

# MARIN

## Maritime Research Institute Netherlands

MARIN is a provider of advanced expertise and independent research to the maritime and offshore industry. Using the newest test facilities and simulators and working together with an extensive innovation and research network we achieve our goal of developing cleaner, safer and smarter ships and maritime constructions. MARIN is actively participating in the development of the offshore wind energy sector. It launched RENT (Renewable Energy Team), a MARIN wide team of specialists covering all the aspects needed to make offshore renewable energy a success.

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Besides involvement in wave and tidal energy, the RENT team is involved in the hydrodynamic design of fixed and floating offshore wind turbines and wind turbine installation and maintenance vessels for which the challenges are very similar to those of the offshore industry: safe and economic design, production, transportation, installation, maintenance, repair and removal.

To further assist the offshore wind market two Joint industry projects (JIPs) are in their closing stage and two will be started in 2015. All JIPs are still open for new participants.

#### WiFi JIP

The objective of WiFi JIP is, to better understand the influence of steep and breaking waves on the foundation of

offshore wind turbines and secondary structures like boat landing platforms. The project aims at an improved methodology to take extreme waves and non-linear wave effects into account in the design of offshore wind turbine construction. The experimental and validated design methods can be used by the JIP participants, to have a better quality control on the design of their structures and to avoid damage by improved design methods and calculation requirements in Guidelines and Standards.

#### Wind Jack JIP

For jack-up wind turbine installation vessels the loads on the legs and the jacking system during touch-down and lift-off are considered to be the most critical step of the installation process. Wind Jack aims to understand and predict the interaction between jack-up legs and the seabed in order to better quantify the operational limits and to make an accurate prediction of the workability of wind turbine installation vessels. To determine the seabed reaction forces on the moving leg tips during touch-down and lift-off MARIN joins forces with the Dutch geotechnical research institute Deltares.

#### Lions Hat JIP

In greater water depths floating offshore wind turbines can be an alternative to fixed wind turbines. In this context, the development of a cost-efficient floating wind turbine relies on a proper prediction of loads on the turbine, its floating foundation and its mooring system. Such a prediction is only possible with simulations accounting for the floater and

the turbine. The goal of this project is to validate standard simulation approaches for Floating Wind Turbines with a specific focus on the coupling of the aerodynamics and the hydrodynamics.

#### Offshore Maintenance JIP

The objective of the offshore maintenance JIP is to decrease the O&M cost and risk for maintenance operations by developing improved knowledge and practical simulation tools for O&M cost analysis. This will be achieved by determining operational criteria based human factors as well as limitations to the vessel and its equipment. The human criteria will be quantified by, physical lab experiments, onboard measurements and Simulator trainings. For this JIP MARIN joins forces with the ECN and TNO.

