

MIC risk prediction on monopiles

Publieke samenvatting / Public summary

Background

Microbial Influenced Corrosion (MIC) has been identified as a potential risk for the structural integrity of an offshore wind turbine. Little knowledge and experience is present in the offshore wind industry on this matter. Specifically for the designs, in which the inside of the monopile is airtight without further mitigating measures against corrosion, a better understanding of the risks associated with MIC is important in order to assess the expected lifetime without additional mitigating measures. From the approximately 80 relevant wind parks, having about 2850 turbines in the West European area, the majority is engineered with a monopile structure. It is thereby a question that encompasses not just Eneco, but many other wind park owners.

Lars Lichtenstein (DNV, 2015) has evaluated several parks and showed the severity of internal corrosion problems. It is without a doubt that microbial activity is present within the monopiles. But it's unknown how much influence microbes have on the corrosion processes.

Objective

The aim of this project is to provide a standardized approach for the evaluation of the severity and progression of MIC, in offshore monopiles. The main problems with MIC are observed and expected at the inside of existing monopiles. The outside is expected to be better protected due to the standardized procedure of both coating and cathodic protection. To be able to understand and predict MIC better, it is important to measure all

Projectinformatie / Project information

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Algemene informatie / General information

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Publicaties en materialen / Publications and attachments

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Links

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microbiology (microorganisms and their function) including the mineralogy (chemical composition), ideally at the surface of the inside of the monopile. Important technical goal is to translate this data into an easily interpretable result for asset owners. Therefore the measured data will be used as input to model the relevant processes and this will be joined in a tool that can give information on the progression of MIC (material loss). This should provide solid ground to support decision making of park owners to optimize CAPEX and OPEX results.

Short description of activities

The activities of the project will include development of the sampling method (WP1). The sampling from the inside of the monopiles is complex. It involves risks due to anaerobic conditions and heights and is difficult to access. Existing inspection robotics are not designed to take biological samples. Therefore, the sampling method needs to be adjusted and designed to be able to take proper samples. The obtained samples will be analyzed using extensive and advanced genetic analysis (Next Generation Sequencing) and mineralogical analysis (WP2), the obtained, complex data need to be processed (WP3), and using the information from the samples and observations with respect to the material loss and surface a MIC risk prediction tool will be developed (WP4). Verification of the tool will be done in the field and at the laboratory of Corrosion (WP5).

Results

The project will result in a MIC prediction tool that will give an estimation of the material loss due to MIC, for the PAWP wind park. The sampling method and analysis and potentially also the tool can be used as a generic approach for all monopile based offshore wind parks. The information obtained in this project and the developed MIC risk prediction tool will give a better understanding of corrosion status, the involved risks, the needed material (designing for higher MIC resistance) and protection (e.g. coating, cathodic protection) the needed monitoring frequency and the expected lifetime of the monopiles. The MIC prediction tool will enable to

optimize pre- and post-failure costs, thereby providing a management and engineering tool for decision making. Both asset managers and engineers are provided with the necessary information to maximize returns (CAPEX and OPEX) of the offshore wind parks.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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