Corrosion Fatigue Life Optimisation (C-FLO)

Publieke samenvatting / Public summary

Background

It is vital to properly evaluate the structural performance of monopile foundations and the influence of environmental actions on corrosion and fatigue that drive the amount of steel and corrosion mitigation needed. Throughout the various life stages, multidisciplinary requirements result in a suboptimal design given the uncertainties in the service life prediction. Hence there is sufficient room for design improvements towards a lighter monopile (less material required and easier to install); more efficient maintenance, inspection and corrosion protection; extended service life of the monopile and the possibility for repowering. On the other hand, too optimistic design might lead to unacceptable risks.

Objective

The overall objective of this project is to develop an advanced corrosion-fatigue model for the service life prediction of monopile foundations. Partner-specific objectives are to improve design parameters (DNV-GL, Sif, Van Oord), behaviour of steel and coatings (PPG, Posco, Rijkswaterstaat), reduction of / improved inspections (Eneco, innogy, Shell, Parkwind, Vattenfall/Nuon, Orsted). The improved model will enable designers, builders and owner/operators to assess the structural design and maintenance choices of the monopiles based on the effectivity and robustness of corrosion protection. This leads towards a more optimal use of resources preventing unnecessarily high costs or risks. In order to ensure both a good validation, acceptation and utilisation of the model, manufacturers, project

Projectinformatie / Project information

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TEHE118023
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Algemene informatie / General information

Penvoerder / Secretariat
Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek TNO

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developers and owners are incorporated in the project.

Short description of activities

The project evaluates the existing knowledge on corrosion and fatigue of representative offshore wind monopiles, including the effects of environmental conditions and countermeasures. Industrial partners in the consortium bring in current practices in detailed design choices and corrosion protection measures. Environmental conditions representing the Dutch North Sea will be collected from field data from industry. Representative load conditions will be simulated using a numerical model of the monopile under the given environmental conditions. Based on the state-of-the-art, a deterministic model is built for describing the interaction of corrosion and fatigue, that will be developed towards a probabilistic framework. The model will be calibrated as a result of corrosion and fatigue testing in the project. Existing field data will be used to quantify the influence of environmental factors on corrosion and the effectiveness of corrosion protection in offshore wind structures using the developed models. The project results are brought to practice by evaluating the impact on the Levelised Cost of Energy (LCoE) and a risk analysis for various corrosion protection scenarios.

Results

The desired outcome of the research is an improved life prediction model including the effect of corrosion protection systems and a structural assessment guidance. Industrial partners involved in the design and maintenance of monopiles will directly use the updated design and maintenance recommendations or use the models for calculating the remaining structural life accounting for various design and maintenance strategies

Website

More information on the C-FLO project can found on the GROW website.

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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