Resource Adequacy Developments at MISO

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Executive Summary

- MISO reliably and efficiently manages and delivers power to 45 million people
- Recent assessments highlights the need for strategic planning to address potential resource adequacy concerns over the next decade including resource additions and market enhancements to prevent future deficits
- The Market Redefinition pillar of MISO's Reliability Imperative focuses on the significant market reforms underway with many prioritizing adequacy through improved signals to inform system resource needs

MISO reliably and efficiently manages and delivers power to 45 million people

MISO KEY FACTS

Area Served	15 U.S. States and Manitoba, Canada
Population Served	45 Million
Transmission Line	77,000 Miles
Generating Units (commercial model)	1,447
Market Participants	+500
Members	59 Transmission Owners
	143 Non-transmission Owners
Market Size	$40 billion annual transactions

Coordinating and executing on the priorities within the Reliability Imperative is required to address challenges to reliability

RELIABILITY CHALLENGES

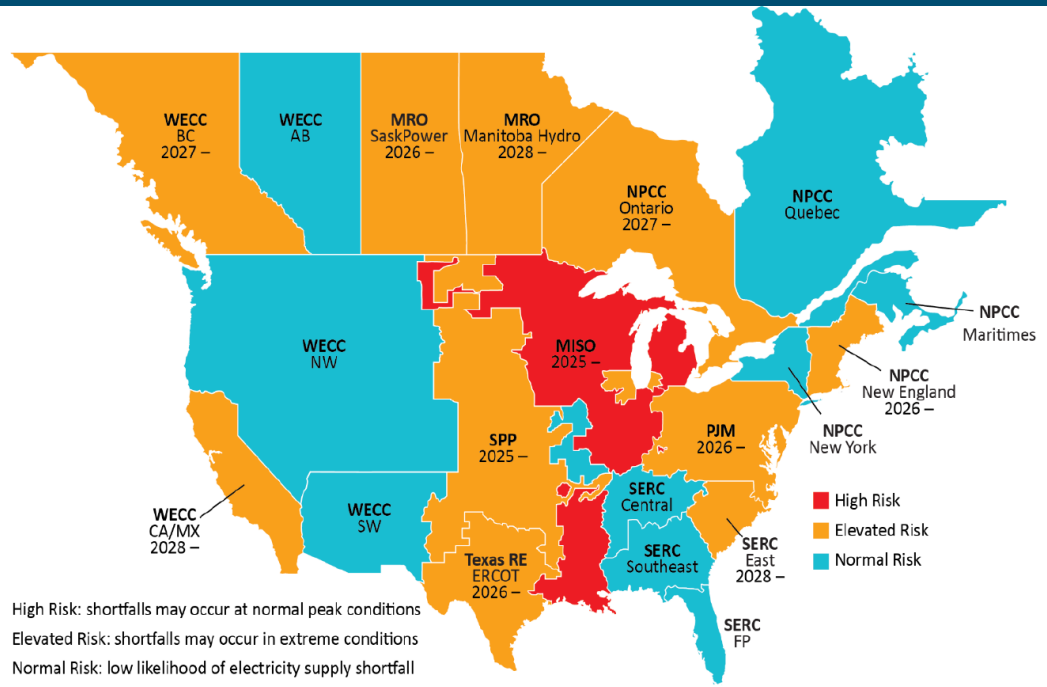
- Attributes needed to ensure reliability will become more scarce
- Extreme weather events are more frequent and severe
- Large single-site load additions and incremental load growth
- Fuel-assurance issues with gas pipelines and other energy infrastructure
- Supply chain and permitting issues are delaying generation projects

KEY INITIATIVES[1]

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 Planning[2]
SYSTEM ENHANCEMENTS	• Hybrid Cloud Capability • Fortify Cybersecurity • Advanced Data Analytics Capabilities

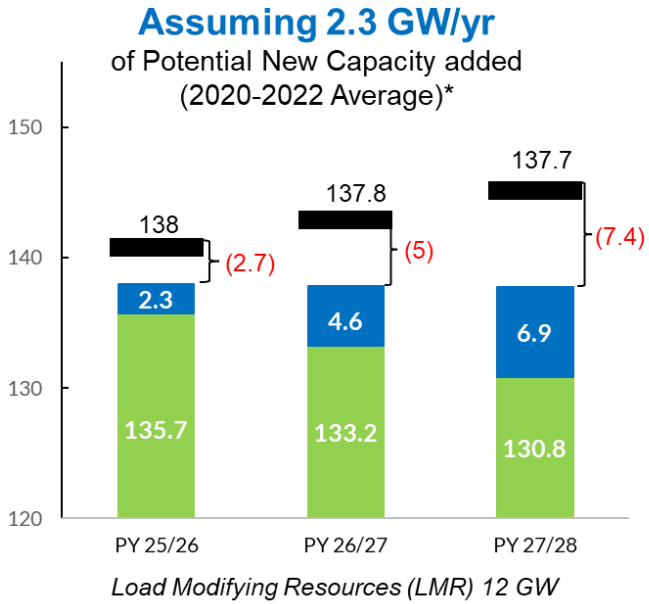
Recent assessments provide critical insights into the current state and future projections of our energy grid

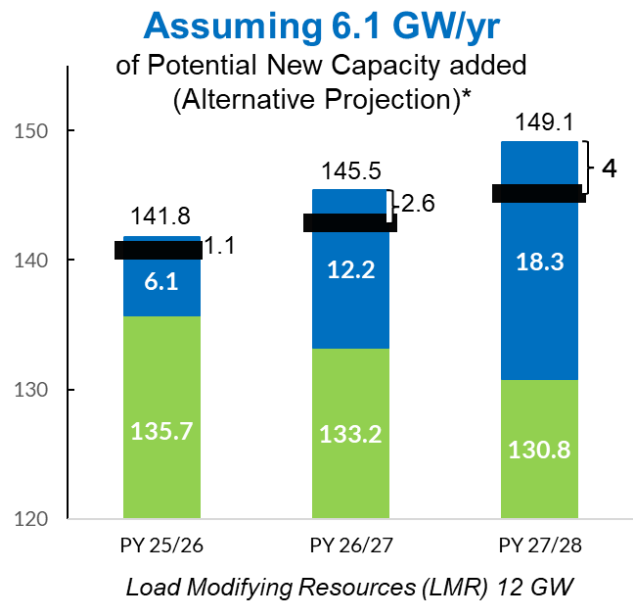
2024 NERC Long-Term Reliability Assessment



High Risk: shortfalls may occur at normal peak conditions
Elevated Risk: shortfalls may occur in extreme conditions
Normal Risk: low likelihood of electricity supply shortfall

2024 OMS-MISO Survey Results





MISO is undertaking significant market reforms, many prioritizing adequacy by improving signals to inform resource needs on the system

Ongoing Challenges

- Accelerating demand for electricity
- Rapid pace of generation retirements continue
- Loss of accredited capacity and reliability attributes
- Continued addition of renewable resources
- Delays of new resource additions
- More frequent extreme weather

Completed Initiatives

- ✓ Implemented Reliability-Based Demand Curve in 2025 PRA
- ✓ Non-emergency resource accreditation *(effective PY 2028/29)*
- ✓ Generation interconnection queue cap
- ✓ Improved generator interconnection queue process (*New application portal coming June 2025)*
- ✓ Approved over $30 billion in new transmission lines

Initiatives In Progress

- ❑ Implement Direct Loss of Load (DLOL)-based accreditation
- ❑ Enhance resource adequacy risk modeling
- ❑ Reduce queue cycle times through automation
- ❑ Implement interim Expedited Resource Addition Study (ERAS) process *(June 2025)*
- ❑ Demand Response and Emergency Resource reforms
- ❑ Enhance allocation of resource adequacy requirements

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

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

Completed

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

In-Flight or Planned

- Provide Accreditation Data
- Implement Shortage Pricing in Energy Markets
- 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 Reserve Products Including Regulation and Ramp
- Demand Response and Emergency Resources Reforms
- Planning Reserve Margin Requirement allocation enhancement
- Capacity Accreditation for Resource with PGIA Interconnection

Appendix

MISO Resource Adequacy Filings

Filing Date	Docket Number	Description (*items listed in BOLD denote 'major' MISO RA filings*)	Links
12/15/2017	**ER18-462-000**	**Resource Adequacy Construct Refiling**	Filing / Order
8/31/2018	**ER18-2363-000**	**Resource Adequacy Construct Locational Enhancements (refiled from original filing rejection)**	Filing / Order
12/21/2018	ER19-650-00 ER19-651-000	Resource Availability and Need LMR Availability Filing Resource Availability and Need LMR Testing Filing	Filing / Order
1/30/2019	ER19-915-000	RAN Outage Coordination Filing	Filing / Order
8/8/2019	ER19-2559-000	PRA Process Timeline enhancements	Filing / Order
5/18/2020	ER20-1846-000	Filing to Enhance Accreditation of Load Modifying Resources	Filing / Order
5/29/2020	ER20-1942-000	Conventional Deliverable ICAP Filing	Filing / Order
6/5/2020	ER20-2005-000	Intermittent Deliverable ICAP Filing	Filing / Order
12/21/2020	ER21-693-000	LMR Performance Evaluation Filing	Filing / Order
1/21/2021	ER21-920-000	Demand Response Testing Deferral and Collateral Handling	Filing / Order
8/6/2021	**ER21-2620-000**	**Hybrid Resource Accreditation**	Filing / Order
11/30/2021	**ER22-495-000**	**RAN Seasonal Construct and Availability based accreditation**	Filing / Order
1/19/2023	ER23-904-000	Shortage and Near-Shortage Pricing Enhancement	Filing / Order
9/29/2023	**ER23-2977-000**	**Reliability Based Demand Curve**	Filing / Order
3/28/2024	**ER24-1638-000**	**Resource Accreditation Reform (DLOL)**	Filing / Order
11/26/2024	**ER25-579-000**	**Shortage Pricing and Price Formation Reforms for VOLL and ORDC**	Filing / Order
3/21/2025	**ER25-1729-000**	**Demand Response Participation Rules Enhancements (Pending)**	Filing
4/4/2025	**ER25-1886-000**	**Demand Response and Emergency Resources Reforms (Pending)**	Filing