GRID
MODERNIZATION
LABORATORY
CONSORTIUM
U.S. Department of Energy

Power Model Integrator Reduces Forecasting Errors

CHALLENGE

Grid coordinators have the daily challenge of forecasting the need for and scheduling exchanges of power to and from a number of neighboring entities. The sum of these future transactions, called the net interchange schedule, is submitted and committed to in advance. To set their schedules, forecasters rely on a combination of personal experience, historical data, and often a preferred forecasting model, which often results in unsatisfactory forecasts and leads to inefficient market operation. Adding to this forecasting challenge are affects from weather, renewable energy fluctuations, and variability in power exchanges between neighboring organizations at any given time.

SOLUTION

Researchers at Pacific Northwest National Laboratory developed a software tool that greatly improves the accuracy of net interchange predictions. The tool, called the Power Model Integrator, adaptively combines the strengths of different forecasting models continuously and in real time. This addresses a variety of scenarios that impact electricity use, from peak periods during the day to seasonal swings. Performance of the tool was tested against five commonly used forecasting models processing a year's worth of historical power system data. For forecasts one-to-four hours out, they achieved a 30-55 percent reduction in error. And with longer-term forecasts—the most difficult to accurately make—the tool also performed best.

IMPACT

With little time for corrective actions, incorrect forecasts can result in millions of dollars in wasted energy costs and affect the stability of regional power markets. The new forecasting tool delivers up to a 55 percent increase in accuracy, allowing utilities to operate closer to the system limit, while minimizing penalties for violating operating standards. The tool completed production testing and is moving into commercial use at the Independent System Operator level, helping improve grid reliability and efficiency.

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PNNL's Power Model Integrator demonstrated up to a 55 percent improvement in forecasting future electricity needs.

In November 2014 the U.S. Department of Energy launched the GMLC, a strategic partnership between DOE and the national laboratories to bring together leading experts and resources to collaborate on national grid modernization goals.

This integrated effort builds on prior individual projects at the national laboratories to deliver grid-related advancements, such as the **Power Model Integrator**.