SolarWind

Publieke samenvatting / Public summary

Aanleiding

The climate agreement anticipates the large-scale implementation of solar and wind energy systems on land. Based on the scarcity in land area in the Netherlands it is realistic that solar and wind energy systems will be combined more often on the same area. Besides the benefit of multiple land use, it also has the advantage that the energy generation of solar and wind energy systems is rather complimentary in time and thus a better balance can be found between electricity generation and demand and the load on the electricity grid can be reduced. Depending on the layout of these combined solar and wind farms (CSWFs), the turbines will cast shadow on the solar panels. This concerns the static shadow from the construction pole of the turbine as well as the dynamic shadow caused by the rotating blades. The effect of the dynamic shadow on the energy yield has not been studied in detail, but initial results from the project DYNAMO suggest that periodic shading in particular could cause significant losses. A better understanding of this behavior will result in improved farm designs and better energy yield predictions.

Doelstelling

The goal of the project is to determine the extent to which static and dynamic shadow effects have on additional energy yield loss and dynamic load on the power electronic equipment that could occur in CSWFs and how these depend on various farm designs and operational choices. This will be used to derive design guidelines for power electronics and park layout.

Projectinformatie / Project information

Projectnummer / Project number
TEUE119001
Subsidiebedrag / Grant amount
€ 338.792,00

Algemene informatie / General information

Penvoerder / Secretariat
Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek TNO

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Korte omschrijving

In this project, existing CSWFs will be used to study the effect of static and dynamic shadowing on the energy yield. This will be done by measuring the energy yield of these farms and by studying the effect of dynamic shadow on the electronics of the solar farm, including the power control system and topography of the electronic system. For this we will identify: - the characteristics of the dynamic shade (in relation to the position of the rotor and that of the sun) - its impact on the PV power electronics (in relation to the hardware and software configuration) - its impact on the PV system yield (in relation to the design of the PV system). Vattenfall, SolarFields and Zwanendal will give access to CSWF data and technical information of their CSWFs. ECN.TNO will perform data analysis. Heliox will focus its research on the required characteristics of the power electronics in the system that is exposed to dynamic shading. Based on these results guidelines will be generated with design principles for CSWFs.

Resultaat

The project will give insight into the characteristics of the dynamic shade in relation to the position of the rotor and that of the sun. It will determine its impact on the dynamics of the PV power electronics. Thirdly the impact of shadowing on the PV system energy yield will be established, for various designs of the PV system. The analysis will result in guidelines for the design and selection of (PV) power electronics, plus guidelines for the optimization of PV system yield in combined solar and wind farms (CSWFs). This could have long term consequences for the solar energy yield of CSWFs and result in a much larger market in the future. These results will be actively disseminated to the solar and wind community in the Netherlands and at conferences.

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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