

# Offshore Maintenance JIP I & II

A growing number of offshore wind farms is being installed and operated. Maintenance on wind turbines is required to minimise LCOE. This maintenance work comes in large varieties, from replacements to repairs. Each maintenance operation requires its own specialist and specialised vessel.



## Objective

The main objective of the Offshore Maintenance JIP is:

*To determine operational criteria for offshore maintenance and apply these criteria to select the most suitable maintenance logistics for each wind farm and maintenance activity. And develop the MeteoDashboard system such that it can be used for short-term access strategy selection for offshore wind*

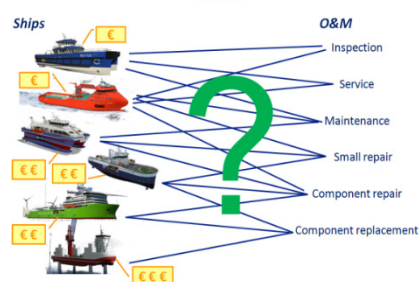


To reach this objective the following sub-objectives are defined:

- To understand and determine operational limits of the crew.
- To determine and take into account operational limits of the vessel and its equipment.
- To apply both human and technical criteria in operability analysis.
- To determine the hydrodynamic response of wind park maintenance vessels.
- To implement all this knowledge into the MeteoDashboard system such that it can be used for short-term access strategy selection for offshore wind.



The effect of the operational criteria, combined with charter or operational costs on wind farm availability and O&M costs will be calculated for a selected number of realistic reference wind farms with different characteristics.



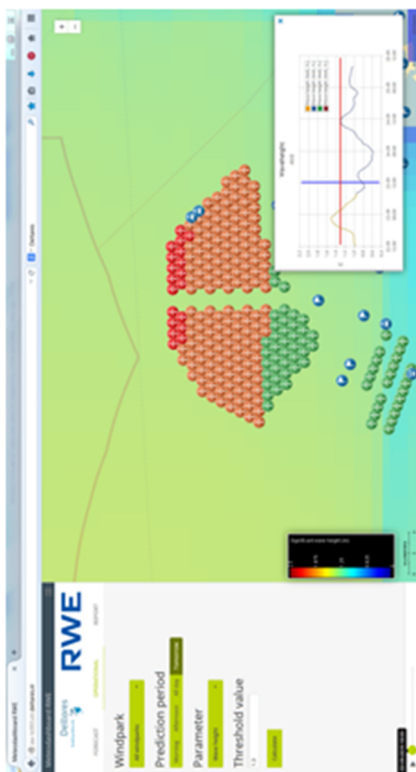
## Deliverables

- ✓ ECN O&M Access software based on knowledge developed within this JIP project, and validated by a 1-year offshore maintenance monitoring campaign.
- ✓ A dedicated TNO seasickness and fatigue model for the domain of offshore wind maintenance to set criteria for loss of manpower due to sickness, fatigue and turbine access safety.
- ✓ A hydrodynamic database for a range of maintenance vessels, during transit, approach and transfer phase. The characteristics will be determined by means of model tests and simulations.

## Participants

The Offshore Maintenance JIP is focussing on, but not limited to, the offshore wind industry. The Maintenance Vessel JIP aims at the following participants:

- Offshore contractors
- Operators of maintenance vessels
- Designers of maintenance vessels
- Builders of maintenance vessels and subcomponents
- Wind park developers
- Maritime engineering companies
- (Renewable) energy companies



Example of the MeteoDashboard

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The experimental and validated design method will give the participants a better quality and cost control of operations and maintenance. The project will give new and indispensable results on human factors in relation to offshore maintenance.

## Approach

Within this project the existing ECN O&M Access software is further developed to include a database of the hydrodynamic characteristics, such as speed in waves and seakeeping behaviour, for a range of maintenance vessels. Operational criteria of equipment and personnel will be determined in Work Package 2 and stored in the tool as well. In combination with the local meteocean climate at the wind farm it can be calculated which maintenance vessels are most suitable for the job and what the operability will be.

## Scope of work

The scope of work is split up in the following work packages in **OM JIP I**:

- WP 1: ECN's O&M Access software is modified to incorporate the hydrodynamic characteristics of the maintenance vessels and existing human factor expertise of TNO. At the start of the project the participants of the OM JIP will get access to the current version of the software, which will be updated during the project.
- WP 2: Operational criteria for both human criteria and limitations to the operational performance of maintenance vessels and their equipment will be determined. Physical experiments are foreseen to determine these operational criteria. Onboard measurements during operations are foreseen to determine human criteria and decrease the differences between the drawing board and onboard decisions.
- WP 3: The hydrodynamic characteristics of each maintenance vessel considered in the JIP will be determined by means of model tests and simulations. The transit, approach and transfer phase will be considered including the analysis of Dynamic Positioning (DP) capability for the vessel concepts if applicable. The obtained data will be stored in databases to be used by ECN's O&M cost estimation software.

The scope of **OM JIP II**:

The MeteoDashboard system will be developed into an integrated software system that collects, stores, computes and presents measured and forecasted meteo- and hydrodynamic data - translated into vessel movements and human performance - for decision making of maintenance activities for offshore wind farms.

To ensure that the developed knowledge is in line with the needs of the participants, each partner of the OM JIP will be represented in the project's main governing structure, the Steering committee, which will be responsible for all strategic decision making.

## Time schedule

The OM JIP started in 2016 and will run till the end of 2019. Project meetings will be organised at least every six months. The total budget is 1.5 million Euros.