

MIDASclay

Publieke samenvatting / Public summary

Aanleiding

The renewable energy sector is experiencing remarkable growth worldwide, particularly in offshore wind energy. Advances in technology and cost reduction have led to the installation of larger and more powerful offshore wind turbines (OWTs). However, the expansion of offshore wind farms into deeper waters and harsher environments presents significant technical challenges, particularly in the design of support structures and foundations. Currently, approximately 80% of all OWTs installed in Europe are supported by monopiles, which are large-diameter tubular steel piles. As the size of OWTs increases, so does the need for larger monopiles.

Doelstelling

The project title, MIDASclay: Monopile Improved Design through Advanced cyclic Soil modelling in clay, effectively encapsulates the project's mission. The primary objective of MIDASclay is to enhance the understanding of monopile-soil interaction under cyclic loading, specifically focusing on cohesive and layered soil deposits and develop engineering model to promote fast, reliable and accurate MP design. By integrating advanced experimental and computational studies, both physical and numerical modelling techniques will be employed to optimize foundation design considering cyclic loading conditions. This comprehensive approach aims to develop a novel design method that will contribute to the knowledge base of both industry and academia regarding embedded monopile (MP) foundations - the knowledge base will be key to the later expansion of the method towards floating wind

Projectinformatie / Project information

Projectnummer / Project number

HER+23-03534912

Subsidiebedrag / Grant amount

€ 1.757.792,00

Algemene informatie / General information

Penvoerder / Secretariat

Techn. Universiteit Delft

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solutions and pile anchors.

Korte omschrijving

MIDASclay targets optimal design of monopile foundations for offshore wind turbines, subjected to environmental cyclic loading. Missing fundamental knowledge and novel engineering models will be developed based on advanced physical and numerical modelling of cohesive soil (clay)-foundation interaction. (iii) An improved method for designing monopiles in clay, incorporating new cyclic soil reaction curves. This enhanced design approach will assist in reducing risks and uncertainties associated with cyclic loading which is especially crucial and unexplored in cohesive soils, ultimately leading to more efficient and economical monopile fabrication.

Resultaat

MIDASclay is driven by the goal of mitigating uncertainties in foundation design associated with the analysis of cyclic monopile-soil interaction. The project's outcomes will include: (i) Novel and, high-quality experimental data that characterizes the cyclic behaviour of monopiles in clay, layered soils, and soil mixtures (highly requested by the industry partners). This data will provide valuable insights into the cyclic evolution of lateral stiffness and permanent tilt. (ii) A unique set of numerical data derived from advanced computer simulations and relevant parametric studies, specifically focusing on cyclic monopile-soil interaction. These simulations will contribute to an enhanced understanding of the phenomena involved in the cyclic behaviour of monopiles in clay.

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

Voor meer informatie over de Topsector Energie, ga naar www.topsectorenergie.nl.

Voor meer informatie over de TSE / Energie-Innovatie regelingen die RVO aanbiedt, ga naar www.rvo.nl/tse.