Implementation of a Model Output Statistics based on meteorological variable screening for short-term wind power forecast - DTU Orbit (09/11/2017)

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A combination of physical and statistical treatments to post-process numerical weather predictions (NWP) outputs is needed for successful short-term wind power forecasts. One of the most promising and effective approaches for statistical treatment is the Model Output Statistics (MOS) technique. In this study, a MOS based on multiple linear regression is proposed: the model screens the most relevant NWP forecast variables and selects the best predictors to fit a regression equation that minimizes the forecast errors, utilizing wind farm power output measurements as input. The performance of the method is evaluated in two wind farms, located in different topographical areas and with different NWP grid spacing. Because of the high seasonal variability of NWP forecasts, it was considered appropriate to implement monthly stratified MOS. In both wind farms, the first predictors were always wind speeds (at different heights) or friction velocity. When friction velocity is the first predictor, the proposed MOS forecasts resulted to be highly dependent on the friction velocity–wind speed correlation. Negligible improvements were encountered when including more than two predictors in the regression equation. The proposed MOS performed well in both wind farms, and its forecasts compare positively with an actual operative model in use at Risø DTU and other MOS types, showing minimum BIAS and improving NWP power forecast of around 15% in terms of root mean square error. Further improvements could be obtained by the implementation of a more refined MOS stratification, e.g. fitting specific equations in different synoptic situations.

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