

Proof of principle for cost-effective floating offshore wind turbine concept

Publieke samenvatting / Public summary

Aanleiding

Offshore wind plays an important role in the energy transition and global and National climate objectives. An important precondition is a further cost reduction of 35%. The sector aims to achieve this by the development of new turbines (focus on larger turbines), innovative solutions for transport and installation, new foundation types and cost reductions in operation and maintenance. At the same time, the offshore wind industry aims to move to deep water areas. TouchWind has developed a disrupting technology, a novel floating wind turbine concept. The most striking feature of the TouchWind turbine is its self-erecting mast that acts as a passive pitch control. With this turbine, TouchWind breaks with the current tradition of three-bladed turbines, resulting in an estimated 29% cost reduction and an increased number of turbines per km². The cost-reductions are the result of the following innovative elements: 1. No active pitch control 2. One-piece rotor blade 3. Lightweight mast 4. Operational at high wind speeds 5. Ease of assembly, transport and maintenance 6. A predicted increased number of turbines per km²

Doelstelling

The main challenge is to convince the offshore wind market of the feasibility of both the technology and cost reductions. For this, the project aims to develop an efficient and stable prototype turbine (1.2-meter rotor). Based on this prototype, the consortium researches the aerodynamics, blade design (aerodynamic design, conceptual structural

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dimensioning, aeroelasticity), mast design, conceptual generator design, floating construction and the aerodynamics of the turbines in a wind farm. The aim is to validate the technology as a preparation for further upscaling.

Korte omschrijving

The work will be performed by a consortium of TouchWind, Technische Universiteit Delft, VDL Mast Solutions, Tres4, Nidec Netherlands and Stichting Maritiem Research Instituut Nederland. The work plan consists of 6 work packages: • Design turbine concept • Realization scale models • Rotor and system design optimization • Design verification and hydrodynamic design • Unconditioned validation • Dissemination and project management

Resultaat

The project delivers the following results: • Proof-of-concept TouchWind turbine (prototype with $C_p > 0.3$) • Insights into the feasibility of the TouchWind turbine and requirements for upscaling • Reports on the research findings (wind tunnel tests, rotor design, wake and tip compressibility effects, structural behavior of the rotor (aero-elasticity), numerical requirements and reliability of model fidelities, aNySIM model validation, hydrodynamic simulations, tunnel wall effects, unconditional tests). These results will be the basis for further development and scaling up of the TouchWind turbine concept.

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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