ONWEC

Publieke samenvatting / Public summary

Aanleiding

The continuous growth in turbine size of onshore turbines, combined with the desire to extract energy from higher wind layers, has resulted in higher loads on turbine towers. This increasing load has driven the need for high capacity connections in these towers. C1 Connections and its partners have developed the Wedge Connection as a high-capacity connection for offshore wind turbine towers in previous projects (OFWEC 1-5). Partners now aim to develop this for onshore wind turbines. The OFWEC (1-5) projects have resulted in the Wedge Connection being matured from a technology at laboratory scale to a full scale implemented technology. It is used in two prototype offshore wind turbines of 14MW and 21MW. The technology development for the offshore Wedge Connection has been supported by 10 of the largest developers in the world and the 3 large European Offshore Wind Turbine suppliers. For the ONWEC project, the onshore OEMs will participate together with the developers that have in 2024 and 2025, supported the development of the Wedge Connection. The results of several of the ONWEC project investigations, are applicable to both offshore as well as onshore wind turbines.

Doelstelling

The goals for ONWEC project are to develop the Wedge Connection technology such that it can be used in commercial onshore wind turbines. Furthermore, the ONWEC project aims at answering several open topics for both onshore and offshore implementation of the Wedge Connection. • Obtain knowledge on the most effective method to quantify

Projectinformatie / Project information

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Algemene informatie / General information

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the preload in the connection over time to eliminate maintenance. • Obtain knowledge on the effects of different tools, installation methods, and coating on the preload in the connection. • Develop T&I equipment designs for the Wedge Connection to be used with existing tower transport, lifting and installation equipment for onshore turbines. • Develop sealing solutions for onshore flanges. • Develop design tools for small diameter onshore connections.

Korte omschrijving

In Work Package 1, C1 Connections and TU Delft will investigate the different measurement techniques and test the connection to confirm that the Wedge Connection can be made maintenance free. In Work Package 2, C1 Connections and TU Delft will investigate the effect of different corrosion protection systems and the effect of their application on adhesion, layer thickness and creep under load which can result in preload loss. By measuring and testing various coating types and the application the effect of this preload loss can be determined which can be used to make the Wedge Connection maintenance free. In Work package 3, C1 Connections will investigate the development of modified T&I equipment to enable efficient installation of the Wedge Connection and sealing of the Wedge Connection in onshore wind farms. This work package will be performed with input from onshore OEMs and Transport & Installation (T&I) experts. In Work package 4, C1 Connections will develop an design tool for onshore wind turbines. The design tool will be validated with fatigue and ultimate load input from various OEMs to deliver structurally sound designs.

Resultaat

Via execution of this research project, knowledge will be obtained for implementation of a Wedge Connection in onshore wind turbines enabling taller towers generating more energy for a given location. The following results are expected: • A validated measurement system for the preload in the connection over time that can be used for long-term measurements in the field and validates a

maintenance free design. • Knowledge of the magnitude of creep for different coating layers and potential plasticity in the flanges to determine long-term stability and ensure a maintenance free connection. • Validated designs for tower transport, lifting and installation equipment for onshore turbines. • A sealing method that is both effective as well as easy to install for onshore flanges. • A design tool that allows 3rd parties to design Wedge Connections for onshore wind turbines.

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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