

Cable Protection Systems (CPS2)

Publieke samenvatting / Public summary

Aanleiding

Offshore wind farms experience unexpected wear and damage of subsea power cables and Cable Protection Systems (CPS), especially where they rest on scour protection near monopile foundations. These failures occur well before the end of the design life and lead to high costs, downtime, and reduced reliability. Current design methods often fail to account for complex environmental forces like waves and currents, leading to dynamic cable motion and degradation. JIP CPS2 builds on prior research including JIP HaSPRo, CALM, Cable 1&2, CPS1, Rock Bag JIP 2, HYROC, and the Offshore Wind Accelerator. CPS2 takes a full-system approach, studying the interaction between cables, CPS, stabilisation (e.g., rock berms), scour protection, and hydrodynamic loads. The project delivers integrated design knowledge to reduce cable failure risks, enhance system reliability, and lower operational costs, thereby contributing to a more sustainable and cost-effective energy transition.

Doelstelling

JIP CPS2 aims to enhance the long-term reliability of subsea power cables and their protection systems by improving how they are designed and stabilised at monopile foundations. The project seeks to reduce cable movement and failure through a system-level understanding of all relevant interactions: hydrodynamic loads, seabed response, scour protection, and stabilisation strategies. The goal is to define effective, scalable total solutions that reduce the need for costly inspections, interventions, and repairs. These solutions will feed into updated industry guidelines and support the

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development of design procedures suitable for automation and predictive maintenance. By enabling safe, robust, and low-maintenance cable protection solutions, CPS2 directly supports improved uptime and reduced OPEX for offshore wind farms.

Korte omschrijving

The project begins with a system definition phase to map all components and their interactions. It then proceeds through three technical tracks: (1) hydrodynamic loads and structural response of cables and CPS near foundations, (2) hydraulic performance of rock berm stabilisation, and (3) geotechnical stability of cable-stabilisation systems. Physical model testing and numerical modelling are used in all tracks. These results are combined to create system-level schematisations and a structured workflow for designing total solutions. Throughout the project, industry design procedures are evaluated in collaboration with DNV and other partners. The outcomes will be translated into improved design methodologies and guideline recommendations for more reliable and cost-efficient cable/CPS systems.

Resultaat

JIP CPS2 delivers validated design methods and workflows for optimising cable/CPS systems at offshore wind foundations. Key outputs include experimental datasets, deformation and damage models, and subsystem insights covering hydrodynamics, hydraulics, and geotechnical behaviour. These are integrated into a system-level design guideline supported by certifiers. The results will help engineers choose and design stabilisation methods like rock berms, evaluate risks, and improve reliability. CPS2 contributes to MMIP Theme 1.1 by enabling safer, smarter, and more cost-efficient offshore infrastructure. This includes reduced human intervention, more predictable system performance, and fewer unplanned outages. The findings are also partially transferable to other foundation types and floating offshore systems.

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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