# PJM's Support for Variable Resources

PJM Interconnection's market rules and Open-Access Transmission Tariff encourage the reliable and efficient integration of variable energy resources like solar and wind into the grid. PJM has taken a number of other measures as well to reduce barriers and facilitate the ability of variable resources to integrate into the system while ensuring continued reliability.

Recognizing the potential impact of a significant infusion of new renewable energy sources not only on PJM but on the Eastern Interconnection as a whole, PJM acted as a catalyst in bringing together the transmission planning authorities across the interconnection to discuss how to create an interconnectionwide planning framework.

The outcome was the formation in 2009 of the Eastern Interconnection Planning Collaborative (EIPC), which is using the existing regional transmission plans of these industry groups as the basis to conduct transmission analyses for the interconnection as a whole. These analyses will address the impact of large amounts of variable energy resources that are expected to come on line in the future.

The wide scope of PJM's operations and markets provides ample opportunities for variable energy resources to conduct business. The following PJM policies, protocols and programs are in place and provide needed support for the development of variable energy resources in the PJM region.

- In the Real-Time Energy Market, there are no penalties levied on generation for scheduling deviations. Instead, all generation can buy power at market prices to meet previously arranged schedules, as for example, if wind output drops. Wind generation also receives market-based revenues if wind project deliveries exceed scheduled amounts.

- Variable resources benefit from the short scheduling intervals of PJM's market. Generators of any type can self-schedule with 20-minutes notice; PJM typically approves a dispatch case and sends out new dispatch signals every four to five minutes. This helps reduce the need for regulation service to deal with changes in load within each hour.

- PJM established a centralized wind power forecasting service in 2009. Aggregated data from the service is made available to members and is used to help determine the next-day unit commitment to ensure there are sufficient reserves. The forecasting also was designed to encourage participation by wind resources in the Day-Ahead Energy Market.

- Variable resources have the ability to earn revenues by participating as capacity resources in PJM's capacity market, the Reliability Pricing Model (RPM). Because of the intermittent nature of these resources, PJM's capacity valuation procedure allows wind to receive capacity credit on a rolling three-year average of actual performance over the previous three summers. If they have been in operation for less than three years, wind and solar projects receive a class-average value – for wind, 13 percent of nameplate capability and for solar photovoltaic facilities, 38 percent of AC rating.

PJM is conducting two integration studies to examine the impact of renewable resources on the planning and operation of the transmission system.

One study is assessing the impact of large-scale renewable energy integration on operations, planning and markets. The other study is evaluating the impact of state renewable portfolio standards (RPS) on the planning of the high-voltage

transmission system at the 345-kilovolt level and above. The study will show what the PJM system could look like in 2021 and 2026 in terms of the transmission enhancements needed to meet the RPS standards of the PJM states.

PJM has taken a number of other steps to help support the effective integration of variable energy resources. These include:

- Forming the Intermittent Resources Task Force (IRTF) to examine the operational, reliability and market issues specific to variable resources. The IRTF has been focusing its attention on three areas: assessing operational impacts, examining interconnection standards and reviewing interconnection study protocols for intermittent resources.

- Implementing changes in software to enhance the management of wind resources.

- Participating in a variety of forums and studies by the North American Electric Reliability Corp. and others dealing with the integration of variable energy resources.

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