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Enhancing short term wind energy forecasting for improved utility operations: the Wind Forecast Improvement Project (WFIP)

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It is widely recognized within the wind energy and electric utility operations communities that current skill levels of wind energy forecasting are adding increased costs to the integration of wind energy onto the U.S.electrical grid. To address this,the U.S. Department of Energy has implemented a joint research program with NOAA and private industry to improve wind energy forecasts. The key elements of this program are 1) a one-year deployment of extensive meteorological observing systems in two regions with significant wind energy production; 2) assimilation of these observations into the hourly-updated NOAA Rapid Refresh (RAP) and High-Resolution Rapid Refresh (HRRR) Models, run nationwide at 13 and 3 km resolution respectively;and 3) evaluation of the benefits of these improved wind forecasts on electrical utility operations, especially for ramp-events in the 0-6 h forecast time-frame.

In this presentation we will describe early results from the one-year field program, which began in August 2011. In particular we will describe:

• The regions selected and local meteorological forecast problems
• Instrumentation deployed, including a network of ten 915 MHz wind profiling radars, two 449 MHz wind profiling radars, twelvesodars, one wind profiling lidar, 17 surface meteorological stations, over 120industry provided meteorological tall (60-80m) towers and 400 nacelle-mounted anemometers.
• Data quality control procedures.
• The HRRR model and its data assimilation system.
• A preliminary analysis of RAP and HRRR model forecast skill versus the NOAA/National Weather Service operational Rapid Refresh and RUC models that do not assimilate the special observations, and the resulting potential economic benefits. Specifically, the separate impact of the assimilated additional observations versus the impact of improved models will be shown.