PJM Interconnection is working with its members and industry organizations to support research on and deployment of synchrophasors. This advanced grid-monitoring technology enhances reliability by increasing the ability of grid operators to collect and analyze data on system conditions over a wide area at a much higher frequency.

Synchrophasors are monitoring devices that take high-speed measurements of voltage, current and frequency at a location on the electric transmission system. The measurements, typically taken 30 times a second, are time-stamped with signals from global positioning system satellites, enabling data from different locations and utilities to be time-synchronized and combined to create a detailed, comprehensive view of the broader system.

Synchrophasors, also known as phasor measurement units, or PMUs, can provide system operators with feedback about the state of the power system with much higher accuracy than the conventional Supervisory Control and Data Acquisition systems used in the industry, which typically take measurements every four seconds. The frequency of the PMU measurements can show system changes that would not be evident with SCADA data.

Because they provide more precise data at a much faster rate, synchrophasors allow more finely calibrated measurements of power flows on the grid and a more accurate determination of operating limits in real time. They will enable operators to evaluate actual system measurements rather than use mathematical estimates, helping them to act proactively to prevent problems rather than react after the fact.

The technology is being combined with advanced analytical software to support wide-area monitoring, power system planning and the analysis of grid disturbances. The technology is expected to offer significant benefits for integrating renewable and intermittent resources, automating controls for transmission and demand response, managing transmission congestion and improving system modeling. All these capabilities will produce both reliability and economic benefits.

PJM and 12 member transmission owners were awarded federal stimulus funds to install additional PMUs in substations in 10 different states. The large-scale installation of the synchrophasor technology across the system received federal Department of Energy matching funds totaling about $14 million.

PJM transmission owners have gone well beyond the original plan, expanding the number of devices to be installed and the number of substations covered. When the installations are completed this year, there will be more than 400 synchrophasor devices in more than 100 substations across the PJM region. The project also includes data concentrators, secure telecommunication infrastructure and visualization and data-analysis software.

PMUs also will be installed at new generating facilities of 100 megawatts or greater under a 2013 proposal approved by federal regulators.