelling used for smaller WTGs are valid for larger ones.
- Tower design and wind turbine control are seen as the main challenges at the design stage; the collaboration with the wind turbine manufacturer is mandatory for the definition of turbine functional requirements and to get to an optimized design.
- Logistics for serial production of large wind farms can be a bottleneck as wind turbines continue to grow in size. Working with the industry is very important for reaching a concept design that adheres to ‘standard’ industry elements (manufacturing, T&I, O&M...)
- Aspects not considered in detail in LIFES50+, such as wind farm layout, turbulence model, power production and O&M strategy can significantly influence the floater and moorings design; to be considered when facing detailed design stages.