The Value of PJM

Since 1927, PJM Interconnection has been providing power reliably and cost-effectively by sharing electricity across state lines. Working with local utilities, PJM provides reliable power from New Jersey to North Carolina and west to Illinois, serving 13 states and D.C.

The Value of Scale

PJM operates across a large geographic footprint, pooling together diverse generation resources and varying electricity demand across its 13-state and D.C. service area, increasing system reliability. This also reduces the amount of both transmission and operating reserves necessary to keep the grid reliable during emergencies or other operational challenges.

The Value of Competition

PJM's competitive markets bring new, more economic resources to the system and facilitate the retirement of older, less efficient resources. These newer resources result in significant efficiencies while reducing emissions across the PJM footprint. PJM's markets also encourage alternatives to traditional generation, such as demand response, to compete and contribute to PJM's reliable and cost-effective operations.

The Value of Transparency

Transparent price signals across PJM's multiple markets encourage investment in new generation and transmission infrastructure where it is needed most. Developers respond to these signals with new generation and transmission, which then help maintain system reliability, reduce transmission congestion and allow lower-cost generation to serve a greater number of customers.

~$5 billion
annual savings produced
PJM's operations, markets and planning functions produce substantial efficiencies for customers by leveraging scale, competition and market transparency.

- **$1.4 billion** Reliability
- **$1.25 billion** Generation Investment
- **$1.1 billion** Integration of More Efficient Resources
- **$990 million** Energy Production Costs
- **$265-$355 million/year** Demand Response Value

Reliability

PJM's regional planning process assesses the need for transmission upgrades to ensure reliability, increase efficiency and advance public policy goals. PJM's large footprint makes this more effective, allowing PJM to consider the entire region rather than by individual states or separate utility service areas when determining transmission needs.

Investments in the transmission system are keeping pace with national and industry trends.

This includes:

- *The transition from older fossil fueled resources to newer, more efficient and cleaner resources*
- *The integration of newer technologies like battery storage and grid-enhancing technologies*
- *The increase of load growth due to data centers*

These trends have necessitated significant upgrades to the PJM system.

Transmission upgrades identified through PJM's planning process produce sizable benefits beyond system reliability. For example, transmission investments reduce grid congestion and allow lower-cost generation to more easily serve a wider range of electricity customers, producing significant savings.

Over the last 10 years, investments in transmission infrastructure have reduced annual congestion by $1.4 billion.

$1.4 billion

A PJM analysis found a net reduction of $1.4 billion in annual congestion costs from transmission upgrades placed into service over the last 10 years, and $900 million over the last five years.

Generation Investment

PJM needs enough generating capacity to serve the 67 million people living and working throughout its region. To do this, PJM's capacity market is designed to procure enough generation to meet its forecasted peak demand plus an additional amount of generation above the forecasted peak, which is called a "reserve margin." This additional reserve generation helps keep the grid reliable during unanticipated system emergencies, during sudden increases in demand and when generators become unexpectedly unavailable.

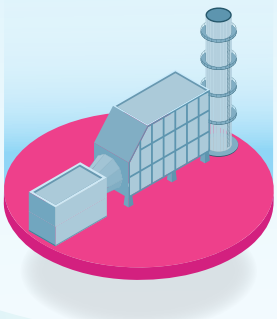
PJM operates across a large geographic footprint, pooling together all its available resources to serve customers each day. This approach helps mitigate the risk of generator outages and improves reliability. Additionally, the large scale of the PJM region results in considerable diversity in electricity use needs as peaks vary by location throughout the day and during each season. This means that generation resources in one area of PJM are often available to serve other areas during their specific peaks.

This dynamic results in PJM needing to have less generation in its reserves, reducing the total amount of investment needed for new generation to reliably serve total system demand. In comparison, were each transmission zone in PJM to operate in isolation, they would require a much larger reserve margin in order to serve customers reliably.

Ultimately, by needing a smaller reserve margin, PJM avoids an estimated $1.25 billion in costs each year.

$1.25 billion

By pooling resources across a large footprint, PJM avoids $1.25 billion in costs each year.



Integrating More Efficient Resources

PJM's competitive markets and generation interconnection process have facilitated the entry of new and more efficient resources onto the grid. More than 68,000 MW of new generation or uprates to existing resources have gone into service in the PJM region since 2011. This new capacity includes efficient natural gas generation, renewable and storage resources.

These resources have displaced over 56,000 MW of older generation during the same period. The now-retired resources had an average age of 42 years upon deactivation and were typically less efficient and less cost-effective to operate than the new generation.

By facilitating newer, more efficient resources to replace older, less efficient generation, PJM avoids $1.1 billion in costs each year.

$1.1 billion

By incentivizing investment in newer, more efficient resources, PJM avoids $1.1 billion in costs each year.

Lower Energy Production Costs

PJM economically dispatches its generation fleet to minimize the total cost of generation needed to meet demand, subject to operational constraints on the system. This automated process is a feature of PJM's centralized market structure working in tandem with its operation of the regional system. The result of this process is lower-cost energy serving a greater number of consumers across the PJM footprint.

PJM's multistate region and the integration of more transmission zones into its service area have increased the ability of customers to access lower-cost energy resources. The development of PJM's centralized markets has also facilitated the economic exchange of energy beyond bilateral exchanges.

By comparing the annual energy production costs of a unified PJM to the simulated costs of individual transmission zones with less power flowing between them, PJM calculates $990 million in efficiencies annually through PJM's centralized economic generation dispatch.

$990 million

The economic dispatch of more efficient resources across the PJM region results in $990 million of energy production cost savings per year.

The Value of Demand Response

$265 million to $355 million

PJM's demand response saves $265 million to $355 million per year by reducing the need for new generation to serve demand.

Part of PJM's role as a grid operator is to ensure there is enough supply to meet system demand in real time and in the future. In addition to a diverse and efficient generation fleet, PJM also leverages a program known as demand response to help balance supply and demand on the grid.

In PJM, demand response participation incentivizes electricity customers to temporarily reduce their demand when system conditions are tight. Because demand response can lower the amount of peak demand that PJM must serve, it also reduces the need for new generation to reliably serve the system.

PJM has one of the largest demand response markets in the world. The demand response procured through PJM's capacity market reflects both the amount of demand response available for each delivery year as well as the new generation that would otherwise be needed to maintain resource adequacy.

PJM estimates that demand response saves $265 million to $355 million per year by displacing the need to invest in new generation resources.

Additional Benefits

Lowered Emissions

The region PJM serves has experienced significant and sustained carbon emission reductions over the past 20 years. Since 2005, CO_2 emissions have dropped by 42%, which is an average reduction of around 7.2 million fewer tons of CO_2 emissions per year.

Why it matters: *PJM's competitive markets have incentivized more efficient generation to come into service to replace older, less efficient resources. The combination of federal and state decarbonization policies has also contributed to a growing amount of clean and renewable resources within the PJM resource fleet. PJM continues to facilitate decarbonization of its resource portfolio as it continues to reliably operate the system.*

Administrative Benefits

PJM administers its functions on behalf of the region instead of individual local balancing authorities each needing to provide these services. PJM has the lowest administrative costs among all regional transmission organizations (RTOs) and independent system operators (ISOs) based on a bundled rate per MWh of transmission served. This rate has remained consistent on a yearly basis.

Why it matters: *RTOs are audited by ReliabilityFirst, NERC and SERC every three years to review compliance with Critical Infrastructure Protection operations and planning standards. Because PJM functions on behalf of the region, this saves transmission owners an estimated $2 million in individual compliance audits.*

System Operator Training

PJM's training curriculum has over 120 active courses, including a mix of live, instructor-led classes and asynchronous, online training. PJM awards approximately 50,000 NERC continuing education hours annually.

Why it matters: *18,000 of these continuing education hours are simulation training, which prepares industry trainees for real-world experiences in system and market operations.*

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