

Title of MSc Thesis

Planning of the Installation of an Offshore Wind Farm

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ABSTRACT

In the present Master Thesis, the management of the installation of an Offshore Wind Farm (OWF) in Greece is examined, aiming at the “optimal” installation schedule and the efficient cost control of the project. In Europe, the OWF industry has been and is being rapidly developed, since the efficient exploitation of the offshore wind energy presents one of the main strategic objectives of the EU, towards the inclusion of renewable energy sources in the EU energy balance. Furthermore, the countries of the Northern Europe have acquired a significant expertise on the manufacturing/installation of Offshore Wind Turbines (OWTs) and they have developed the corresponding technology. These facts have triggered the installation of OWTs in larger water depths, enabling the exploitation of the vast offshore wind potential through OWTs of bigger sizes and of bigger capacities. In Greece, however, the investments in the OWF sector present currently just a future goal due to the existence of various obstacles. Among these obstacles, the lack of know-how as well as the lack of predicting failures during the installation stage of OWFs could be considered.

Based on the above, in the present thesis the management of the installation of an OWF in the Greek seas is implemented, aiming at the efficient planning and cost control of the installation process. The above are implemented through a specific Case Study corresponding to a 200 MW OWF (66 fixed bottom OWTs) in the coastal area of Alexandroupoli in Northern Greece. Initially, all the installation stages and methods related to fixed bottom OWTs are described; additionally, the critical parameters of the installation process are presented, corresponding to: (a) the management and construction methods and (b) the installation fleet (vessels). The installation of the examined 66 OWTs is implemented through the development of three different installation scenarios, enabling the investigation of the effect of the two aforementioned parameters on the duration and the cost of the installation process. Finally, the effect of the weather conditions (wind velocity, significant wave height) on the installation timetable and cost is being investigated. This is achieved through the inclusion of weather constraints on the timetable and the calculation of cumulative probabilities related to the project's duration and to additional installation cost, resulting from tasks' delays.

Keywords: Management of offshore wind farms installation, Time schedule, Cost control, Installation Vessels, Weather Constraints, Cumulative probability of project's duration and installation costs.