



Resource Adequacy & Reliability Metrics

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Reliability Imperative

There are immediate and serious challenges to the reliability of our region's electric grid, and the entire industry – utilities, states and MISO – must work together and move faster to address them.

MARKET REDEFINITION

- Resource Accreditation
- Reliability Attributes
- Pricing Reforms
- Forecast Uncertainties

OPERATIONS OF THE FUTURE

- Uncertainty & Variability
- Planning & Preparedness
- Situational Awareness & Critical Communications

TRANSMISSION EVOLUTION

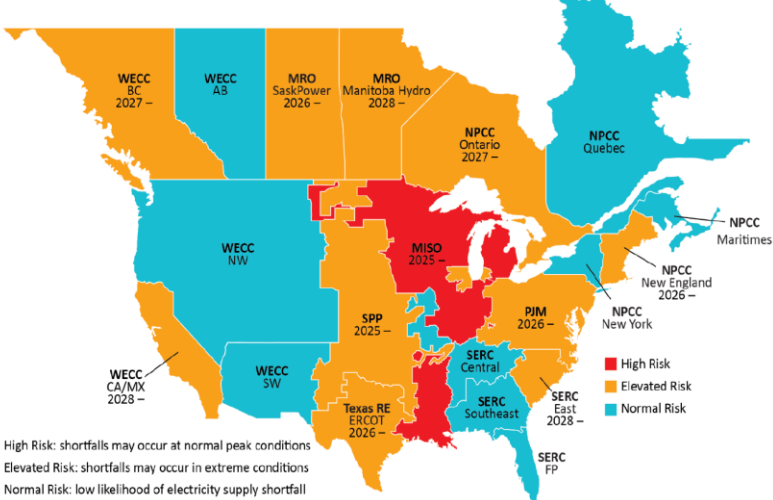
- Long Range Transmission Planning
- Generator Interconnection
- Joint Transmission Planning²

SYSTEM ENHANCEMENTS

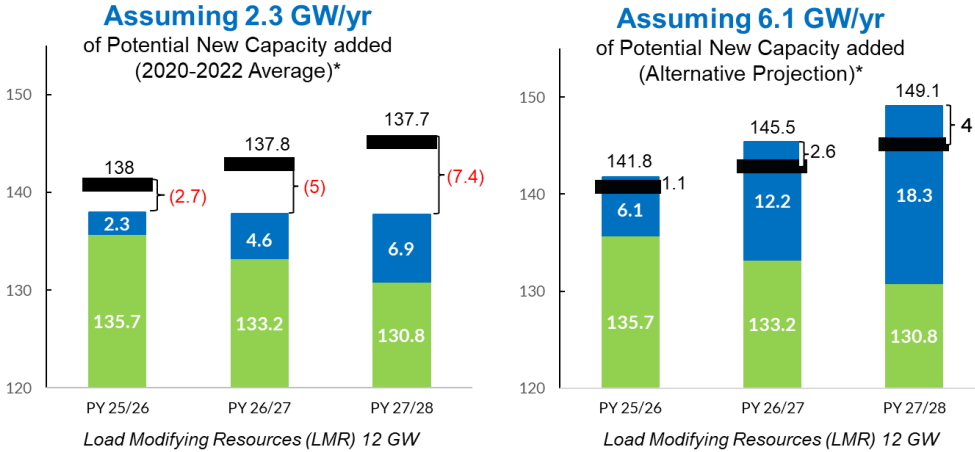
- Hybrid Cloud Capability
- Fortify Cybersecurity
- Advanced Data Analytics Capabilities

Portions of the MISO region reached minimum Planning Reserve Margins in 2022. Near-term projections indicate continuing challenges to resource adequacy.

2024 NERC Long-Term Reliability Assessment



2024 OMS-MISO Survey Results



Planning Resource Auction reforms have been a key focus to ensure the accurate reflection of current operational risks and conditions, preparing MISO for the future

Seasonal Construct

Changed from summer peak-based Planning Resource Auction (PRA) construct to four distinct seasons

- Identifies reliability needs unique to each season
- Aligns resource accreditation with seasonal needs and resource availability during the high-risk period
- Accounts for typical seasonal outages or partial-year resource operation

Implemented

Reliability-Based Demand Curve

Improves alignment of capacity price signals and reliability needs

- Planning Resource Auction clearing prices will more properly value incremental capacity, recognizing the value of additional capacity above the one-in-ten Loss of Load Expectation standard
- Reduces price volatility to small changes in supply, demand or other parameters
- Allows the market to find the most efficient market clearing solution

Filed – Ready for 2025-26

Accreditation Reforms

Balanced approach that incorporates forward-looking probabilistic analysis and historical performance during periods of high-system risk

- Ensures MISO measures the reliability contributions of the established resource classes during high-risk periods
- Aligns Planning Reserve Margin Requirements with accreditation of all resource classes
- Continue to determine the accreditation of individual resources based on actual performance

Filed – Ready for 2028-29

The Reliability-Based Demand Curve (RBDC) enhances reliability, providing a more effective capacity pricing mechanism to better support resource investment and retirement decisions in the MISO market

Why change from a vertical demand curve to sloping demand curve:

- The PRA was not properly valuing incremental capacity
- The PRA prices were not helpful to facilitate necessary investment & retirement decisions
- The PRA prices were volatile

The RBDC improves the prices and reliability signals in the Planning Resource Auction (PRA) to better reflect the risks identified under the Reliability Imperative.

- ✓ RBDC offers more *stable and predictable pricing signals* that more properly values incremental capacity in the PRA
- ✓ PRA capacity prices will better support investment & retirement decisions
- ✓ PRA should clear at more economically efficient outcomes, reflecting the value of incremental capacity

2025 PRA IMPORTANT DATES:

M A R C H

- ▶ **March 26** – Offer window opens
- ▶ **March 31** – Offer window closes

A P R I L

- ▶ **April 28** - Results Posted

The Resource Adequacy Metrics and Criteria Roadmap* recommend a collaborative approach with states and the industry to revisit the 1-in-10 LOLE criterion, explore alternatives, and provide visibility into complementary metrics

1-in-10 LOLE

Quantifies the expected number of days that, on average, the system can be expected to experience loss of load.

CURRENT USE

- Widely used across the industry
- Served MISO well in the past and will continue to do so in the near-term
- Used to calculate:
 - Planning Reserve Margin Requirements (PRMR)
 - Resource accreditation for the year and the future

RISKS

- Risk shifting to winter season
- The ability of the future resource fleet to serve load over extended periods of time

IDENTIFIED GAPS

- Does not Account for duration, severity and size of event
- Does not use multiple metrics for more robust risk characterization



We have made significant progress on foundational initiatives that provide improved data and market signals with more work underway to address the needs of the future

MARKET REDEFINITION

Completed

- ✓ Attributes Roadmap published
- ✓ Seasonal Resource Auctions (2024-25 PRA)
- ✓ Accreditation - Direct Loss of Load (2028-29 PRA)
- ✓ Reliability Based Demand Curve (2025-26 PRA)
- ✓ Value of Loss Load FERC Filing
- ✓ Shortage Pricing FERC Filing

In-flight or Planned

- Provide Accreditation Data
- Implement Shortage Pricing Across Time Horizons
- Execute Planning Resource Auction with Reliability Based Demand Curve
- Illustrate Energy Adequacy Risks Across Time Horizons and Locations
- Develop and Communicate Risk Metrics
- Implement Dynamic Locational Reserve Products Including Flexibility & Ramping



Questions



Expedited Resource Addition Study (ERAS) Proposal

Andy Witmeier

Director, Resource Utilization

Many factors continue to drive changing and increasing resource adequacy risk



Continued large volumes of Generator Interconnection Queue requests and accumulating backlog prevent one-year study timeframe



Delays getting projects with signed interconnection agreements built due to supply chain bottlenecks, permitting delays and commercial challenges

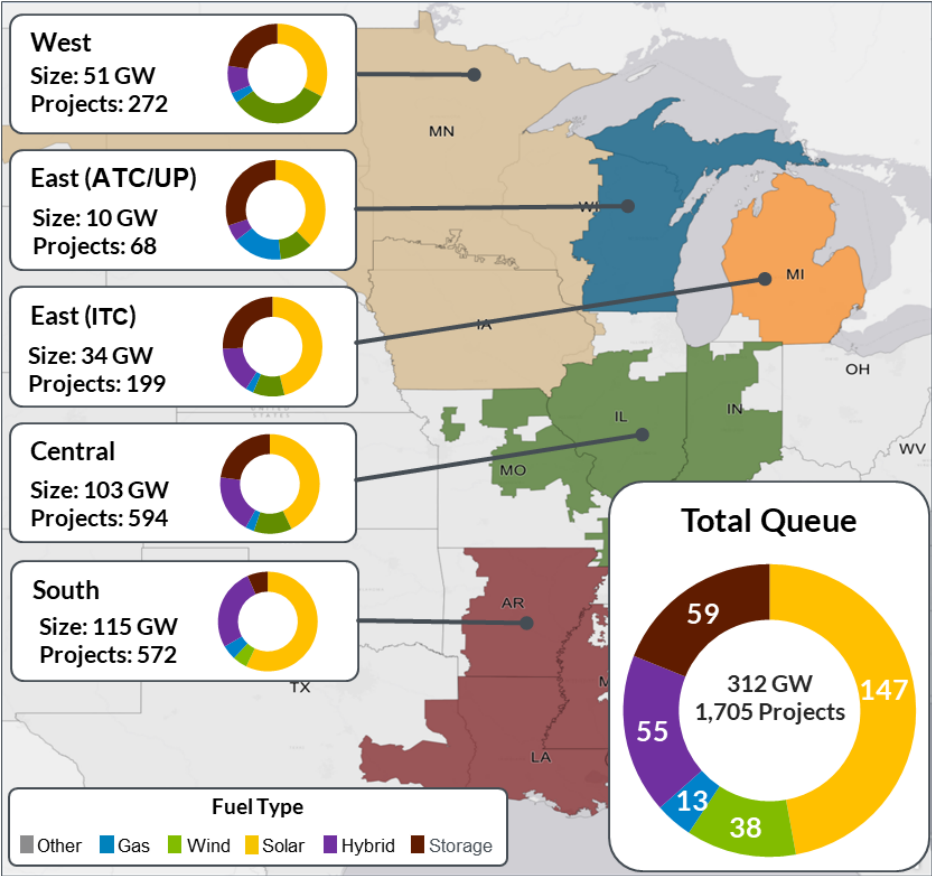


Load growth due to economic development and new, large spot load additions and lack of ability to concurrently add new resources



Continuing rapid pace of resource retirements

MISO's large Queue volume and a backlog of applications are contributing to the delay of resource additions



CURRENT QUEUE

- Tariff time is 1-year
- Cycles are taking 3-4 years
 - Late-stage dropouts from 2020-2022 require restudies and prevent processing of later cycles
- Generator Interconnection Agreements are required now for projects aimed at meeting resource adequacy needs in the next 3-5 years

MISO has been actively improving the manageability of its Queue, but it may take several years to reduce Queue processing to a one-year timeframe

2024 Accomplishments	2025 Plans	
	Queue Improvements	Support for Timely Resource Additions
<ul style="list-style-type: none">• Implemented FERC-approved reforms• Filed compliance with FERC Order 2023• Received FERC approval of JTIQ framework	<ul style="list-style-type: none">• Implement Queue Cap upon receiving FERC approval• Begin using innovative software for automation of early Queue phases	<ul style="list-style-type: none">• Commercial Operation Date tracker tool and web postings• Launch Expedited Resource Adequacy Study (ERAS) process



Improvements are addressing the Queue backlog, improving certainty of projects and addressing resource adequacy needs

New software and the Queue Volume Cap will help achieve a more manageable number of requests and a one-year processing timeline

QUEUE VOLUME CAP

- Cap is 50% of each planning region's non-coincident peak load

Filed Nov. 2024 with requested effective date of Jan. 2025

Projects over Cap will be first in line for the next cycle, per submission timestamp

- Addresses engineering problem of only serving load with new requests
 - More realistic resource dispatch, models and analysis
- FERC guidance incorporated in MISO's refiling

AUTOMATION

- Enables early-stage studies to run in parallel in the cloud
- Increases the efficiency of power flow model build processes
- Provides customers information more quickly
 - Pre-screen
 - Power flow models
 - Network Upgrade identification and cost allocation
 - System Impact Study (SIS) reports
- Additional automation is planned

MISO is proposing the Expedited Resource Addition Study (ERAS) as a short-term solution to address capacity concerns and Queue backlog



Addresses Load Serving Entities with resource adequacy needs that must be resolved within the next five years

Projects must be recognized by their regulatory authority



Projects would be evaluated individually instead of in clusters, allowing GIA execution within months versus years



ERAS would be available for new projects and some existing projects in the Queue

MISO continues to refine the ERAS proposal based on stakeholder feedback

Name Update: Expedited Resource *Addition* Study

- The new name is in response to the trend of spot load additions driving the need for an ERAS process to supplement current MISO processes
- The queue will remain the standard way to add new resources to the system; ERAS is a temporary and targeted process to complement this process

Sunset Date

- MISO believes 3 years is appropriate
- It allows time for the GIQ to reach a 1-year timeline
- It also provides another avenue to timely meet reliability and resource adequacy needs
- December 31, 2028, sunset will be memorialized in the Tariff

State/RERRA Acknowledgement

- MISO is collaborating with OMS on the RERRA acknowledgement that will apply, including participation in OMS committee and working group meetings

Filing Date

- Extending the filing date to mid-March to provide additional time for stakeholder discussions and feedback

Ongoing Consideration

- MISO continues to contemplate what guardrails or additional entry requirements are appropriate for the process
- How Interconnection Customers (ICs) outside of Load Serving Entities (LSEs) can participate when their projects are designated to serve new spot load additions

MISO is finalizing a comprehensive checklist of ERAS project requirements

Requirements include the following:

- ☑ D1 = non-refundable \$100,000
- ☑ M2 = \$24,000/MW
- ☑ 100% site control (site and POI)
- ☑ RERRA acknowledgement
- ☑ Commercial Operation Date 3 years from submission
- ☑ Technical requirements:
 - Synchronization Date
 - Commercial Operation Date
 - Interconnection Facilities In-Service Date
 - Service Type (NRIS)
 - Generator Output
 - Primary Fuel Type
 - Generator Manufacturer & Model Number
 - Library Stability Model
 - One-Line Diagram
 - Generating Facility Data
 - Step-Up Transformer Data

ERAS projects are still subject to affected system studies coordination

- Neighboring systems will continue to have the right to evaluate the impact of an ERAS project on their system
 - Order 2003 and Order 2023 set priority based on submission time
 - JOAs and other agreements, where applicable, set priority based on completion of first studies
 - MISO is discussing with SPP the ability to prioritize each others' ERAS projects first
- ERAS projects that meet the JTIQ criteria will be subject to JTIQ
- AFS study results may not be available during EGIA process
 - Where available, AFS Network Upgrades will be documented in the EGIA
 - Where Affected Systems analysis is not available for inclusion in the Final EGIA, EGIA will continue to be executed by all parties and MISO shall provide such analysis when received from the applicable Affected System
 - Interconnection customer will execute EGIA and agree to AFS

MISO anticipates implementing ERAS after receiving FERC approval

Date	Action
January 22, 2025	PAC: Updated ERAS proposal presentation
February 19, 2025	PAC: Final ERAS package presentation with Tariff language, feedback will be requested
March 3 or 7, 2025	Potential special PAC meeting
Mid-March 2025	FERC filing
June 1, 2025	Requested effective date

Questions