

Tri Suction Pile Caisson (TSPC)

Publieke samenvatting / Public summary

Aanleiding

The Suction Pile technology, which is part of the TSPC foundation concept, is well-proven; SPT Offshore alone has performed already over 600 successful installations of Suction Pile Anchors and -Jackets. The suction pile technology enables noiseless, accurate and rapid installation, thus no noiseinduced damage to marine life, no expensive noise mitigation equipment and -vessels are required, nor costly schedule constraints apply. For decommissioning, the entire structure will be pumped out of the seabed; the scour protection can also be fully recovered, or if client wishes so, left in place to remain acting as marine habitat. Since the suction technology itself is proven technology, in this research proposal we focus on other challenges that are relevant for the development of the TSPC-foundation. and we intend to go beyond state-of-the-art on several design aspects, in order to further reduce costs and decrease risks.

Doelstelling

The main objective of this project is to further develop the concept to a level which allows to execute a real offshore demonstration test. The objectives are: - Developing a basic design that includes structural analysis, design of the double slip joint, buoyancy means to comply with hydrostatic and hydrodynamic criteria and as such confirm technical feasibility; - Develop the methodology and equipment specification for the free-floating tow, hook-up and installation of the TSPC; - Optimize the scour mitigation strategy for the TSPC structure by developing and applying an innovative laboratory testing method and

Projectinformatie / Project information

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Algemene informatie / General information

Penvoerder / Secretariat

SPT Offshore B.V.

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developing a scour protection design suiting its shape while reducing CO₂ and NO_x footprint; - Making a cost estimation of the Engineering, Procurement, Transport and Installation of the TSPC and comparison with the conventional foundation types to confirm commercial feasibility; - Develop a Nature-Inclusive-Design that is technically feasible and optimized for its ecological value, e.g. aiming for flat oyster restoration or enhancing fish population and biodiversity, at reduced cost compared to the current status.

Korte omschrijving

The work plan consists of 6 work packages (WP):
WP1 Base case design: Basic design of the TSPC for a specific Dutch far offshore wind farm, including design of an optimized Double Slip Joint. WP2 Marine performance of the floating TSPC during tow: starting with numerical simulations of the basic design, followed by model tests in a towing tank
WP3 Scour mitigation: desk assessment of scour development around unprotected TSPC basic design, design of a scour protection system for this robust shaped foundation, followed by basin tests of a cost-efficient scour protection design with a realistic offshore climate and finally numerical simulations of the hydrodynamic loads around the scour protected TSPC
WP4 Integrated project costs: Integration of all available cost data, i.e. fabrication, transportation and installation, to substantiate the LCOE reduction and comparison with conventional (WTG) foundations. Quantification of reduction in CO₂ and NO_x emissions
WP5 Preparation for a full- or mid-scale demo
WP6 Nature-Inclusive-Design of a TSPC foundation: developing an alternative design focusing on enhancement of biodiversity and ecological value of the foundation and its surroundi

Resultaat

Deliverables of this project include: - Technical analysis of the TSPC concept including design reports for key design drivers; - Commercial analysis of the TSPC, comparing against existing types of foundations for the full lifecycle cost, including comparison of CO₂ and NO_x emission reduction and environmental impact with existing type of

foundations; - Nature-Inclusive-Design (Eco-friendly alternative) that is pre-installed onto the TSPC and/or scour protection system, for which the additional costs compared to post-installed NID components will be quantified. Feasibility of the design will be confirmed by scale testing in the current basin; - The desktop preparations for a full / mid-scale test, as a step-up to materializing such test (with the final target to raise the TRL to 7). We regard this phasing as necessary for an efficient development process. The result will be to demonstrate that this innovative foundation concept is economically attractive and sustainable, and therefore will benefit to the Dutch offshore wind market and Dutch companies active worldwide in the offshore wind market. Furthermore, recommendations for future developments will be presented.

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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