



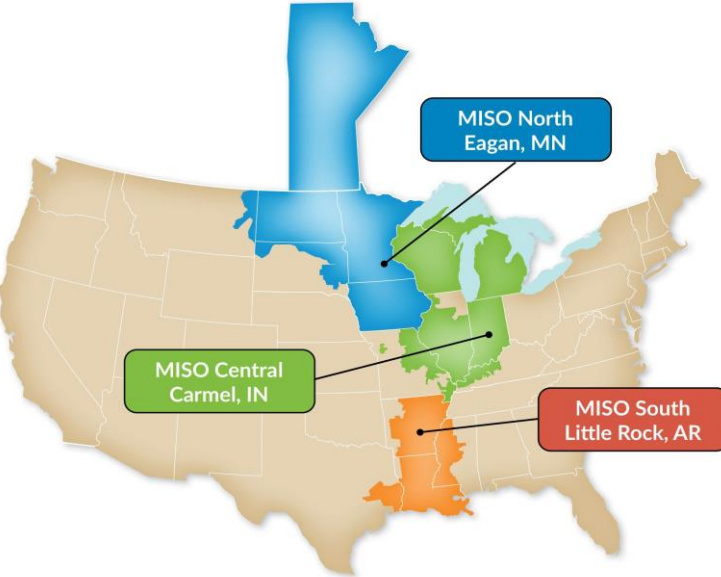
# MISO Update: Reliability Imperative

Illinois Renewable Energy  
Conference  
Marc Keyser  
October 2<sup>nd</sup>, 2024

# Executive Summary

- The OMS-MISO Survey shows capacity is insufficient to support expected load growth
- Broad agreement exists around significant load increases ahead although visibility into magnitude and timing is currently limited
- The Regional Resource Assessment shows only modest growth in accredited capacity
- Many approved new resources will be delayed getting online, and neighbors' capacity margins are declining quickly
- A coordinated transition plan is required, including deferring retirements until other options are available

MISO is an independent, not-for-profit Regional Transmission Organization serving 15 U.S. states and one Canadian province



MISO's reliability footprint and locations of regional control centers.



Who we serve	
Members	197
Market Participants	500+
Customers Served	45 Million
Value Provided to Members	\$4 Billion

MISO by the numbers	
High Voltage Transmission	75,000 miles
Generating Units	6,800+
Generation Capacity	217 GW
Peak Summer System Demand	127 GW

# What does MISO do?

## Efficient Wholesale Market Management & Operations to Ensure Reliability

- Conduct day-ahead and real-time energy and operating reserves markets
- Manage least cost economic dispatch of generation units
- Monitor and schedule energy transfers on the high voltage transmission system



## Comprehensive Regional Transmission Planning

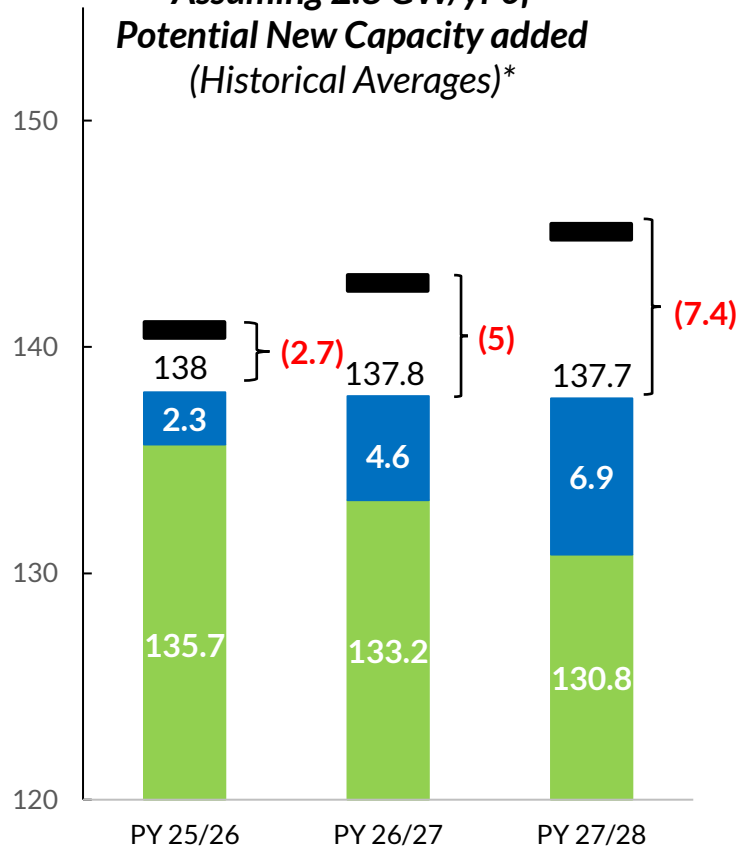
- Long-range transmission planning
- New generator interconnection and retirement
- Transmission studies, e.g., Renewable Integration Impact Assessment (RIIA)

***MISO's Vision: Be the most reliable, value-creating RTO***

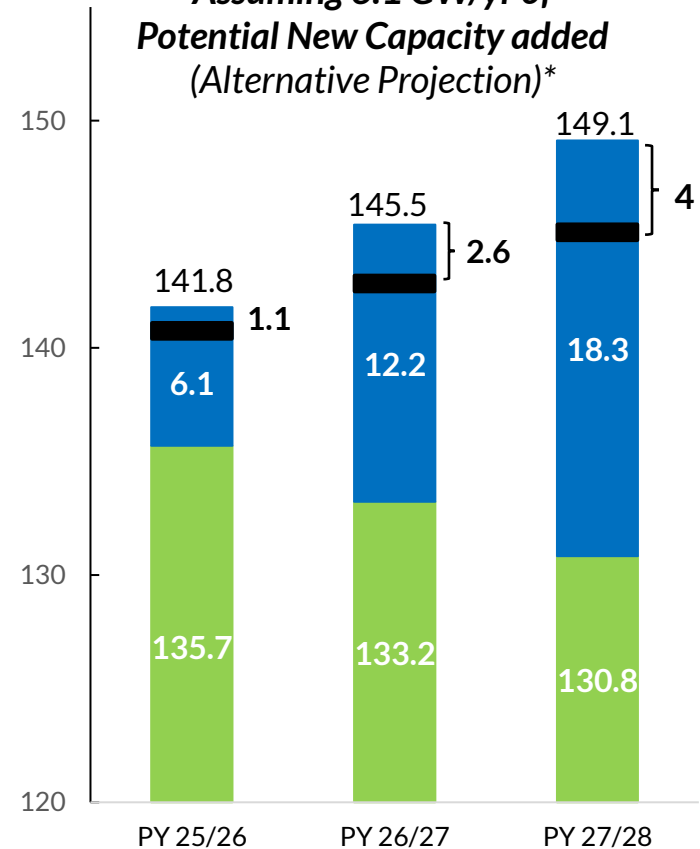
# 2024 OMS-MISO Survey indicates increasing capacity deficits requiring a dramatically accelerated pace of new build to mitigate

## OMS - MISO Survey Resource Adequacy Projections – Summer (Accredited GW)

**Assuming 2.3 GW/yr of Potential New Capacity added (Historical Averages)\***



**Assuming 6.1 GW/yr of Potential New Capacity added (Alternative Projection)\***



An unprecedented pace of new capacity additions to mitigate deficits would require:

- Easing of supply chain challenges
- Reduced permitting delays
- Adequate skilled labor
- Supportive commercial viability
- Continued queue improvements

Projected PRMR  
 Potential New Capacity  
 Committed Capacity

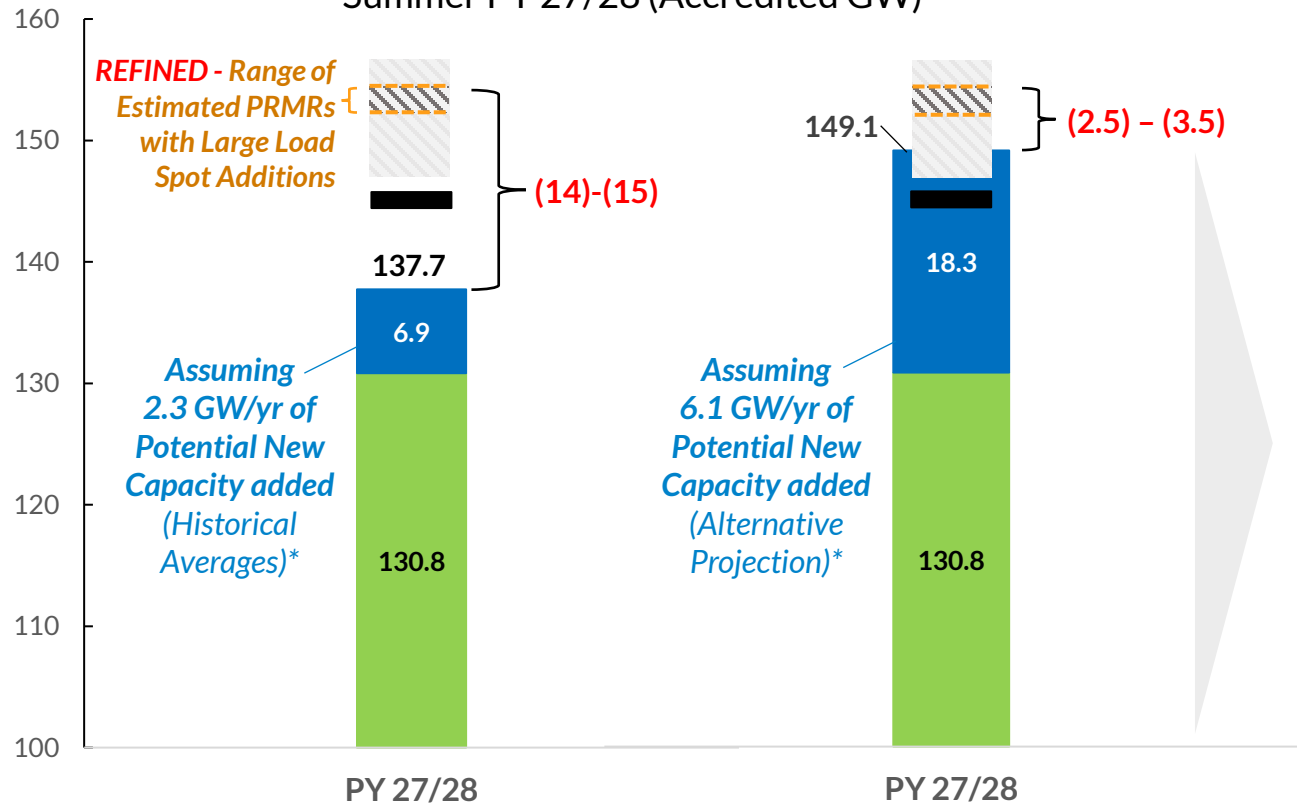
- Bracketed values indicate difference between Committed+ Projected New Capacity and projected LSE PRMR
- Capacity accreditation values and PRM projections based on current practices
- Regional Directional Transfer (RDT) limit of 1,900 MW is reflected in this chart

PRMR: Planning Reserve Margin Requirement All references to capacity indicate Seasonal Accredited Capacity (SAC)






\* Using methods for Potential New Capacity described in 2024 OMS-MISO Survey presentation

# The trend of announced large load additions will exacerbate the urgency for new generation, including dispatchable, long-duration resources

**MISO Resource Adequacy Projection vs.  
an Expanded Range of Future Large Load Spot Additions\***  
Summer PY 27/28 (Accredited GW)



**Meeting a high spot load addition scenario would require capacity be added at a rate even greater than the 6.1 GWs/year assumed here**

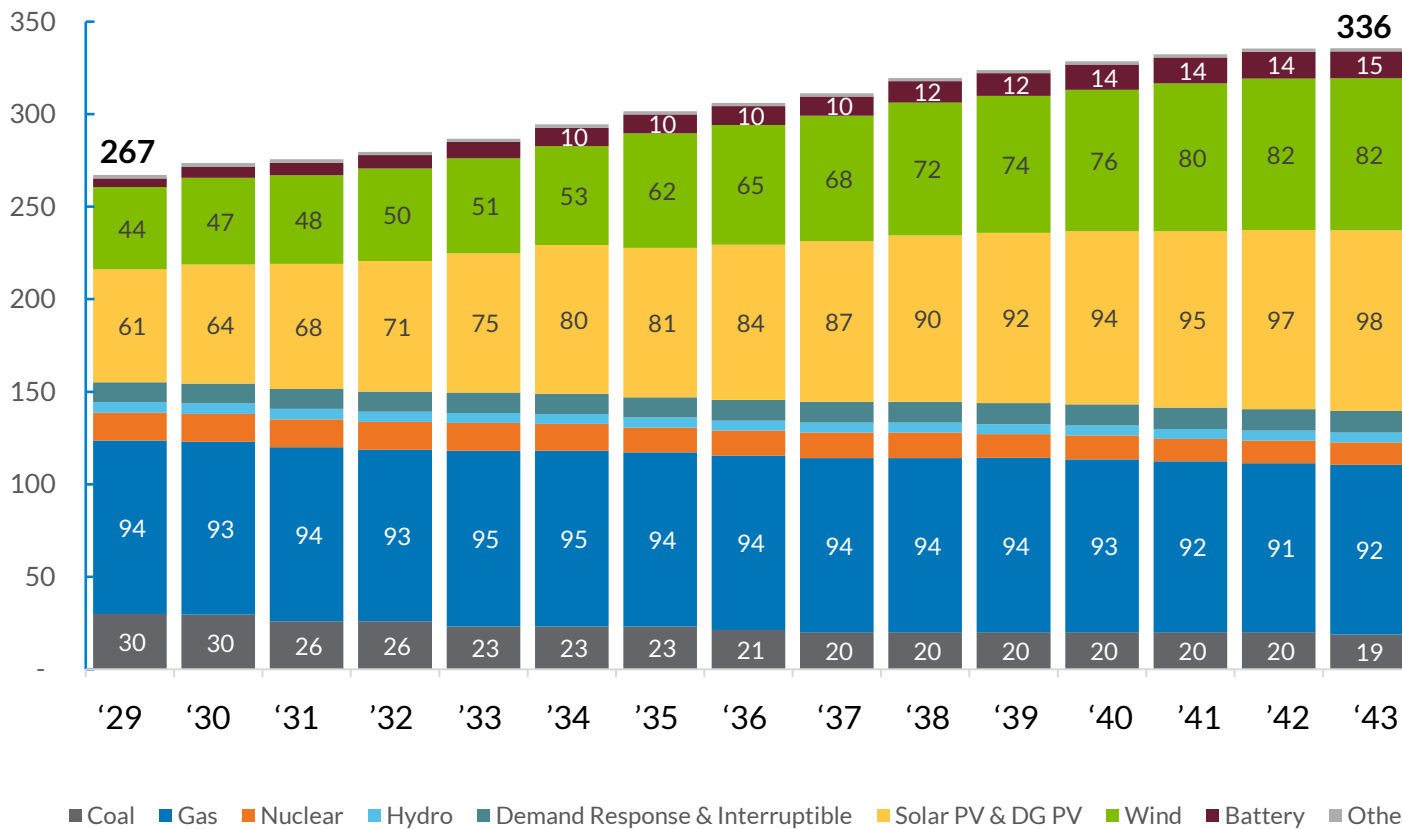
-  **REFINED** Range of Estimated PRMRs with Large Load Spot Additions
-  ORIGINAL Range of Estimated PRMRs with Large Load Spot Additions
-  Projected PRMR with LSE load forecast
-  Potential New Capacity
-  Committed Capacity

- Bracketed values indicate difference between Committed + Projected New Capacity vs. Projected PRMR with large spot-load additions
- Capacity accreditation values and PRM projections based on current practices
- Regional Directional Transfer (RDT) limit of 1900 MW is reflected in this chart

\* Using methods for Potential New Capacity and Large Load Spot Additions described in 2024 OMS-MISO Survey presentation  
PRMR: Planning Reserve Margin Requirement

# However, member-submitted plans in the 2024 Regional Resource Assessment (RRA) show new additions are primarily weather-dependent resources

Existing & Planned Member Fleets, Installed Capacity (GW)



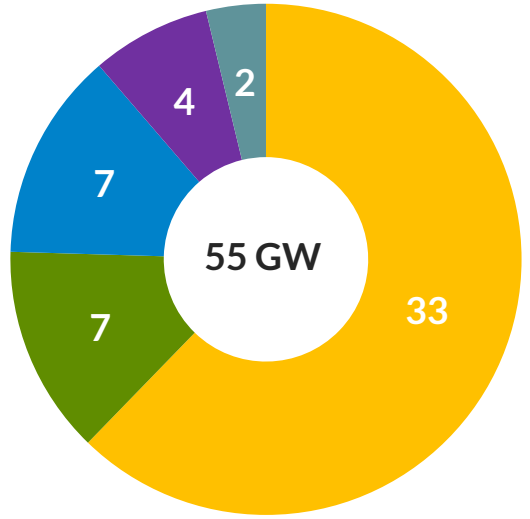
2029	2043	Change
<b>Installed Capacity (GW)</b>		
267	336	↗ 26%
<b>Accredited Capacity (GW) (Current Methodology*)</b>		
183	193	↗ 5%
<b>Accredited Capacity (GW) (Draft Future Methodology**)</b>		
~160	~160	→ 0%

\* Current Methodology (Summer Season): Solar accredited at 50% through 2027, declines to 20% in 2037 and levels off. Wind accredited at 16.6%.

\*\* Future Methodology (Summer Season): Draft/Indicative-only: Solar accredited at < 10% by 2027, declining thereafter. Wind also approaches 10% in 2027, declining at a slower pace relative to solar.

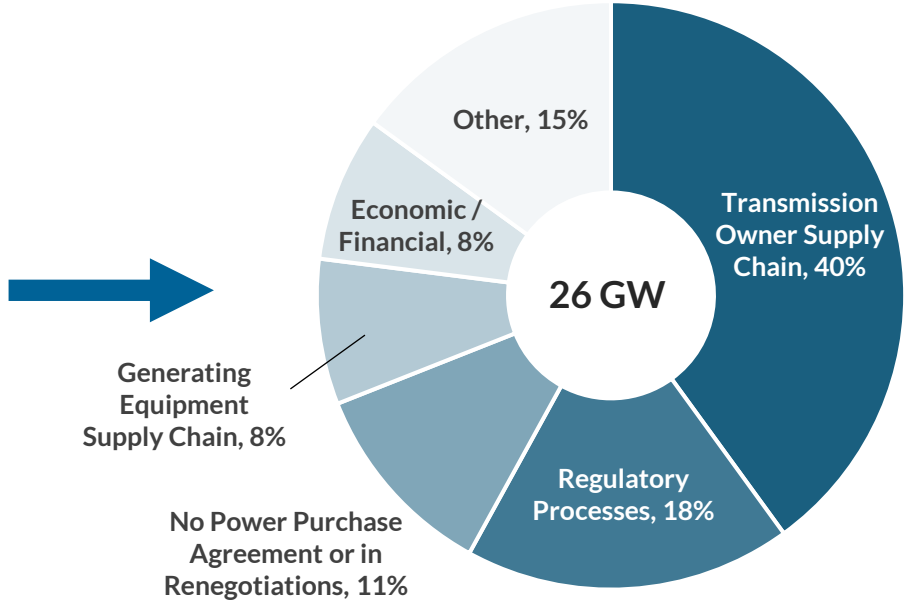
# While we are approving more new resources, approximately half continue to experience delays in getting online

Approved Generator Interconnection Requests (GW)\*



Other Gas Wind Solar Hybrid Storage

Approximately Half of Projects Report Development Delays\*\*



50 GW of resources approved through MISO's interconnection processes are in or awaiting construction with approximately 50% already signaling a delay

\*Queue data as of September 4, 2024

\*\* Reasons for delay based on responses from a subset of delayed projects



# Capacity trends of our RTO neighbors point to declining availability of supportive transfers

## PJM

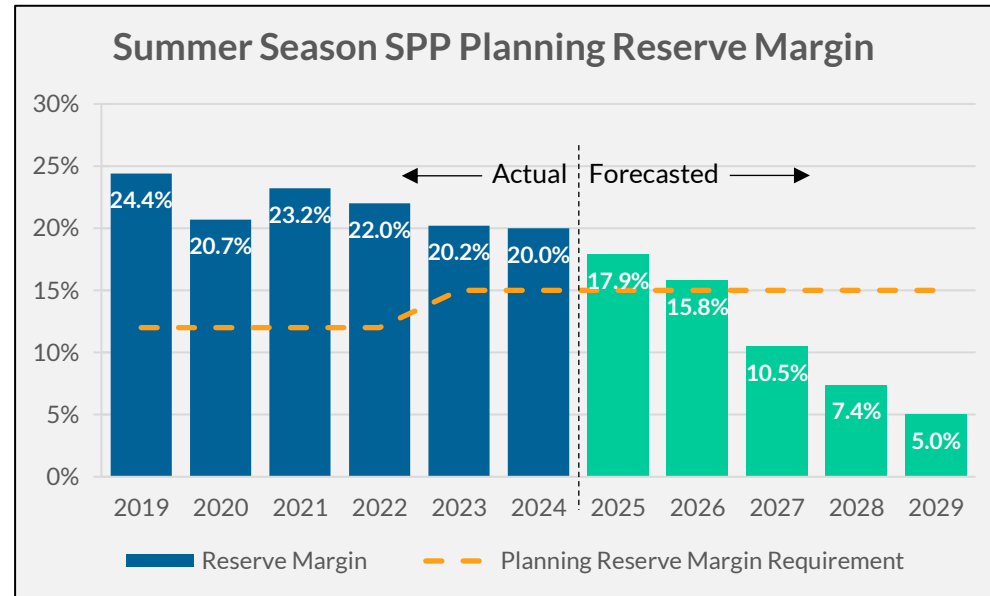
Significant year-over-year supply/demand changes resulted in record prices in capacity auction for 2025/26 delivery year

Offered Supply:	- 13.3 GW	(down 8.8% vs. prior year)
Load:	+ 3.2 GW	(up 2% vs. prior year)
Reserve Margin: (% above target)	0.7%	(vs. 5.4% in prior year)
Clearing Price:	~ \$270 / MW-day	(vs. ~\$29 in prior year)

Source: PJM 2025/2026 Base Residual Auction Report

## Southwest Power Pool

No capacity auction but reserve margin projected to fall to requirement in 2026 and decline further



Excess capacity of 2,750 MW in 2024 becomes a deficit of 5,950 MW in 2029 due to:

- 10% increase in forecasted demand
- 3% reduction in capacity

Source: 2024 SPP Resource Adequacy Report

# MISO has made considerable progress on evolving our processes and tools to support resource adequacy, but additional coordination can drive more efficient and effective resource planning

## Recently Completed / In-Process

Initiative	Objective
Seasonal Requirements in Planning Resource Auction	More accurately reflect variations in resource capabilities and availability
Accreditation Enhancements	Improve alignment of capacity “value” with reliability contribution
Reliability-Based Demand Curve	Improve price signals for capacity and inform investment decisions
Shortage Pricing	Incentivize market participant real-time behavior and actions to avoid potential shortage situations



## Next Opportunity

- As the fleet continues to evolve, visibility and clarity will be critical to support timely and prudent action.
- MISO processes and assessments provide insights into the region’s short- and long-term supply and demand picture:

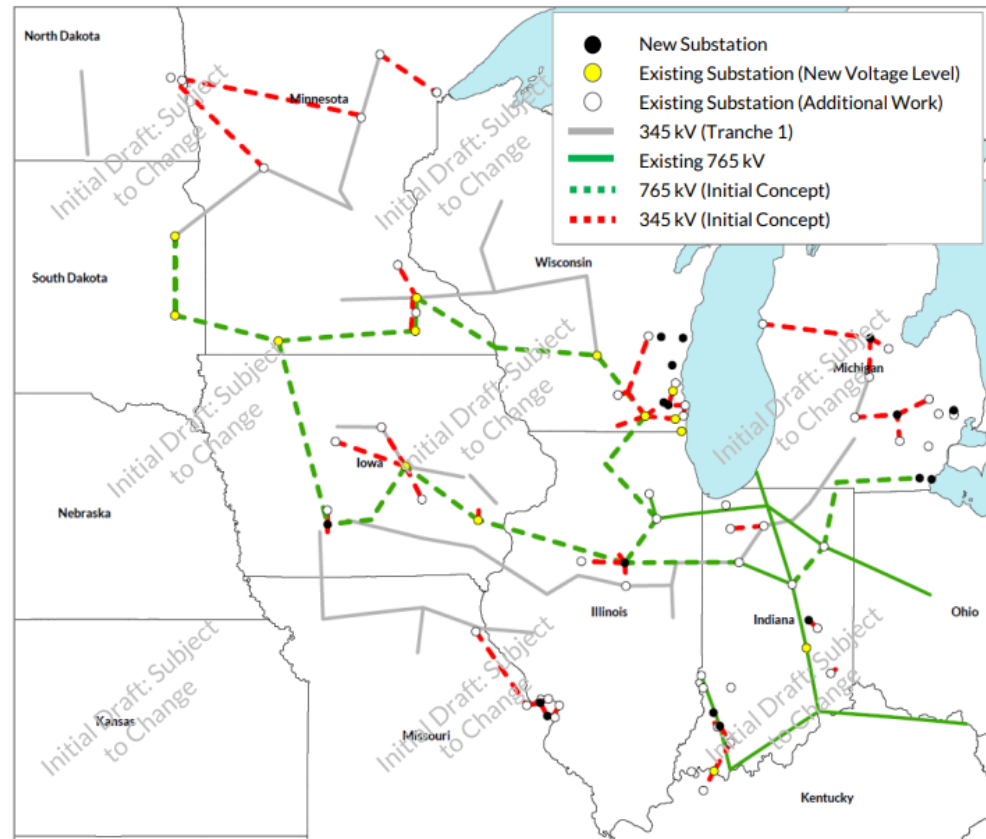
Planning Resource Auction	1 Year
OMS-MISO Survey	5 Years
Regional Resource Assessment	20 Years
MISO Futures	20 Years

- A recent stakeholder survey uncovered a desire to evaluate streamlining MISO’s assessments, which may improve participation.

# MISO's Long Range Transmission Planning effort provides the transmission infrastructure our membership will need to connect supply with demand

## Near-Final Tranche 2.1

Projects as of 07/12/2024



# Addressing the Reliability Imperative and operational challenges remains MISO's focus to meet the reliability pressures facing our region.

## Market Redefinition

### Completed

- ✓ Reliability Based Demand Curve FERC filing (2025/26 PRA)
- ✓ Direct Loss of Load FERC filing (2028/29 PRA)
- ✓ Attributes roadmap published

### In-Process

- Accreditation Reforms implementation (2028/29 PRA)
- Scarcity Pricing filing (targeted Q4 2024) and implementation (2025)
- Load Modifying Resources filing (targeted Q4) and implementation (2028/29 PRA)
- Ancillary Services deliverability

## Transmission Evolution

### Completed

- ✓ Completed Tranche 1 solicitations
- ✓ Filed JTIQ tariff changes with FERC
- ✓ Launched MTEP enhanced portal
- ✓ Completed queue process reforms

### In-Process

- Tranche 2.1 Approval (targeted Q4)
- PJM Interregional Study
- Additional queue reforms (CAP filing)
- Order 1920 assessment

## System Enhancements

### Completed

- ✓ Enhanced protective security controls
- ✓ Implemented new data and analytics platform
- ✓ Deployed first machine learning tool
- ✓ New Day Ahead Market Clearing Engine Operational (targeted Q3)

### In-Process

- Real Time Market Clearing Engine (RAC)
- FERC Order 881 day ahead system changes
- CIP rearchitecture and expanding data analytics

## Operations of the Future

### Completed

- ✓ Operator in training program
- ✓ Implemented uncertainty management model

### In-Process

- Expand uncertainty management with predictive model with shorter time horizons
- Enhance congestion and outage management
- Expand observability, dispatch, and control

