

Gentle Driving of Piles

Publieke samenvatting / Public summary

Aanleiding

Monopiles are the most commonly used foundations of the Offshore Wind Turbines (OWT). The size of the monopiles grows rapidly together with the size of the offshore wind turbines. A six-megawatt OWT, for example, needs a monopile of about 80 meters long and 8 meters in diameter which can weigh up to 1300 tonnes. These huge steel piles need to be driven into the ground for a significant part of their length. Organisation and execution of this process is challenging, time consuming and costly. Dutch contractors are world-leading in the installation of OWT foundations and it is in their best interest to make the pile installation process as efficient as possible.

Doelstelling

This project aims to help the contractors achieve the goal of making the pile installation process as efficient as possible by means of testing a novel pile installation method based on simultaneous application of low-frequency and high-frequency vibrators exciting two different modes of motion of the monopiles. We call the proposed method "Gentle Driving of Piles" (GDP) for its envisaged capability to reduce the driving loads and the emitted installation noise which is harmful for the environment. These goals will be achieved without compromising the pile penetration speed and the soil bearing capacity, which is essential for a stable OWT operation. During this project new models will be developed and validated with experimental data collected from a measurement campaign while novel pile installation methods will be tested.

Projectinformatie / Project information

Projectnummer / Project number

TEHE117100

Subsidiebedrag / Grant amount

€ 2.756.747,00

Algemene informatie / General information

Penvoerder / Secretariat

Stichting GROW (Growth through Research, development & demonstration in Offshore Wind)

Publicaties en materialen / Publications and attachments

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Korte omschrijving

The project will be executed in two parallel phases: one experimental and one theoretical. The experimental part will provide a first proof of concept that the proposed method of “Gentle Driving of Piles” is advantageous compared to other existing methods, while it does not compromise soil bearing capacity and pile penetration speed. The theoretical part aims to explain the physics governing the novel pile installation technique and optimise the procedure while at the same time it can show that noise generated with GDP is considerably reduced compared to conventional installation methods. In order to enable a speedy, practical implementation of the results, the proposed method will first be validated experimentally such that in a relatively short period after the start of the project, a proposal can be issued for a full scale verification of the installation method. In parallel, numerical tools will be developed, which will allow an optimization of the installation procedure for new offshore wind farms.

Resultaat

The main result of this project is the development of a novel pile installation technique based on simultaneous application of vibrators acting in vertical and torsional directions. The desired outcomes are envisaged as follows: - Provide a solid “proof of concept” of the proposed installation method with the aim to show that the pile penetration speed and the soil bearing capacity stay uncompromised in order to issue a proposal for a full scale verification of the installation method soon after the start of the project; - Develop models to predict the effects of installation using GDP including noise emission.

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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