

1 Deliverable 7.2 Design Basis

This report, together with the LIFES50+ Deliverable 1.1, “Oceanographic and meteorological conditions for the design”, forms the design basis for the design of the four concepts.

Three generic sites have been defined for the design of the four concepts, representative of moderate (Site A), moderate (Site B) and severe (Site C) conditions. The site conditions for the three sites are partly based on the publicly available information from three areas: Golfe de Fos area (France) for the Site A, Gulf of Maine area (USA) for the Site B, West of Barra (Scotland) for the Site C. The site conditions for the three sites are provided in the LIFES50+ Deliverable 1.1, “Oceanographic and meteorological conditions for the design”. The Appendix A to this report includes the background information on how the environmental parameters have been selected.

This report gives the criteria, the parameters (e.g. environmental conditions) and the Design Load Cases (DLCs) for the analysis of the four concepts for the three sites.

The four designers have agreed to design according to DNV-OS-J103:2013-06 “Design of floating wind turbine structures” and the related standards, e.g. DNV-OS-J101 and DNV-OS-E301. In addition, also IEC standards have been used, e.g. in the definition of the wind environmental conditions according to IEC61400-1.

It is strongly advised to not deviate from the requirements of the governing standards (DNV-OS-J103), if not explicitly mentioned in the design basis. Particular care shall be used in mixing requirements from different standards: the criteria, the methods (including factors) and the load cases should be consistent. In particular, in order to ensure a fair evaluation of the four concepts, it is important that the safety class and the evaluation of the concept redundancy are consistent with the governing standards.

Some assumptions and simplifications have been made in the design basis, the most important ones are:

- Only a selected number of DLCs is considered for the analysis of the four concepts. These DLCs are considered the most relevant for the design of floating wind turbine structures, and some selected sensitivity studies will be carried out to justify this assumption; however, additional analysis and considerations would be needed for a commercial project.
- It is assumed that the project consists of a single unit. If a commercial wind farm would be developed, additional considerations might influence the analysis and the cost, e.g. evaluation of the shallowest position at the site, different orientations of the station keeping system, park turbulence, etc.
- The fatigue analysis is based on a simplified approach and it is considered only for one generic site. The local wave and wind conditions at the three sites are not used for the fatigue analysis.
- In case the local wind distributions are used to calculate the Levelized Cost Of Energy (LCOE), it should be noted that the impact of the different wind distribution is not reflected in the design (e.g. the benefits of an higher average wind speed will be visible in the power production but not in the cost of the wind turbine).
- Assumptions on the site conditions were taken in LIFES50+ D1.1, e.g. turbulence intensity is according to IEC Class C; extreme wind conditions were limited to be within IEC Class I; simplified soil conditions are used.

