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Transmission and Generation Reliability

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Illinois Commerce Commission

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Background

The Illinois General Assembly enacted the Electric Service Customer Choice and Rate Relief Law of 1997

- Illinois became a restructured state – electric utilities transferred to affiliates or sold their generation assets
- Illinois now relies upon federal oversight through the Federal Energy Regulatory Commission (FERC), the North American Reliability Corporation (NERC), and Regional Transmission Organizations (RTOs) to ensure reliability of the high voltage bulk power system in Illinois and North America.



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RTO Reliability Planning

Transmission Reliability

- RTOs study reliability from thermal and voltage perspectives to confirm the transmission system has sufficient capacity to provide quality reliable service to customers and also that the system will return to a stable operating system after disturbances.
- Studies typically include simulations to assess transmission reliability in the near and long term by using models representing various system conditions.



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Compliance Standards

- Reliability standards adopted by the North American Electric Reliability Corp. (NERC)
- Reliability standards adopted by Regional Entities (RE) applicable within the transmission provider region



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Midcontinent Independent System Operator Control Room





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Reliability Planning (Cont.)

- RTOs also consider local Transmission Owner (TO) planning criteria, which may go beyond regional or federal reliability standards
- Identify solutions for violations that occur over time that could otherwise lead to overloads, equipment failure or blackouts
- Ensures retirement or suspension of these assets is evaluated to ensure transmission is adequate in such cases



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Generation Reliability

Each RTO calculates and recommends an appropriate Planning Reserve Margin (PRM) for its region

- For example, for the Midcontinent Independent System Operator (“MISO”), the Long-Term Resource Assessment (LTRA) examines the balance between projected resources and the projected load.
- These resources are compared with Planning Reserve Margin Requirement (PRMR) to calculate a projected surplus or shortfall.
- Falling below the PRMR signifies a region would operate at a reliability level lower than the 1-day-in-10-years load-shedding standard



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Capacity

- Capacity represents a commitment of resources to be available when needed, particularly in case of a grid emergency.
- Capacity markets can assist in ensuring long-term grid reliability by securing the appropriate amount of power supply resources needed to meet predicted energy demand in the future.



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PJM

- Members secure these resources for the future through the PJM capacity market (Reliability Pricing Model, aka “RPM”).
- The essential elements of the PJM capacity market are:
 1. Procurement of capacity three years before it is needed through a competitive auction;
 2. Locational pricing for capacity that varies to reflect limitations on the transmission system and to account for the differing needs for capacity in various areas of PJM; and
 3. A variable resource requirement curve, which is the energy demand formula used to set the price paid to market participants for capacity.



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MISO

- Allows for a variety of options for Load Serving Entities (“LSEs”) to obtain the resources required to meet their Planning Reserve Margin Requirement, including Fixed Resource Adequacy Plans, bilateral transactions, self-scheduling, capacity deficiency payments, and auction purchases.
- Procurement of capacity immediately before it is needed through a competitive auction.



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PJM v MISO Process

- PJM's three year-ahead auction provides more assurance that capacity will be available further into the future. MISO's auction process only provides assurances for the immediate delivery year.
- PJM's auction allows capacity providers to bid in and then build generation to meet the bid requirements. MISO's auction generally allows only existing generation to successfully bid.
- PJM's auctions have resulted in higher historical capacity prices because it features more forward uncertainty.
- MISO's footprint tends to have more vertically integrated suppliers and MISO relies more on states to conduct reliability planning.



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Recent Developments

- *PJM – Polar Vortex* (a cold weather event that triggered concerns over the existing PJM reliability construct)
- During the coldest period of the 2014/2015 winter, up to 22% of PJM capacity was unavailable due to cold weather-related problems—highlighting potentially significant reliability issues.
 - Commodity gas market and interstate pipeline scheduling not harmonized with power market operation.
 - Cold weather caused unplanned outages due to inability of generators to start (e.g., frozen generation equipment, frozen fuel, frozen emissions systems, problems with units not frequently run, etc.).
 - Also had gas supply inflexibility, natural gas interruptions, and fuel-oil delivery problems.



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These problems are causing PJM to incent or require:

- Enhanced operational performance requirement in peak periods
- Fuel security – dependable fuel source
- High availability resources
- Flexible unit operational parameters
- Operational diversity



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MISO - Coal Retirements

- Coal units are retiring as a result of environmental regulations and other forces. Not every coal unit retiring is being immediately replaced with an equivalent resource.
- Given that the majority of its members are traditional, vertically integrated, MISO's response is to primarily look to states to address the problems.
- MISO actions have largely been informal. It has called meeting with the Commission to discuss potential reliability concerns and to ask the Commission to consider State driven solutions.



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Nuclear Power Plants

Almost half of the electricity generated in Illinois comes from nuclear plants that run a high percentage of the time.





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Nuclear Closures

Several events have called attention to preservation of these generation resources:

- The owners of these plants have announced the possibility of closing up to three such plants in Illinois because they currently may not be profitable,
- The US environmental protection agency has proposed new carbon dioxide pollution rules for electricity generation facilities that, if enacted, would incent Illinois to ensure the nuclear plants (which do not emit carbon) are not closed,
- PJM's proposal to address reliability concerns considers that nuclear plants are a reliable source of base load generation that generally did not suffer unplanned outages during the cold polar vortex weather period.



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Questions and Answers



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References and Resources

Electric Service Customer Choice and Rate Relief Law of 1997:

<http://www.ilga.gov/legislation/ilcs/ilcs4.asp?DocName=022000050HArt%2E+XVI&ActID=1277&ChapterID=23&SeqStart=35800000&SeqEnd=40900000>

MISO transmission expansion planning:

<https://www.misoenergy.org/PLANNING/TRANSMISSIONEXPANSIONPLANNING/Pages/TransmissionExpansionPlanning.aspx>

PJM transmission expansion planning:

<http://www.pjm.com/documents/reports/rtep-documents.aspx>

“Problem Statement on Capacity Performance Definition”

<http://www.pjm.com/documents/reports.aspx>

PJM's proposed tariff filed with the Federal Energy Regulatory Commission.

http://elibrary.ferc.gov/idmws/docket_search.asp (enter the docket number ER15-623)



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Resources Continued

MISO's Issues Statement describing resource adequacy problems at:

<https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/SAWG/2015/20150305/20150305%20SAWG%20Item%2002%20Resource%20Adequacy%20Issues%20Statement.pdf>

For Illinois House Resolution 1146 see:

<http://www.ilga.gov/legislation/BillStatus.asp?DocNum=1146&GAID=12&DocTypeID=HR&SessionID=85&GA=98>

ICC Report on House Resolution 1146 <http://www.icc.illinois.gov/electricity/hr1146.aspx>

Illinois proposed legislation impacting nuclear plant viability by providing subsidies for plants that produce electricity with low carbon output.

<http://www.ilga.gov/legislation/BillStatus.asp?DocNum=3293&GAID=13&DocTypeID=HB&LegId=89473&SessionID=88&GA=99>