



PJM Interconnection is responsible for the reliable operation of the electric grid serving more than 65 million customers in 13 states and the District of Columbia. Ensuring a safe and reliable bulk power system – keeping the lights on – is PJM’s most important priority.

This requires constant system monitoring by skilled operators; real-time coordination with other operating entities and industry sectors; and extensive planning to make sure the grid is prepared to serve future needs.

A Changing Energy Landscape

A broad set of trends is reshaping the electric industry, including a growing number of states and stakeholders adopting decarbonization goals of varying ambition.

Increasingly, renewable resources – whose power is intermittent by nature – are coming online, altering the traditional resource mix.

Maintaining reliability in this new paradigm will require consideration of changes to the rules and processes that PJM follows in its core functions of planning, markets and operations.

The Building Blocks of Reliability

Regardless of resource mix, the four building blocks of bulk power system reliability remain the same:

Adequate Supply: There must be sufficient generation and other resources, including demand response, available on the system to meet customer demand at all times.

Accurate Forecasting: Accurately predicting the demand for electricity for the next hours and days, as well as years into the future, enables reliable planning and operation of the system. Forecasts consider multiple drivers, including weather, economics and customer behavior.

Reliable Operations: Grid operators work around the clock to monitor and control the system, directing how much energy should be supplied by generators to match the demand, ensuring transmission lines and facilities stay within their safe operating limits, and constantly preparing for the unexpected.

Robust Transmission: At its most fundamental purpose, the transmission system ensures that electricity can be delivered reliably across the grid to customers the instant it is needed. This reliability is a function of thermal, stability and short-circuit power system fundamentals. The standards for these are set by the North American Electric Reliability Corporation (NERC).

At a Glance

- Ensuring a safe, reliable bulk power system is PJM’s most important priority.
- This requires constant system monitoring by skilled operators; real-time coordination with other operating entities and industry sectors; and extensive planning to make sure the grid is prepared to serve future needs.
- Maintaining reliability in a changing energy landscape will require an evolution of the processes PJM follows.
- The building blocks of reliability remain the same for any resource mix: adequate supply, accurate forecasting, reliable operations and robust transmission.
- PJM adheres to NERC reliability standards, which are built on adequacy and operating reliability.





PJM Adheres to NERC Reliability Standards

NERC, with oversight from the Federal Energy Regulatory Commission, is the regulatory entity responsible for developing and enforcing the reliability standards that PJM and other systems must follow.

NERC defines system reliability in terms of two fundamental aspects:

- **Adequacy:** This is the ability of the electric system to supply power to consumers at all times.
- **Operating Reliability (also called Security):** This refers to the system's ability to withstand sudden disturbances, such as the unanticipated loss of system components.

It is not possible or economically feasible to plan and operate the system in a manner that is perfectly reliable, with no risk of power outages or blackouts. Many grid operators, including PJM, set a target level of reliability to avoid involuntary customer load shed (power outages) due to inadequate supply, with a risk of no more than once in 10 years.

PJM Markets, Planning and Operations Work Together To Maintain a Reliable Grid

PJM's competitive wholesale markets provide a powerful tool to support reliability by providing financial incentives and encouraging competition to provide electricity where and when it's needed. The markets serve to attract investment in new generation and technology at the lowest reasonable cost.

PJM's comprehensive Regional Transmission Expansion Plan (RTEP) process identifies the need for changes and additions to the system up to 15 years into the future. This approach makes the transmission planning process more efficient by considering the region as a whole, rather than as individual states or separate transmission zones.

Operationally, the system enhancements arising out of the RTEP process reduce emergency procedures and alerts, increase operating margins, and improve the ability to import or export power with neighboring grid systems.

How PJM Operates Reliably

PJM system operators use advanced analysis tools to monitor and control the bulk electric system from two redundant, geographically separate control centers. They continually adjust generation output to match the demand on the system, while respecting equipment limits such as thermal ratings and voltage levels.

The system is always being prepared for the next peak season, whether it be summer or winter. Spring and fall have their own operational challenges, as transmission and generation outages are typically scheduled this time of year.

PJM's system operators prepare for the loss of generation and transmission by evaluating thousands of "what-if" scenarios. They act before a potential event occurs, so that if it were to happen, all of the remaining facilities could continue to operate reliably and safely.

When Emergencies Occur

Severe weather such as tornados and hurricanes or periods of extreme heat or cold can cause multiple facilities to be removed from service. In these cases, system operators may need to rely on emergency procedures to maintain the reliability of the bulk electric system. Sometimes these occur with little or no advance notice, and can include disconnecting customers. These emergency procedures are used only as a last resort.

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