Improving Wind and Extreme Precipitation Forecasting

WFIP2/Hydro-FIP field site in Wasco, Oregon

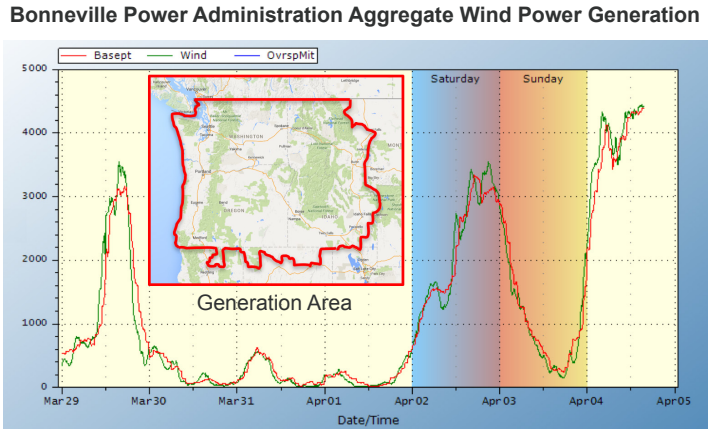
WIND FORECAST IMPROVEMENT PROJECT (WFIP)

Wind power production of electricity is dependent on weather conditions. Operators keep the electric grid stable by balancing variations in the amount of power produced from wind farms with power production primarily from coal and natural gas. Having advance knowledge of when wind power will ramp up or down through accurate weather forecasts can lead to significant improvements in the management of the entire electrical grid system.

WFIP2 is a Department of Energy (DOE) and NOAA funded public-private partnership, including universities and the private sector whose goal is to improve the skill of weather model forecasts for turbine-height winds in regions of complex terrain (such as coastlines, mountains, and canyons).

An 18-month field study began in October 2015 in the Pacific Northwest – focusing on the Columbia River Gorge and Columbia Basin in eastern Oregon and Washington states. Improved observations and the resulting advances in understanding of the atmospheric processes that affect turbine height winds, will be used to improve NOAA/NWS forecasts and shared with the wind energy community.

Klondike Wind Farm in Sherman County, Oregon



Wind power generation in the WFIP2 study area as measured by the Bonneville Power Administration. The green line is the actual amount of wind energy produced. On April 4-5, the wind power increased by ~4300 MW over a 12 hour period. For comparison, the typical output of a nuclear power plant is 1000 MW, so this increase was equivalent to about 4 nuclear plants.

HYDROMET FORECAST IMPROVEMENT PROJECT (Hydro-FIP)

The Pacific Northwest is vulnerable to precipitation extremes. The complex terrain of the region influences the amount, intensity and path of the storms, both locally and further inland. High-intensity, moisture-rich storms can bring beneficial moisture or sometimes lead to dangerous floods. Improved monitoring and better forecasting of extreme precipitation events can provide the early warning and inform preparedness to reduce vulnerabilities.

For Hydro-FIP, NOAA's Earth System Research Laboratory in Boulder, Colorado has installed additional instruments to augment the WFIP2 observing network in order to better monitor and better predict extreme precipitation and its impacts (floods and droughts). This program helps fill gaps in the observation, understanding and predicting of extreme precipitation and resulting streamflow in regions of complex terrain. Hydro-FIP advances in predicting the location, intensity, and duration of extreme precipitation events in this region will be used to improve NOAA/NWS forecasts, and shared with the water resource management agencies, emergency managers, and the hydropower production community.

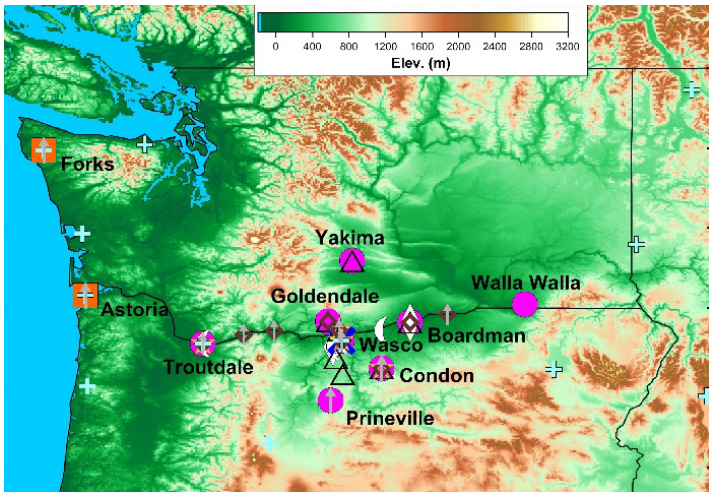
Chief Joseph Dam near Bridgeport, Washington

State Route 112 in Sekiu, WA suffered severe damage from flooding in the aftermath of storms in 2009.

OUTCOMES

Improved wind energy and extreme precipitation forecasting resulting from WFIP2 and Hydro-FIP will advance the state-of-the-art, science-based information provided to decision makers and users to better manage risks and utilize natural resources.

Enhanced environmental intelligence resulting in better integration of wind energy and hydropower production into the electric grid system will improve the reliability of these energy sources as essential components of the nation's energy portfolio.



Map showing the Washington/Oregon study area for the WFIP2 and Hydro-FIP projects.

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