



Project Summary

Day Ahead Regulation Requirement Prediction Tool

Context

Regulation is a process of providing minute-to-minute system balance by adjusting power output of units connected to the automatic generation control (AGC) system. Currently, the regulation capacity is calculated by the California Independent System Operator (CAISO) on a day head basis, for each operating hour of the next day. There is a growing concern at the CAISO that the increasing penetration of intermittent renewable resources in California could result in additional regulation needs.

Regulation is an expensive resource; the annual price of regulation significantly exceeds 120 million dollars in California. This proposed project targets developing a more scientific approach to procuring regulation capacity that would minimize the required regulation capacity for some operating hours without compromising CAISO's control performance characteristics.

Goals and Objectives

The goal of this project is to minimize the cost of regulation by developing an operational tool for providing a more scientific forecast of the CAISO's regulation requirement on the day ahead basis. The tool will calculate the regulating capacity, ramping and ramp duration requirements for each operating hour of a day, separately for the upward and downward generation.

Description

The project spans a 21 month time frame and consists of 4 major tasks: research, development, testing, and validation.

The research component of the project will include selection of the prediction methodology, its additional development and adjustment based on innovative basic ideas that are already developed or are currently under development.

The development component will include algorithm development, MATLAB coding, offline testing and

verification of the regulation procurement prediction tool using historical data provided by CAISO.

A prototype tool will be evaluated jointly with CAISO and improved through an iterative process.

Key Results/Conclusions

A methodology capable of evaluating the impact of wind and solar generation along with load uncertainties on the regulation requirements has been developed. As a result, the uncertainty ranges for the required regulation performance envelope can be evaluated in a day-ahead period.

A software tool has been developed that includes a graphical user interface, input-data error detection and correction algorithms, an Oracle-based database, and a self-validation procedure. The tool can predict hourly specific regulation requirements over the next 24 hour period and provides various statistics to assist the operator in decision making.

Why It Matters

Regulation is an extremely expensive ancillary service needed to keep the generation and load in balance on a minute by minute basis. As renewable resources become a larger portion of total generation, the variability of those resources is predicted to cause a rapid increase in the amount of regulation services required. The amount of regulation procured must be sufficient to allow for any uncertainty in the amount needed. More effective forecasting can substantially reduce the amount of regulation needed to be procured resulting in less cost and lower rates to users.

{More details}



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Participating Organizations

Principal Investigator:

Pacific Northwest National Laboratory

Research Partners:

California Independent System Operator;

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Project End Date: August 31, 2011

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CEC Contract No.: 500-07-037

Reports

Final Report: *Predicting Day-Ahead Regulation Requirements for the CAISO Balancing Area*

Funding



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