Cable JIP

Publieke samenvatting / Public summary

Bluewater is developing a floating Tension Leg Platform (TLP) to support floating offshore wind turbines called BlueFlex, which can be deployed in water depths of approx. 40 - 200 m. The BlueFlex TLP foundation is relatively lightweight compared to other types of floating foundations and includes innovations in the floater, tether system, anchor point and installation equipment.
The TLP floating platform has limited motions, raising the research question if it possible to apply TKF's special static cable technology for the inter array cables for the power export from the TLP to the seabed. Static cable solutions are much lower in cost compared to dynamic cable technologies. In order to use static cable technology, special designed bend restrictors will be required at the floater connection and the seabed to limit the cable internal stresses.
For shallow water sites, the umbilical design is more challenging as it provides limited space to cope with the imposed floater motions. Furthermore, currents are typically higher in shallow water, which may cause more vortex-induced vibrations (VIV).

Objective

The purpose of the project is to improve existing static high voltage cable technology from TKF with new and appropriate bend restrictors to allow this already special static cable to be used as a (quasi) dynamic umbilical between a shallow water TLP and the seabed. Successful numerical modelling, model scale testing and detailed model testing at a large scale, will increase the Technology Readines Level (TRL) of the umbilical system to 5.

Projectinformatie / Project information

Projectnummer / Project number
TEWZ117005
Subsidiebedrag / Grant amount
€ 496.744,00

Algemene informatie / General information

Penvoerder / Secretariat
Marin

Publicaties en materialen / Publications and attachments

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  Eindrapport TEWZ117005

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Using static cables with only bend restrictors at the seabed touch-down point and at the floater will greatly simplify and reduce the cost for the power transfer between a floating wind turbine and the substation. Static high voltage (33kV or 66kV) cables are commonly used in bottom founded wind turbine farms, already resulting in a large volume market with relative low cost.
The bend stiffeners and its connection to the floater as well as to the seabed are considered to be essential. The project will develop and evaluate these bend stiffeners. The new bend stiffeners will be based on in-expensive materials, allowing much larger length bend stiffeners with greater freedom to find the optimum design that supports the cable integrity.

Short description of activities
The Cable JIP project aims to prove the feasibility of High Voltage power export cable (umbilical) based on static cable technology for the power export from a (shallow water) Tension Leg Platform (TLP) based floater for full scale offshore wind a large 8+ MW turbines to the seabed. The feasibility design of the umbilical will be validated by determination of the imposed motions at the umbilical termination connection point on the TLP and the resulting ultimate- and fatigue loads on the umbilical. At the floater-end and at the sea-bed end, special bend restrictors will be validated in order to prove that an umbilical based on existing high voltage static cable designs is feasible.

Results
The project will provide reports that shows the technical feasibility of an innovative cost-effective solution for electrical cables between a TLP type floating Wind Turbine Generator (WTG) and a sub-station. This solution uses the existing static cable technology of TKF with the application of improved bend stiffeners. The numerical and experimental tests will reduce the risk associated with the application of a static cable as a (quasi) dynamic umbilical for floating WTGs. The study results will use an existing full-scale application as design basis, being the Dutch Borssele V site.

In the TLP model tests, a real-time hybrid testing method will be used to allow more flexibility in modelling the loads from a wind turbine, for example the new 8 to 10 MW offshore wind turbines. In the detailed umbilical alone model tests, a hexapod based testing method will be used to impose the TLP motions at the top of the umbilical. The resulting umbilical and bend stiffener motions will be recorded in detail to allow future full scale fatigue testing on a part of the static cable that encounters the largest (fatigue) loads.

Visit the website of the project

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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