Silent Installation of MonoPiLEs IIB

Publieke samenvatting / Public summary

Aanleiding

Costs of the support structure and the installation of the support structure account for approximately 25% of the total CAPEX of offshore. A substantial part of these costs is attributed to a sub-optimal installation method. Pilling, the current installation method for monopiles, has the following major downsides: 1. Piling operations using a hydraulic hammer and obligatory noise mitigations are complex, time-consuming and thus prone to delays in bad-weather conditions. 2. The currently available hammers are difficult to scale to the larger monopiles that the industry needs to build in the future to accommodate larger wind turbines. 3. Each hammer blow creates high noise levels that are harmful to marine life. Several European governments introduced regulations that result in the mandatory use of expensive noise mitigation such as bubble curtains. 4. The impact of the hydraulic hammer on the top of the pile causes fatigue damage to the foundation pile, although several innovations are in progress, eliminating fatigue damage during installation is not yet achieved which leads to overdesigned, heavier and thus more expensive monopiles.

Doelstelling

The project goals are: • To show that the Jet-gun technique leads to a reduction of installation and foundation costs and outperforms alternatives by: o Eliminating the need for noise mitigating measures; o Reducing the installation time of the foundations, thus enlarging the window of operation; o Eliminating the need to over-dimension monopiles to compensate for fatigue damage during the

Projectinformatie / Project information

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Algemene informatie / General information

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GBM Works B.V.

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installation process. In order to limit financial risks, GBM's Project SIMPLE has been split into 3 phases before launch in the offshore installation market: • SIMPLE I, focusing on the drivability in sand at a 1:6 scale, which has been proven successfully. • SIMPLE II, focusing on the drivability in clay at a 1:4 scale while further integrating the functions into a more mature prototype. • SIMPLE III, full scale offshore tests as a final step before commercial application. This subsidy is only meant for SIMPLE II. Next to the SIMPLE projects, the Jet-gun technology of GBM Works will be tested on lateral bearing capacity in the SIMOX project. GBM Works will be a partner in this project. Certification of the method will also be a focus point in the SIMOX project.

Korte omschrijving

To prove the driveabiltiy of the Jet-gun technology in clay, first the optimal values of the operational parameters of the Jet-gun for these specific soil conditions will be approached theoretically and tested at a lab scale. These activities will be carried out at laboratory level by the project team of GBM Works, in collaboration with Deltares. Based on the theoretical optimization and lab tests of the operational functions, the different product parts of the Jet-gun prototype will then be designed and produced by Machinefabriek Barth, a firm with its core business in fabrication and engineering for one off equipment in the offshore industry, with a focus on soil excavation. The prototype of the Jet-gun will be assembled on a pile, supplied by DIMCO, an inshore contractor, who will also execute the field tests in a suitable location and supervised by the SIMPLE II project team. The information and results from these tests will be used to improve the theoretical models by the project team, and a feasibility study will be carried out for experiments on a full scale by launching customer and project partner DEME Offshore NL

Resultaat

After completion of the project SIMPLE II, we expect the following conclusions: 1. A cost assessment of the Jet-gun technique on full scale, supported by (and validated with) the project results; 2. A

validated design for full scale operation in sand and clay grounds; 3. A successful proof of concept test of the Jet-gun technique by installing a 2-meter diameter pile to a depth of 25 meters in a relevant nearshore environment, achieving a TRL of 7. Tests will also learn how to install a foundation pile to the required depth in a typical North Sea soil. The following will be determined: • Frequency and amplitude of the vibrations to be applied to reduce the friction of the soil along the pile; • Energy, pressure, flow and nozzle configuration of the Jet-gun at the bottom of the pile, for the reduction of the soil resistance on the inside of the pile, with a focus on clay soils.

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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