D2.8 Expected LCOE for floating wind turbines 10MW+ for 50m+ water depth

The levelized cost of energy (LCOE) calculation is a method used to obtain the cost of one unit energy produced and is typically applied to compare the cost competitiveness of different power generation technologies and concepts. The method has been used in the LIFES50+ project to evaluate economically the floating offshore wind turbine (FOWT) concepts.

The objective of this document is to present the findings of the economic assessment of the FOWT concepts and the LCOE values obtained during the concept evaluations performed in phase 1 and phase 2 of the project. Furthermore, potential cost and LCOE reductions are demonstrated as a result of the optimization of the concepts and industrialization studies.

The document introduces with a review on LCOE values of FOWTs obtained in the literature and then presents the results of the phase 1 concept evaluation of the LIFES50+ project. Furthermore, a sensitivity analysis outlines the parameters that most influence the LCOE in order to highlight potential components for cost reductions. In phase 2 of the project, the 2 selected FOWT concepts have been optimized based on the performed experimental test campaigns and numerical modeling. An evaluation at the end of the phase has resulted in a mean LCOE reduction of the optimized concepts by about 2%. Besides a mean decrease in manufacturing cost, a significant reduction in transport and installation costs could be achieved.

The document reports further an outline on potential cost reductions through industrialization and quantifies the LCOE reduction that can be achieved by economies of scale in substructure unit costs. As the sensitivity analysis has highlighted the discount rate to be one of the most influencing parameters on the LCOE, its impact on the concept evaluation is assessed. It has been found that a 3% lower discount rate can achieve a LCOE reduction of about 18% to 20% depending on the offshore site studied. A lower discount rate can be achieved by reducing both the commercial and technology risk with more experience in the sector, improved numerical models and a large employment of the technology.

The findings presented in this document show that the FOWT concepts of the LIFES50+ project are highly competitive and provide LCOE values below the estimates of the IEA Wind Task 26 expert survey and reference values in literature. Furthermore, the optimization of the concepts in phase 2 has resulted in an additional LCOE reduction. Moreover, different studies such as the impact of the discount rate and economies of scale have shown that the commercialization of FOWTs is key for a further cost reduction.