PJM INTERCONNECTION: A CASE STUDY AND FUTURE CHALLENGES

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13th session of the Group of Experts on Cleaner Electricity Production from Fossil Fuels
26 October 2017
Geneva, Switzerland
Introduction

• The success of the U.S. grid is largely attributed to the development of power pools, and there is no instance more famous than that of the PJM Interconnection.

• PJM enhanced energy security to its customers, by recognizing the need for a diverse fuel mix, diverse generation sources, and future planning with a coordinated fundamental understanding of competitive markets.
A Brief History of PJM

• Formerly known as the Pennsylvania-New Jersey-Maryland Interconnection, the organization established the world's first continuing power pool in 1927.

• By 1993 the PJM Interconnection Association was established opening membership to non-utilities led by an elected Board of Managers.

• In 1997, PJM became the first Federal Energy Regulatory Commission (FERC) approved independent system operation (ISO) which granted PJM access to operate but not own transmission systems.

• PJM became the first regional transmission organization (RTO) in 2002 when FERC sought to establish competitive generation with open access to transmission.

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Source: [https://www.ferc.gov/market-oversight/mkt-electric/pjm/elec-pjm-footprint.pdf](https://www.ferc.gov/market-oversight/mkt-electric/pjm/elec-pjm-footprint.pdf)
Reliability

• As an RTO, PJM balances the flow of supply and demand for electricity producers and users in both real-time and day-ahead bids
  • This results in pricing data within time intervals as short as 5 minutes.
  • This complex, real-time market, requires advanced technology and monitoring solutions to limit outages.

• PJM works closely with the North American Electric Reliability Corporation (NERC) to safeguard uninterrupted and coordinated services.
Regional System Planning

• The planning process, known as the Regional Transmission Expansion Plan (RTEP), forecasts up to 15 years out, and includes mechanisms for:
  • incorporating new transmission systems
  • analysing future grid upgrades
  • maintenance
  • new generation

Source: https://learn.pjm.com/three-priorities/planning-for-the-future.aspx
Wholesale Power Markets

- PJM runs the world’s largest competitive wholesale power market, and has done so with the foundation that wholesale markets balance and price resources to best meet customer needs.
- PJM’s wholesale markets are based on competition, transparency and independence.
- The power markets not only result in better prices for consumers but also provides for a more diverse electricity grid as the wholesale market does not discriminate against any fuel source.
- PJM ranks resources based on their economic merit and ability to provide electricity when dispatched.
Generation and Government Policy

• PJM consistently works to comply with and incorporate government policies that often impact electricity generation.
• In 2005, PJM developed the Generation Attribute Tracking System (GATS) that follows emissions from generators and creates a certificate for megawatts produced in order to prove government compliance.
• Each state can have their own standards and regulations and it is PJM’s responsibility to incorporate those considerations when planning for the future grid within the wholesale market.
Trends and Challenges for PJM:
Plant Retirements

• In 2010, PJM “identified approximately 12,000-19,000 MW of coal-fired generation that may be at risk of retirement….this range of potential generation at risk represents 7-12% of the installed generation capacity in the PJM region.”


• According to Moody’s Investors Service, “PJM’s latest forecast report indicates load has declined over the last decade, with system load falling to 790 TWh in 2015 from 822 TWh in 2005.”

Trends and Challenges for PJM: Plant Retirements

- The U.S. electricity grid has seen tremendous changes in the last decade alone, owing largely to the shale gas revolution, prices for natural gas and support for cleaner burning fuels has sent natural gas generation soaring.

Trends and Challenges for PJM: Resiliency

• In the event of similar extreme weather (like that of the Polar Vortex) or other significant grid disruptions, would PJM be able to provide reliable service without the soon-to-retire coal and nuclear fleet?

• U.S. Secretary of Energy, Rick Perry, recently has presented this question to FERC, and offered the need to consider, “grid resiliency” in power markets and suggested that owners of these plants be compensated for the value of having on-site fuel availability.

• “Resilience is the ability of the grid to withstand or bounce back quickly from all events that pose additional operational risks. These risk range from extreme weather to earthquakes, cyber and physical attacks, and events not yet imagined.”

• *PJM CEO and President Andrew L. Ott, “PJM Conference on Grid Resilience Explores New Challenges to Grid Security,” 20 September 2017.*
Concluding Remarks

• PJM not only will meet these challenges with neutrality and transparency, but also will likely yet again transform the way electricity markets operate today all over the world.

• PJM’s example is one of an organization that truly puts customers first, and is willing to take informed risks and make efficient changes only if the outcome could benefit the customer or economically improve efficiency.

• PJM throughout its history has time and time again been the first to develop new standards, and time and time again it will continue to do so.
Questions?