Improving Wind Ramp Forecasts by the HRRR System via Statistical Postprocessing

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Wind power forecasting is gaining enormous international significance as more and more countries and regions enact policies to increase the use of renewable energy. Wind ramps pose a particular challenge in decision-making processes in the wind energy industry since a sudden decrease or increase in wind energy production must be balanced by conventional power generators and could be costly for wind farm operators.

In this study, we assess the performance of the High-Resolution Rapid Refresh (HRRR) numerical weather prediction model in predicting wind ramps with up to 12 hours of lead time at two wind tower locations in the United States. Novel statistical postprocessing methodology is used to generate scenarios of short-term wind power production; this probabilistic enhancement of the deterministic HRRR forecasts significantly improves the skill in predicting wind ramp events, and could be implemented by wind farm operators to support decision-making.