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Construction Port Requirements for Floating Wind Turbines

Authors : Alan Crowle, Philpp Thies

Abstract : As the floating offshore wind turbine industry continues to develop and grow, the capabilities of established port facilities need to be assessed as to their ability to support the expanding construction and installation requirements. This paper assesses current infrastructure requirements and projected changes to port facilities that may be required to support the floating offshore wind industry. Understanding the infrastructure needs of the floating offshore renewable industry will help to identify the port-related requirements. Floating Offshore Wind Turbines can be installed further out to sea and in deeper waters than traditional fixed offshore wind arrays, meaning that it can take advantage of stronger winds. Separate ports are required for substructure construction, fit-out of the turbines, moorings, subsea cables and maintenance. Large areas are required for the laydown of mooring equipment; inter-array cables, turbine blades and nacelles. The capabilities of established port facilities to support floating wind farms are assessed by evaluation of the size of substructures, the height of wind turbine with regards to the cranes for fitting of blades, distance to offshore site and offshore installation vessel characteristics. The paper will discuss the advantages and disadvantages of using large land-based cranes, inshore floating crane vessels or offshore crane vessels at the fit-out port for the installation of the turbine. Water depths requirements for import of materials and export of the completed structures will be considered. There are additional costs associated with any emerging technology. However part of the popularity of Floating Offshore Wind Turbines stems from the cost savings against permanent structures like fixed wind turbines. Floating Offshore Wind Turbine developers can benefit from lighter, more cost-effective equipment which can be assembled in port and towed to the site rather than relying on large, expensive installation vessels to transport and erect fixed bottom turbines. The ability to assemble Floating Offshore Wind Turbines equipment onshore means minimizing highly weather-dependent operations like offshore heavy lifts and assembly, saving time and costs and reducing safety risks for offshore workers. Maintenance might take place in safer onshore conditions for barges and semi-submersibles. Offshore renewables, such as floating wind, can take advantage of this wealth of experience, while oil and gas operators can deploy this experience at the same time as entering the renewables space The floating offshore wind industry is in the early stages of development and port facilities are required for substructure fabrication, turbine manufacture, turbine construction and maintenance support. The paper discusses the potential floating wind substructures as this provides a snapshot of the requirements at the present time, and potential technological developments required for commercial development. Scaling effects of demonstration-scale projects will be addressed, however, the primary focus will be on commercial-scale (30+ units) device floating wind energy farms.

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