

Smart wind turbines can predict the wind

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Risø DTU researchers have recently completed the world's first successful test on a wind turbine with a laser-based anemometer built into the spinner in order to increase electricity generation.

"The results show that this system can predict wind direction, gusts of wind and turbulence. So we estimate that future wind turbines can increase [energy production](#) while reducing extreme loads by using this laser system, which we call wind LIDAR," says Torben Mikkelsen, Professor at Risø DTU, Denmark.

This new Danish laser technology means that wind turbines are able to "see" the wind, before it hits the blades. By 'predicting' the wind, the wind turbine can optimize its position and adjust the blades so that the wind is used more efficiently, and the wind turbine lives longer.

The wind turbine industry is going to grow tremendously in the next years due to a global focus on renewable energy and climate change. New high-tech research will integrate "laser providence" and "smart blades" into the turbines, allowing them to operate better and last longer, thereby maintaining the competitiveness of the Danish wind power industry.

Increased electricity production from wind turbines

It is expected that the technology can increase energy production by up to 5%, primarily because it is possible to use longer blades. For a 4 MW wind turbine, this means a financial gain of 200,000 Danish kroner a year. Compared to the Danish Energy Agency's predictions, this technology could cut CO2 emissions by 25,000 tons by 2025, if every 10th turbine is equipped with a wind LIDAR. At the same time, the technology can be combined with "smart blades" and thereby increase longevity.

"The LIDAR system can be used to increase blade

reliability by making the blades cope better with the irregularities of the wind. Subsequently it is possible to produce larger blades. This increases energy production, and power from wind energy becomes more competitive, says Lars Fuglsang, Global Research Director of LM Glasfiber;

"The LIDAR systems allows a paradigm shift in the way of controlling [wind turbines](#)", says Jakob Dahlgren Skov, CEO of NKT Photonics A/S.

Source: Risø National Laboratory for Sustainable Energy

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