

SAMSON helps assess the risk of wind farms

Within the coming years a large number of offshore wind farms are planned in European waters. To measure the extent of their environmental impact, MARIN can perform a study in which the safety aspects related to shipping are assessed.

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From a shipping point-of-view a wind farm has to be located where shipping densities are low. However, when it comes to the practical, operational factors, other issues are involved. For example, a location close to the infrastructure on shore is preferable.

In the last few years MARIN has performed risk assessment studies for several wind farms, for instance the Near Shore Windpark, the wind farm Q7-WP for E-Connection (Dutch sector of the North Sea) and the wind farm Meerwind for Windland Energieerzeugungs (in the German sector).

In the latest risk assessment process for the Near Shore Windpark, MARIN made use of the Safety Assessment Model for Shipping and Offshore in the North Sea (SAMSON). This consists of a traffic database that describes all shipping movements at sea.

Using SAMSON, the following items were quantified for alternative locations: (1) new safety levels due to the change of the shipping routes around the wind farm, (2) the impact on shipping in terms of extra miles to be sailed due to presence of

the wind farm and (3) the likelihood of casualties, like ramming a wind turbine after a navigational error and drifting against a wind turbine by a disabled ship.

In co-operation with the designer of the wind turbine, the possible consequences for the wind turbine and for the ship involved were established. Any consequences of collisions with the wind turbines could be assessed in terms of possible oil and chemical spills and the likelihood of fatalities.

Average yearly collision frequencies are presented for three (out of six) possible locations for the Near Shore Windpark, divided into ramming and drifting frequencies. Depending on the ships concerned, the distribution of the kinetic energy involved in the collisions has been assessed. Then based on this and the construction of the wind turbine, it could then be estimated whether the wind turbine will be permanently damaged or no structural damage will occur. There were large differences between the six locations (see figure), with the most suitable location having a score more than 10 times better than the worst one.

Collision risk for three possible locations of the Near Shore Windpark.

