Computer program for reducing the cost of offshore wind energy

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The costs of generating electricity through wind farms at sea still need to be lower. Researcher Michiel Zaayer of TU Delft has developed a program that can help. On Monday 16 December, he will defend his doctoral dissertation on this topic at TU Delft.

Costs need to be lower

In terms of technology, it is not a problem to use wind farms at sea to generate electricity. There is another problem, however: the costs of this form of energy still need to be lower. Researcher Michiel Zaayer is certain that, in the future, we can expect further cost reductions for this technology, which is currently still new.

In his doctoral research, Zaayer addresses two challenges in this area. "The first challenge involves the difficulty of optimising the system as a whole, because offshore wind farms are multi-disciplinary by nature and because they consist of many components. The second challenge is that the design of the wind turbine is not prepared simultaneously with the design for the wind farms in which they will be installed."

Program

The optimisation of the design plays a central role in both of these challenges. The wind turbine affects the costs of many elements of a wind farm at sea, including the structure upon which it will be built, the electric cabling, installation, maintenance and, most importantly the production of electricity.

"It is difficult to estimate the exact effects when designing the wind turbine", explains Zaayer. "We have therefore developed a method for estimating the effects that a wind turbine is likely to have on the performance of a wind farm at sea. The method is based on a computer program that automatically designs a farm for a wind turbine entered by the user. By varying the data entered, the user can determine which wind turbine will yield the lowest costs."

Case study

The method has been tested with a case study and a review by a number

of industrial users. The results of the case study indicate that the method can indeed result in a better wind turbine. The test users recognise the utility of the program as well. "The use of the program also stimulates deeper cooperation between the marketing division and the engineering division. This might require some companies to adjust their usual manner of working."

Provided by Delft University of Technology

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