

# Wind Farm Control

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## Abstract

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A wind farm is a collection of wind turbines which are all placed within a limited geographical area and with a common coupling to the power grid. The farm is usually intended to be controlled externally as one unit, i.e. a single set point is given to the farm controller which will distribute the individual set point to the turbines. At present most farm controllers simply distribute power set point to the turbines evenly or set each turbine to produce the maximum possible power.

The performance of the farm controller can be improved by utilizing the on-line measurements from each turbine in the farm. By reducing the power set point for the first rows of turbines in the up wind direction and thereby letting more wind through for the following turbines the wind can be utilized better. Such a control scheme could improve the overall power output from a wind farm. This would also result in improved lifetime of the wind turbine as the load on the first rows (in the up wind direction) would be lowered and distributed more evenly throughout wind farm.

Preliminary analysis show a production gain of up to 4.5% for certain wind directions and an annual gain of 0.65%. For the Horns Rev wind farms this corresponds to an annual gain of 9100MWh which is enough to cover the annual electricity consumption of approximately 2300 households in Denmark.

This approach is very desirable as the implementation is mainly software and cost is therefore low compared to the reward.