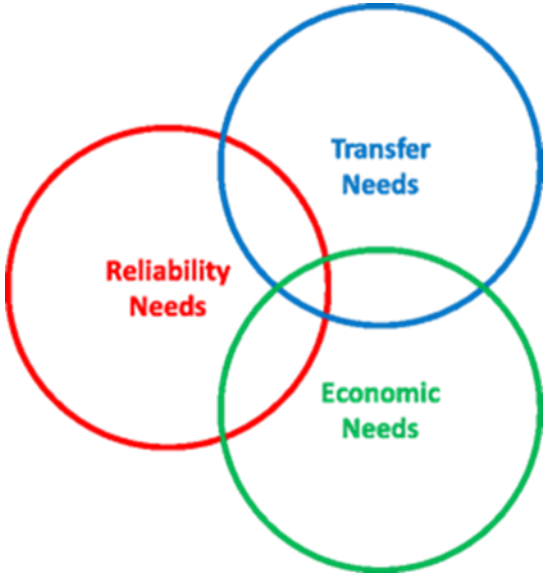
PJM/MISO Interregional Transfer Capability Study

Study Highlights

- PJM and MISO designed a study to identify near-term upgrades that incrementally enhance transfer capability between the two RTOs
- The study includes reliability, economic, and transfer analyses using forward-looking models and assumptions (2032 model-year)
- Potential solutions will address needs using existing right-of-way, and upgrading terminal equipment or transformers
- This study, along with Order 1920, will pave the way for future efforts focused on longer-term needs and greenfield solutions
- Following the study, MISO and PJM will partner with states and stakeholders to identify and pursue JOA/Tariff adjustments as needed to bring solutions forward for implementation



Study Details

- **Area(s):** The transmission system along the RTO seams, specifically the MISO Classic and PJM West regions
- **Modeling:** The RTOs will use 2032 Models which include forward-looking assumptions
  - MISO: LRTP Tranche 2.1 Core Reliability Models and Economic Model (without Tranche 2.1 solutions)
  - PJM: blended LTRTP Reliability Models and Economic Model (details in next slides)
- **Analysis:**
  - Reliability analysis
  - Economic/congestion analysis
  - Transfer analysis
  - Extreme weather event scenarios

Defined Study Transfers

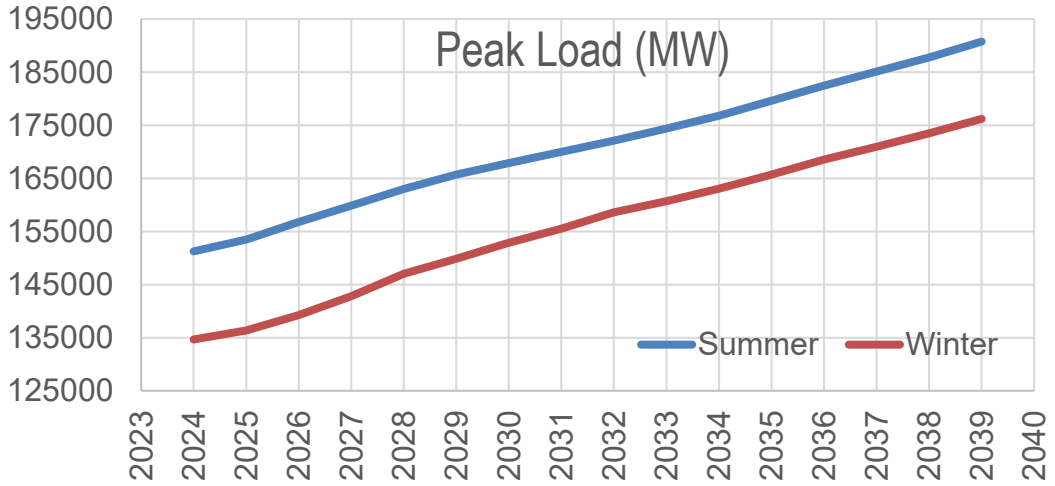
Model Assumptions

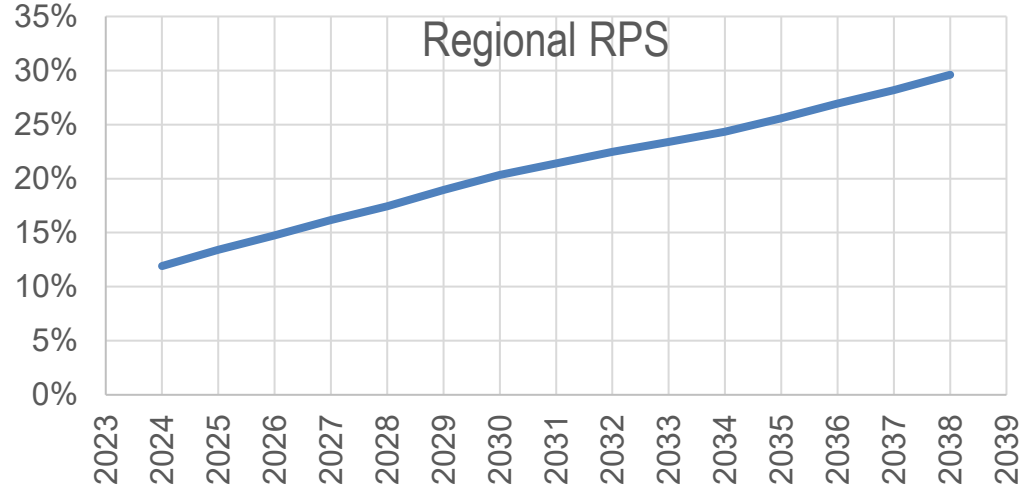
- The RTOs are closely coordinating on assumptions and methods
- MISO will use models built on its Future 2A 2032 assumptions
  - The economic and reliability models are the same reference cases being used for LRTP Tranche 2.1
  - Future 2A incorporated 100% of utility Integrated Resource Plans (IRPs) and announced state and utility goals within their respective timelines

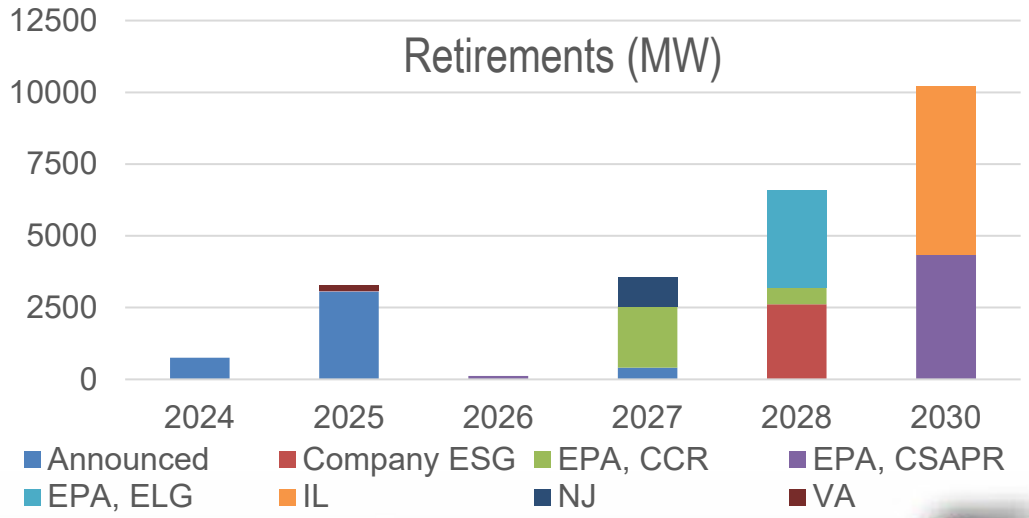
- PJM has developed a model that blends MISO F2A models for MISO's footprint and PJM LTRTP models for PJM's footprint*
  - Approximate 2024 Regional Transmission Expansion Plan (RTEP) topology
  - PJM 2024 official Load Forecast
  - Retirements due to federal regulations and state laws based on the Independent State Agencies Committee (ISAC) workbook
  - Sufficient replacement generation or storage for resource adequacy (i.e. to meet 1-in-10 Loss of Load Expectation) selected from interconnection requests and withdrawals using capacity expansion techniques with consideration of new generation policies based on the ISAC workbook

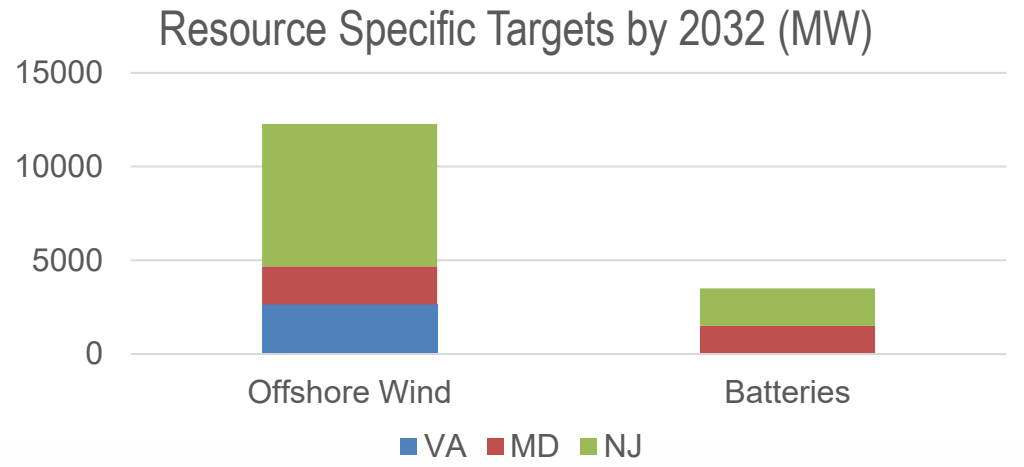
* See TEAC, 1 October 2024: https://www.pjm.com/-/media/committees-groups/committees/teac/2024/20241001-special/item-04---ltrtp-workshop-policy-study.ashx

PJM Blended Model: Load and (Some) Policy Assumptions (PJM Footprint)









Reliability Analysis

- MISO:
  - Focus on MISO Classic region (East/Central/West)
  - Reliability tests:
    - Single initiating (*N-1*) event contingency analysis
    - Summer Peak, Winter Peak, Light Load, and Average Load
- PJM: near-full reliability analysis
  - Focus on PJM West
  - Reliability tests
    - Summer, Winter, and Light Load
    - *N*-1, *N*-2 (345*kV* and above), Generation Deliverability, Load Deliverability for ComEd

Transfer Analysis

Defined study transfers

- Transfers agreed upon by two RTOs (details in appendix)
- Additional informational transfers; e.g., transfers defined in NERC ITCS
- *N*-1 (single and common-mode outages)
- Seasonal Models:
  - Summer
  - Winter
  - Light Load
  - Average Load (MISO Only)

Economic Analysis

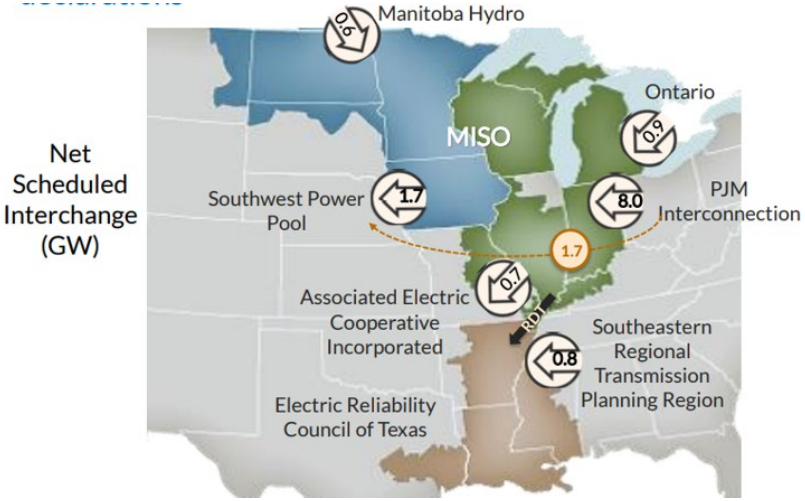
- MISO
  - LRTP Tranche 2.1 Future 2A Economic Model
  - MISO event file:
    - Create a blended event file combining MISO F2A and PJM events
- PJM
  - Blend PJM LTRTP model for PJM footprint into MISO F2A model
  - PJM event file:
    - F2A event file + Transfer analysis limiting elements + all PJM/MISO tie-lines + *subset* of 2024 RTEP Market Efficiency + *subset* of reliability analysis events depending on distance from the seam*

* The subset is defined as 100kV and above in ComEd, AEP, DEOK, ATSI; 230kV and above in the rest of PJM West; 345kV and above in PJM East and South

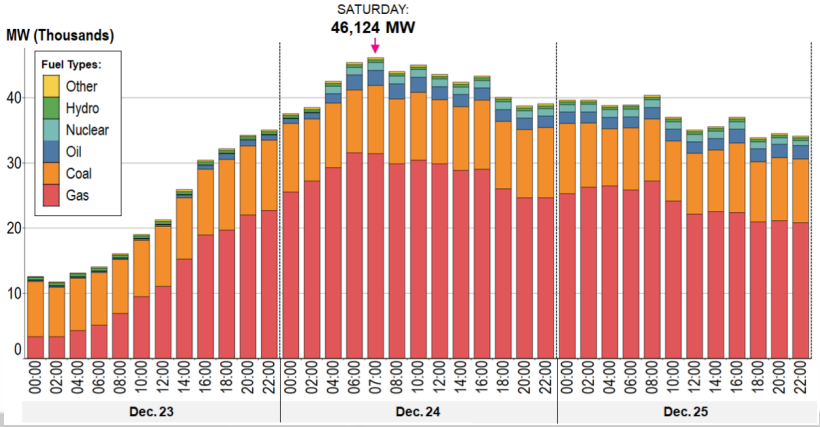
Extreme Cold Weather Event Sensitivities (Reliability Analysis)

- **Scope:** Informational extreme cold weather sensitivity modeled on Winter Storms Uri for MISO and Elliott for PJM (as in the NERC ITCS). The sensitivities will assume one region is in normal conditions and can support the stressed region
- **Purpose:** Highlight system issues resulting from transfers across a stressed system. The team will test the ability of solutions to alleviate these issues.
- **Analysis:** Only *N*-1 reliability analysis (no economic analysis)

Winter Storm Uri (2021) Flows:

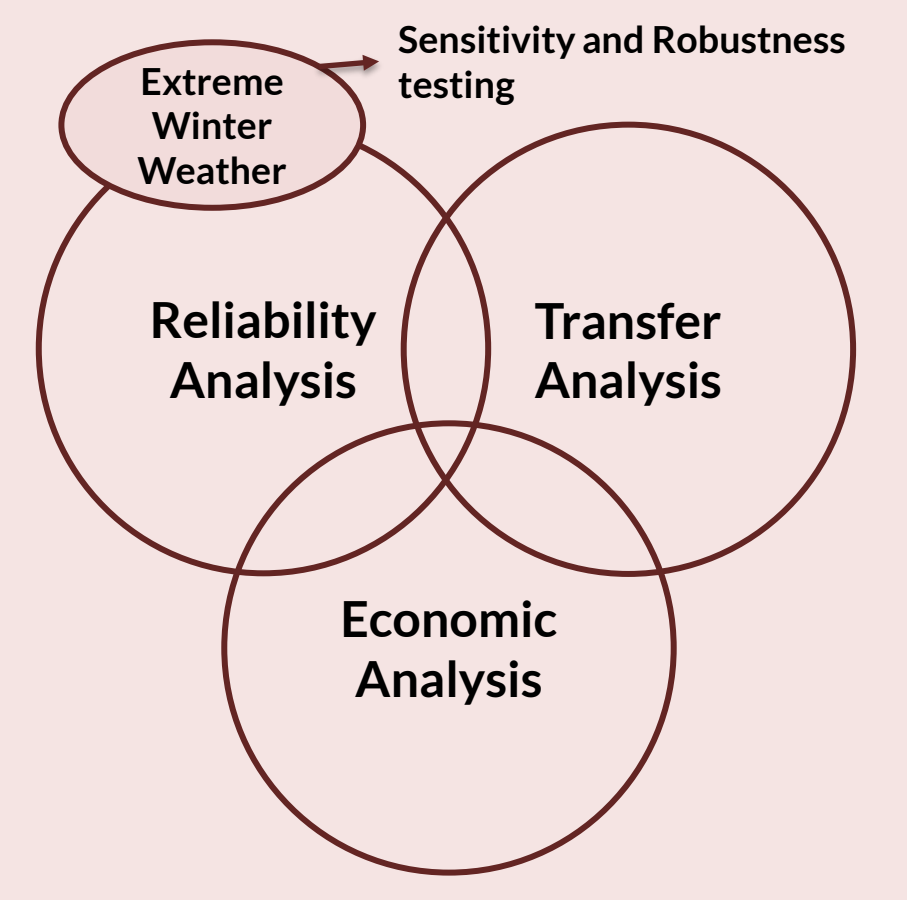


PJM: Winter Storm Elliott (2022) Forced Outages



Issue Identification and Solution Evaluation

Holistic Planning Approach



- Four (4) analyses inform issues and solution identification with the goal of increasing transfer capability
- Three (3) focus areas blend for potential solutions while the fourth focus area (*extreme winter weather sensitivities*) will measure robustness, but not drive unique solutions
- Solutions may stand on their own or have intersecting drivers/benefits

Timeline and Milestones

Completed Milestones	• Interregional Transfer Capability Study Kick-off – **Q1 2024** • Press Release/Announcement – **May 9th, 2024** • OMS/OPSI Presentation – **July 8th, 2024** • IPSAC FAQs & written update – **September 27th, 2024** • IPSAC - Scope, assumptions & analysis review – **November 22nd, 2024**
Future Milestones	• IPSAC – Share initial analysis results – **March 7th, 2025** • IPSAC – Finalize Results – **June 2025** • Catalog lessons learned for future engagements & pursue JOA/tariff revisions with the states & stakeholders as needed for implementation and to further improve the joint planning process – **2nd half of 2025**

Appendix

Interface and Transfer Names Summary

Transfer Short Name	Interface Name	Transfer Full Name	Transfer No.	Source	Sink
Michigan Exports To The South	Michigan Southern Interface	Michigan Exports To The South Over The Michigan Southern Interface	1a	LRZ7	LRZ6 & PJM West (minus ComEd)
Michigan Imports From The South		Michigan Imports From The South Over The Michigan Southern Interface	1b	LRZ6 & PJM West (minus ComEd)	LRZ7
Wisconsin Exports To Northern Illinois	Wisconsin Interface w/ Northern Illinois	Wisconsin Exports To Northern Illinois Over The Wisconsin Interface With Northern Illinois	2a	LRZ2	ComEd
Wisconsin Imports From Northern Illinois		Wisconsin Imports From Northern Illinois Over The Wisconsin Interface With Northern Illinois	2b	ComEd	LRZ2
Iowa & Southern Illinois Exports To Northern Illinois	Iowa/Illinois Interface w/ Northern Illinois	Iowa & Southern Illinois Exports To Northern Illinois Over The Iowa/Southern Illinois Interface With Northern Illinois	3a	LRZ3 & LRZ4	ComEd
Iowa & Southern Illinois Imports From Northern Illinois		Iowa & Southern Illinois Imports From Northern Illinois Over The Iowa/Southern Illinois Interface With Northern Illinois	3b	ComEd	LRZ3 & LRZ4
Indiana Exports To Northern Illinois	Indiana Interface w/ Northern Illinois	Indiana Exports To Northern Illinois Over The Indiana Interface With Northern Illinois	4a	LRZ6	ComEd
Indiana Imports From Northern Illinois		Indiana Imports From Northern Illinois Over The Indiana Interface With Northern Illinois	4b	ComEd	LRZ6
Indiana Exports To The East	Indiana Interface w/ Ohio & Kentucky	Indiana Exports To The East Over The Indiana Interface With Ohio	5a	LRZ6	PJM West (minus ComEd)
Indiana Imports From The East		Indiana Imports From The East Over The Indiana Interface With Ohio	5b	PJM West (minus ComEd)	LRZ6

Defined Study Transfers