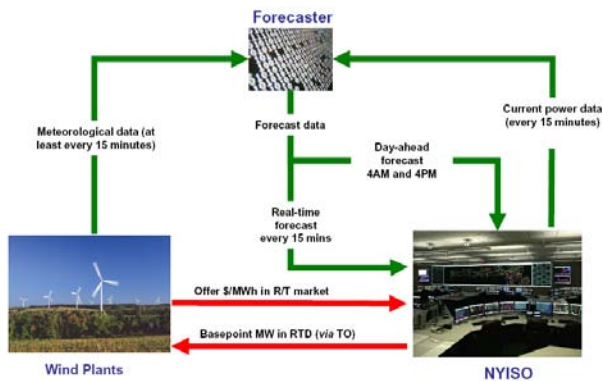


Transmission Efficiency Initiative: Host Demonstration Project

Wind-Integrated, Security-Constrained Economic Dispatch (SCED) to Improve System Utilization and Optimize Renewable Generation Resources



NYISO's scheduling system, incorporating wind power

Wind power is growing as a generation resource in New York State. The number of wind plants operating in the state has increased significantly over the past two years. Wind-powered projects also comprise a dominant portion of the proposed new generation projects in the interconnection queue of the New York Independent System Operator (NYISO). The location of these resources and their intermittent nature present a new challenge for grid and market operations. Many of the proposed wind plants are seeking to interconnect in concentrated clusters located in the northern and western regions of the state. These regions are supported by an existing transmission network that might not be capable of delivering all the potential wind output to the load centers in the southeastern regions of the state.

As the system operator, the NYISO is responsible for system security and reliability planning. The NYISO maintains minute-by-minute system security by dispatching resources to meet the electrical load using a least-cost, bid-based optimization algorithm that recognizes transmission constraints. Wind plants, like all other generators, might be subjected to re-dispatch if they are interconnected to constrained portions of the transmission system. A conventional generator typically indicates its willingness to be re-dispatched through its

- Demonstrate the benefits of integrating wind power into the economic dispatch.
- Reduce wind generation curtailment.
- Reduce carbon emissions by improving the operation of renewable resources.
- Improve system reliability.

economic offering so that the NYISO can optimize the use of limited transmission through security-constrained economic dispatch (SCED). Until NYISO market rules were changed in May 2009, wind plant operators had no such requirement. The NYISO and local transmission operators had to rely on manual intervention to re-dispatch wind plants when it was necessary to address a reliability issue. Manual schedule adjustments were less efficient because they tended not to be based on an optimized dispatch. This could result in larger reductions in wind generator output than necessary in order to relieve the transmission constraint. Furthermore, it was observed that, during the periods of negative pricing that can occur when the transmission system is constrained, wind plant operators had an incentive to instantaneously cut all output in order to avoid producing power at a financial loss.

Wind plant output can be best optimized by evaluating each plant's economic preferences within the real-time SCED as is done with other generating resources. In 2009, the NYISO implemented an innovative dispatch procedure—wind-integrated SCED—in which wind generators are required to submit their economic bid curves just like conventional generators for inclusion in the real-time market SCED. Combined with the NYISO's centralized wind forecasting,

this allows the SCED to look ahead and more optimally maintain wind plant operation. By providing economic re-dispatch signals to wind generators, it is possible to avoid negative pricing and enable wind generation to operate more efficiently.

Project Objective and Scope

NYISO is evaluating interregional transaction coordination for improving congestion management and optimizing the operation of wind resources.

The objective of this project is to verify and validate the benefits realized by the application of advanced forecasting tools, fully integrated with SCED, and applied across a broader system with market rules that will allow more frequent optimization of resources across control areas.

Expected Benefits

One or more of the following benefits related to transmission system efficiency and utilization might be realized through wind-integrated SCED:

- More efficient actions to cope with reliability issues, minimizing the period and amount of wind generation curtailments.
- Minimized periods of extreme negative locational-based marginal price in the real-time markets.
- Lower CO₂ emissions and fuel savings
- Enhanced transmission grid reliability

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