

Positive wake effects of wind turbines with tilted rotors - POWER

Publieke samenvatting / Public summary

Aanleiding

On the 28th of June 2022 the Dutch government announced its ambition to accelerate the realization of wind energy in the North Sea. The government aims to cluster wind farms as much as possible and to leave as much contiguous space as possible for other uses at sea. The aim is to realize this having compact wind farms built, with approximately 10 MW of wind capacity per square kilometre. This 'power density' is approximately 2.5 times higher than the first large-scale wind farms, and thus makes proportionally less use of the available space at sea. This is, however, easier said than done as wind farms are affected by wake effects. These effects appear both within the wind farm between turbines as well as between wind farms, thereby affecting each other. An upwind wind farm with traditional turbines & rotors generates decreased downwind wind speeds which undermine the capacity of the wind farm for power generation as well as negatively affecting neighbouring wind farms, reducing their potential revenues.

Doelstelling

The goal of this project is to lower the costs offshore energy production from wind by drastically decreasing the wake effects of offshore wind farms. This reduction is possible due to the tilted rotor concept of the TouchWind floating wind turbine. To reach this goal the consortium will carry out research into a better understanding of the behaviour of the wake effect in a windfarm with tilted rotors. With this understanding it will be

Projectinformatie / Project information

Projectnummer / Project number
HER+22-02-03444939

Subsidiebedrag / Grant amount
€ 5.842.446,00

Algemene informatie / General information

Penvoerder / Secretariat
TouchWind B.V.

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possible to optimise the potential wake reduction in windfarms with turbines with tilted rotors. The findings of this project will not only apply to the TouchWind floating wind turbines, but can be adapted to other wind turbines with tilted rotors including fixed offshore wind turbines. The future commercialization and deployment of the POWER concept will result in significant cost reductions for offshore wind. Cost reductions are realised by the higher power output and more compact wind farm, theoretically resulting in a 4x higher power density. Based on the RVO model to calculate the 'basisbedrag' for wind energy the cost reduction is estimated at 38,5 €/MWh. This is a reduction of 15,6%.

Korte omschrijving

In this project 10 experimental turbines with tilted rotors will be developed, designed and built. With these turbines experiments will be carried out, first on land and then on water. In the experiments various wind farm layouts (configuration, distance etc.) will be tested and extensive measurement campaigns will be carried out. Data from these experiments are used to develop, test and validate numeric models that describe the behaviour of the wake effect in wind farm with tilted rotors.

Resultaat

The project will result in the necessary tools to develop an offshore wind farm based on turbines with tilted rotors. These tools will be used to design and develop the first demonstration with 10x2,5MW TouchWind turbines and subsequently the first large scale windfarm before 2030. The higher power output of these wind farms will result in substantial saving of future SDE++ expenses.

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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