

The National Renewable Energy Laboratory (NREL) asked MMI Engineering to develop cost comparison and feasibility data for various types of offshore wind turbine support structures. MMI assessed monopiles, tripods, jackets and gravity base structures for a range of water depths and turbine size requirements.

The objective of this study was to define specific feasibility limits of the conventional alternatives for offshore wind turbine support structures, and to evaluate their relative sensitivities to variations in the primary site conditions, namely: turbine size, water depth, wave height, wind speed and soil condition.

The study included three primary elements:-

- The first phase of the work included a literature survey to assemble a database of design requirements and development cost data for existing wind farms. This database was used to develop an initial definition of cost trends for various site conditions and design strategies
- The second phase of the work included the development of baseline designs for each of the candidate concepts for a single site development scenario. The baseline designs addressed and compared the various design drivers for each concept (i.e. strength and operational loading) and compared the impact of these different conditions to each design
- The third phase of the work included a series of sensitivity analyses to define the change in design requirements for changes in site conditions. This analysis compared concept costs for sites with water depths ranging from 10 to 40 meters and for turbine sizes of 1 to 7 MW. These sensitivities addressed the complex behaviour of support structures subject to potential resonant behaviour with rotor operation, wave slam, wave harmonics and soil-pile interaction

