In its role as a regional transmission organization, PJM Interconnection works to keep the electric grid operating in balance. This means that PJM manages the available generation and transmission to provide the electricity needed at any given moment by more than 65 million customers across 13 states and the District of Columbia.

Operating the electric system is a balancing act that involves generating enough electricity to meet customers' demand while keeping the transmission system within safe operating limits. RTOs like PJM manage the grid to ensure reliability. To do that, they must keep these elements in balance at all times.

There is one additional weight to balance, and that is cost. PJM deploys generators in the most economical way possible, calling on the lowest-cost generation first.

**At a Glance**

- Electricity must be produced and consumed on demand.
- The availability of generation resources must be balanced with customer demand at all times to ensure the grid remains reliable.
- PJM must respond instantaneously to changes in demand and operating conditions to keep the electric grid in balance.
- PJM uses sophisticated computer programs to forecast how much electricity will be needed each hour and coordinates with generators to adjust to changes in real time.
- In an emergency, PJM dispatchers are always prepared with energy reserves that can be called upon to fill the gap.

## Getting the Power Where It Needs To Go

PJM controls the operation of about 183,000 megawatts of generating capacity in its territory. The more than 1,400 generating units that make up this capacity produce electricity to meet demand, supplemented when needed by purchases from other sources or reductions in usage from demand resources.

PJM operates more than 88,000 miles of high-voltage transmission lines across its territory. These lines move electricity from the generating units to large substations that reduce the electricity's voltage so that it can be distributed further, ultimately to local distribution points that supply homes and businesses.

## Managing a Vast Undertaking

To manage the electric system, PJM acts as a data clearinghouse and decision-maker.

Using sophisticated computer programs, PJM forecasts how much electricity will be needed each hour and arranges to meet that demand from the available generation and other sources. As the actual demand changes in real time, PJM adjusts the generation and other sources to balance the demand while maintaining the transmission system at safe operating levels.

Because electricity is a speed-of-light product that has a limited ability to be stored, PJM must respond instantaneously to changes in demand and operating conditions across its 368,906-square-mile territory.

## Air Traffic Controllers of the Grid

At PJM's control centers, a staff of experts monitors the power grid 24 hours a day, seven days a week. PJM system operators react to shifts in electricity use to keep supply and demand in balance. They direct how much energy should be supplied and request adjustments to the production of generating plants to accommodate changes in demand and to make sure that no transmission lines or facilities are overloaded. The system operators also watch for unusual conditions and react to them to protect the electricity supply.



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In protecting the reliability of the electric system, PJM experts study thousands of "what-if" scenarios, assisted by computer simulation programs that help them prepare to deal with almost any event. Each variable that conceivably could affect supply and demand for electricity is carefully considered and tested – from extreme weather conditions, emergency conditions and multiple equipment failures to the more easily anticipated impact of daily, weekly and seasonal cycles in demand.

PJM has extended this traditional power-in-balance paradigm to encompass the realities of the 21st century electricity industry.

## Markets and Planning Work Hand in Hand With Operations

Competitive electricity markets also help keep power in balance. In PJM, markets and reliability work hand in hand, with the operation of competitive electricity markets sending price signals that reinforce the already strong incentives to keep the grid reliable.

The ability of demand resources to participate in many of PJM's markets also benefits reliability. Retail customers who can cut their electricity demand in response to the needs of the PJM grid can be paid for those demand reductions, just as generators are paid for increasing their output when demand is high.

PJM's Regional Transmission Expansion Planning process determines what changes and additions to the grid are needed to maintain reliability into the future. The process systematically evaluates proposed transmission and generation projects to ensure that compliance with reliability criteria is maintained.

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