

Summary of 2025 MISO State of the Market Report

Presented to:

MISO Markets Committee of the Board of Directors
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Introduction

- As the Independent Market Monitor (IMM) for MISO, we:
 - Monitor the performance of the market, the market operator, and the conduct of the market participants
 - Investigate and evaluate issues in these areas to develop remedies, needed improvements, sanctions or other market power mitigation measures, and manipulation referrals to FERC
 - Produce reports that summarize our key findings, the most extensive of which is our Annual State of the Market (SOM) Report
- This presentation summarizes the following aspects of our 2025 SOM Report:

**Market
Performance
in 2025**

**Operational
Challenges**

**Future Market
and System
Needs**

**Recommended
Improvements**

Progress in Improving MISO's Markets in 2025

- MISO has continued to respond to past recommendations and implemented several key changes in 2025:
 - **Capacity Market:** MISO transitioned to a reliability-based demand curve in the 2025/2026 Planning Resource Auction, is reforming its resource accreditation to reflect resources' marginal contribution to the reliability of the system in the riskiest hours, and removed Energy Efficiency
 - **Energy Market:** MISO reformed its shortage pricing provisions in the Fall of 2025 to allow energy and ancillary service prices to better reflect the expected potential costs of load shedding and recently filed recommended penalties to improve incentives for resources to follow setpoints
 - **Market Operations:** MISO made key changes in its commitment practices and operating procedures to manage congestion, which has greatly reduced inefficient uplift payments. MISO also improved its logging systems and improved its emergency procedures
- These changes will improve the performance of the markets and the operation of the system

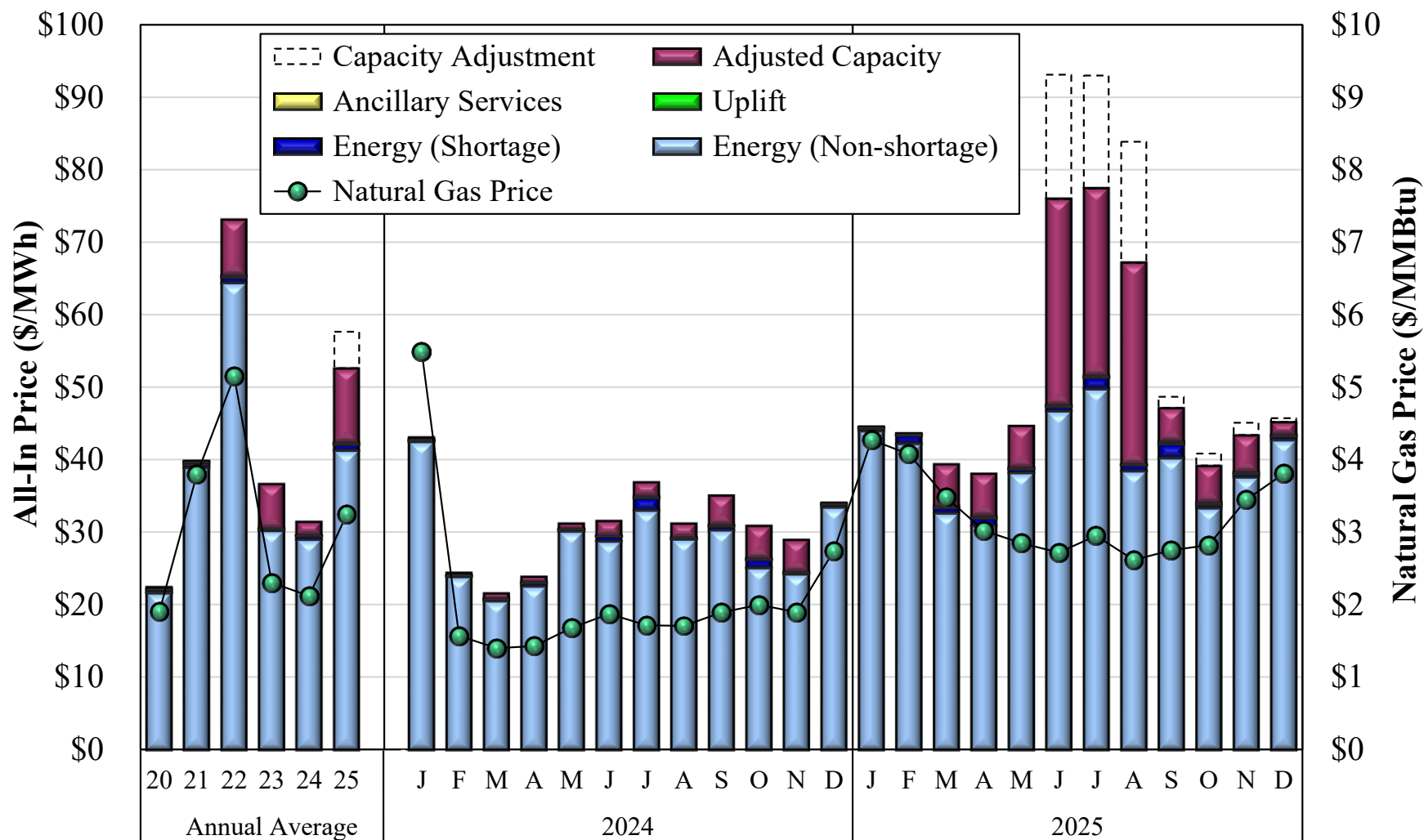
Competitive Performance and Areas of Focus

- The MISO markets performed competitively – the “price-cost mark-up” was slightly negative – indicating that offers were highly competitive
- In many respects, MISO’s markets are more advanced and well-developed than other RTOs’, leading to superior performance
- We identify opportunities to lower costs and improve MISO’s market performance, many of which will be critical in the coming years as its generating fleet evolves and system uncertainty rises
- The report recommends important improvements in these key areas:
 - Changes needed to successfully navigate the clean energy transition
 - Network utilization to lower congestion costs and improve reliability
 - Market and system operations, including minimizing out-of-market actions
 - Real-time pricing and the incentives it provides for good generator performance, availability and flexibility, and
 - Alignment between the capacity market and MISO’s reliability needs

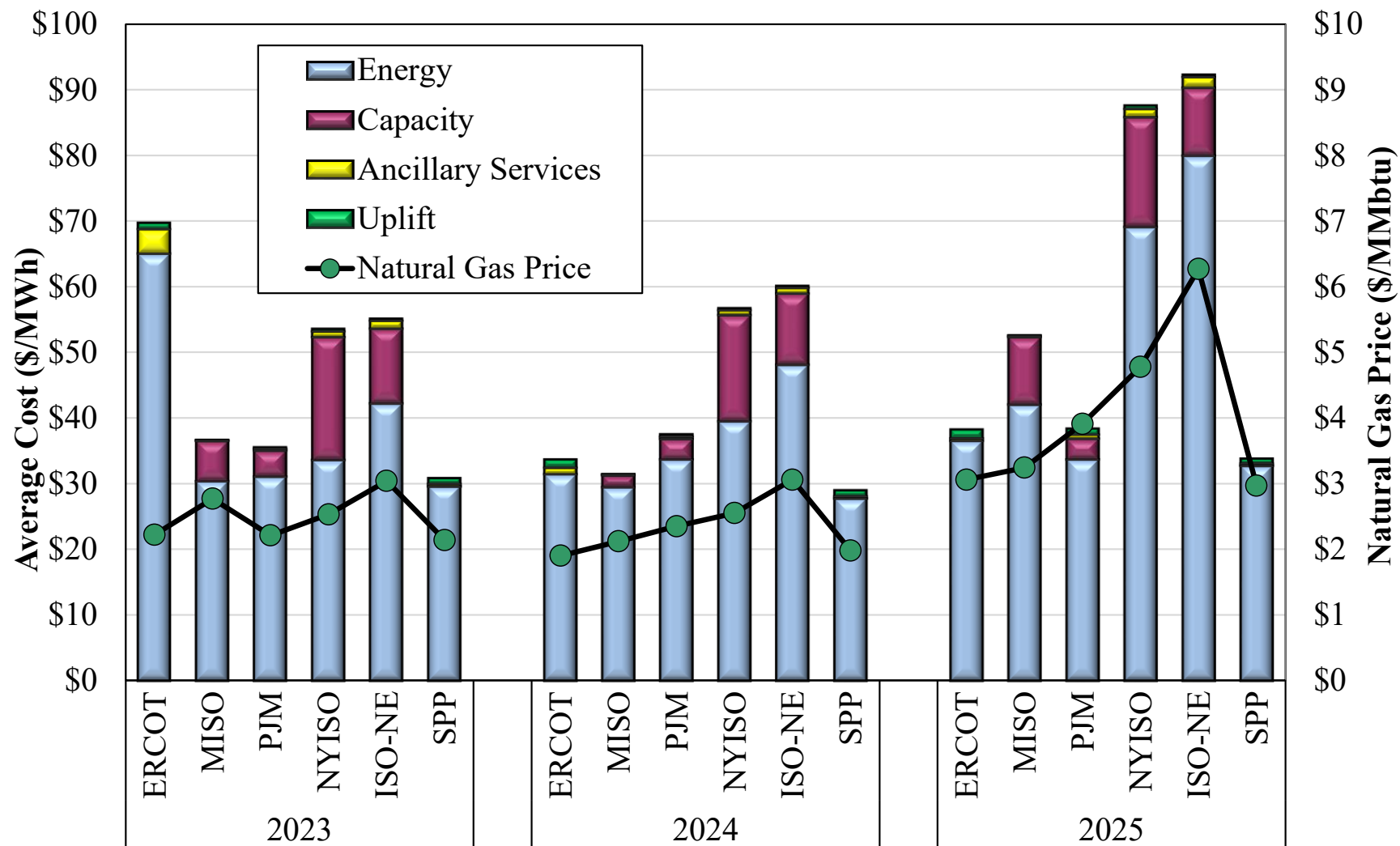
Market Highlights: Load and Prices

- The all-in price in 2025 shows a 67 percent increase to average \$53 per MWh
 - The increase in energy prices reflects a 58 percent increase in natural gas prices and a 3 percent increase in average system load
 - The capacity contribution to the all-in price rose significantly as a result of MISO's implementation of the Reliability-Based Demand Curve in the auction
- Real-time transmission congestion rose by about 23 percent to \$2.2 billion
 - Higher gas prices were the primary driver of the increase
- Real-time congestion and wind curtailment are still higher than optimal because of several key congestion management issues:
 - Conservative static ratings by most transmission owners
 - Defining and coordinating market-to-market constraints
 - MISO's operating actions (transmission derates and manual re-dispatch)
 - MISO's limited authority to coordinate outages
- We continue to recommend several improvements to lower the cost of managing congestion on MISO's system

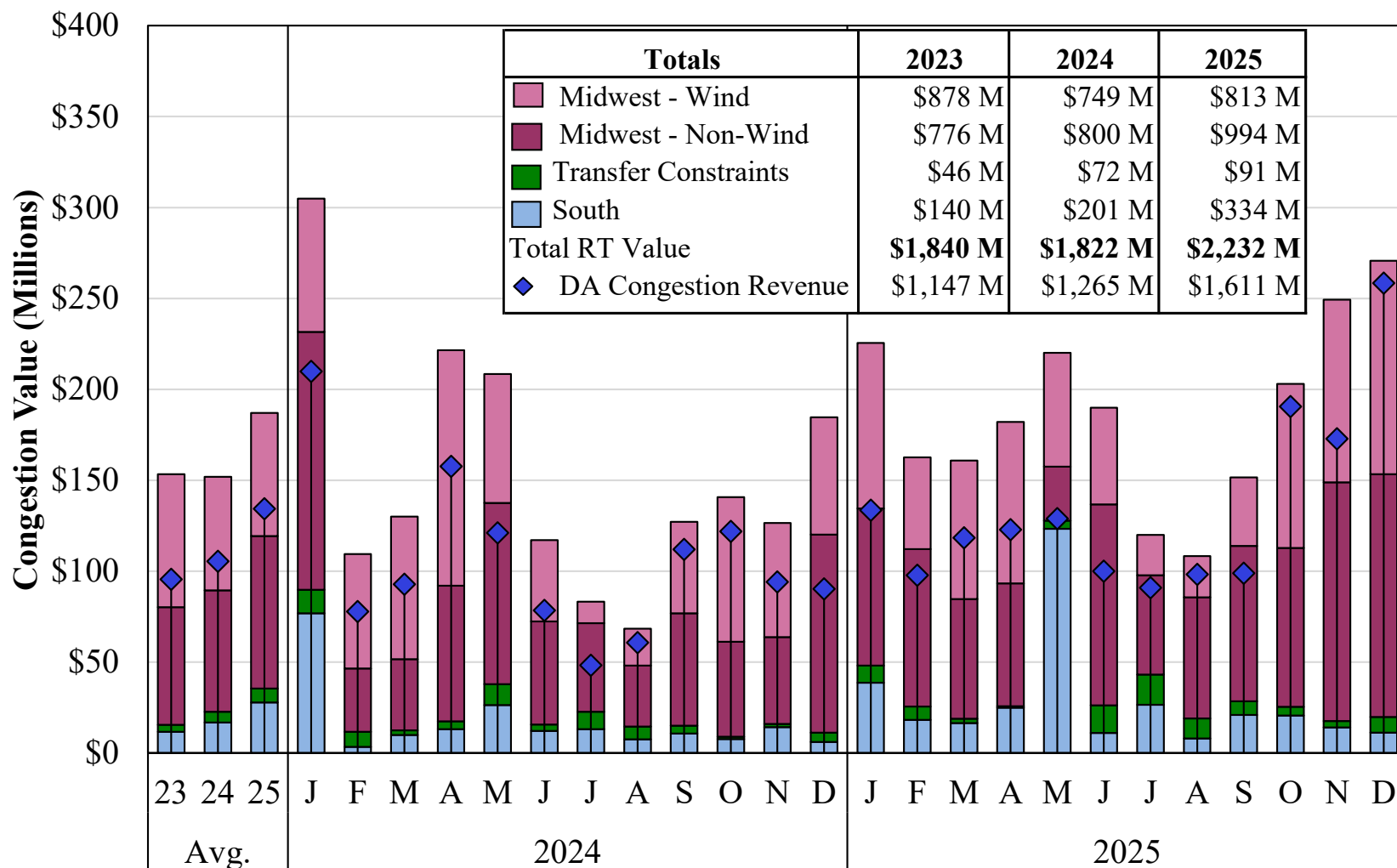
All-In Price



All-In Price Comparison



Real-Time Value of Congestion in MISO



Day-Ahead Market Performance

- Day-ahead market performance is key because it coordinates the commitment of MISO's resources and facilitates almost all settlements
- MISO's day-ahead market performed well in 2025:
 - Day-ahead prices converged well with real-time prices, exhibiting a premium of two percent on average
 - However, episodes of congestion caused by generation and transmission line outages led to transitory periods of divergence at various locations
 - Market power mitigation is infrequent in the day-ahead market because the market is extremely liquid and competitive
- The report shows that virtual trading enhanced the efficiency of the market by improving the day-ahead market's coordination of resources
- We have recommended a virtual spread product for years that would facilitate arbitrage of congestion deviations with the real-time market and improve convergence

Virtual Participation in MISO and Other RTOs

- The good performance of the day-ahead market was due in part to active virtual trading that provides essential liquidity in the day-ahead market
 - Virtual trading is more liquid as a percent of the load in MISO than in other RTO markets because other RTOs over-allocate costs to virtual transactions
 - This liquidity leads to good price convergence and low virtual load profits
 - Virtual supply profits are higher because MISO efficiently allocates to virtual suppliers the RSG costs that they cause by reducing resource commitments

2025 Market	Virtual Load		Virtual Supply	
	MW as a % of Load	Avg Profit	MW as a % of Load	Avg Profit
MISO	15.5%	-\$0.30	15.5%	\$1.49
NYISO	6.1%	\$3.39	7.7%	\$1.25
ISO-NE	4.5%	-\$3.19	8.0%	\$2.67
SPP	11.6%	\$1.80	16.7%	\$3.60
PJM	5.9%	\$1.01	6.0%	\$1.24

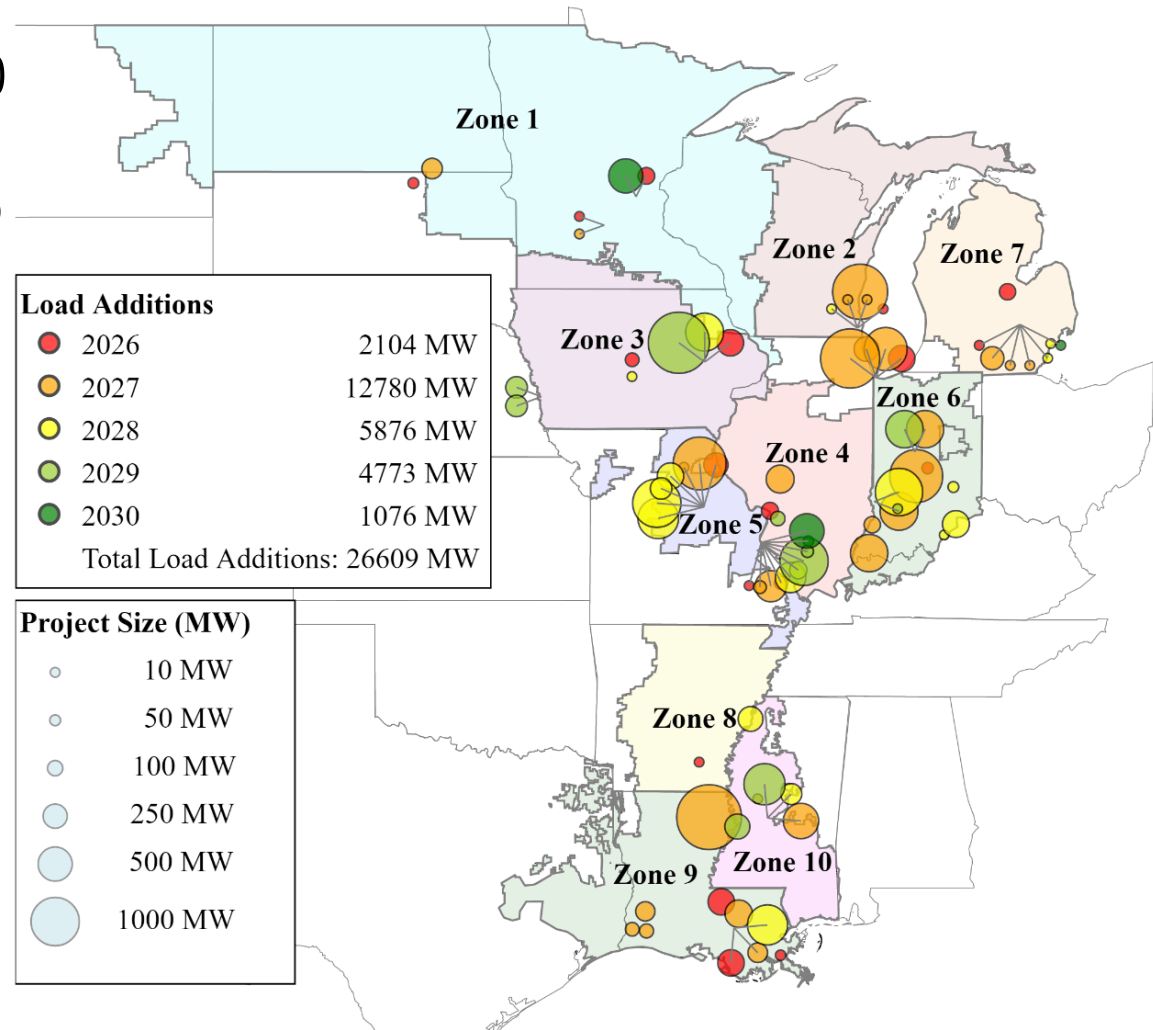
- Almost all virtual transactions are submitted by financial participants
- Our report shows that 57 percent of virtuals were efficiency-enhancing

Future System Needs

Future System Needs

Expected Large Load Additions

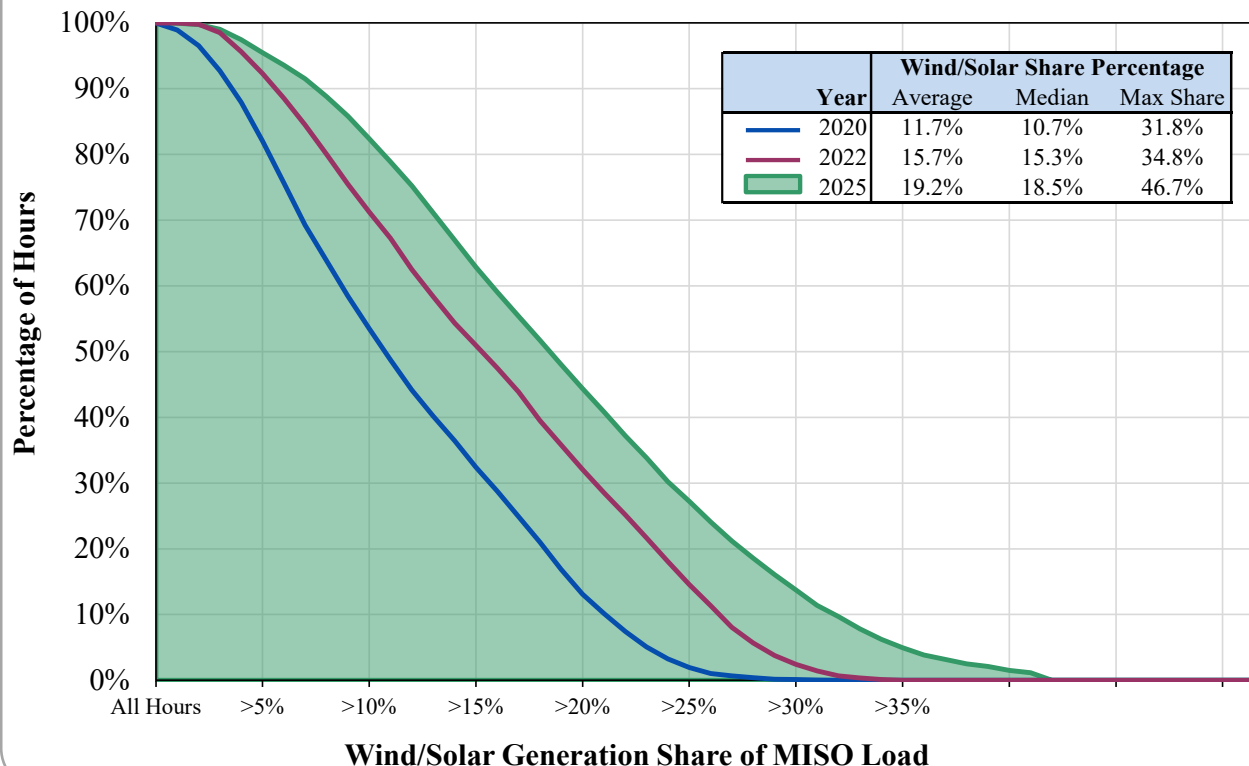
- MISO projects load additions of 26.6 GW by the end of 2030
 - Projected 5-year CAGR increased from 2.2% in 2025 to 3.1 to 5.1% in 2026 OMS-MISO survey
 - Improving the speed of the interconnection process and providing efficient market signals is critical
- Issues re: large loads:
 - Siting at weak network locations should be non-firm pending upgrades
 - Co-locating generation and load should not allow load to avoid capacity or transmission costs



Future System Needs

Share of MISO Load Served by Renewable Resources

- The share of load served by renewables is growing considerably, peaking at over 45 percent in 2025. This can cause significant issues:
 - Increased ramp demand volatility requiring sufficient dispatchable resources and new processes for addressing ramp uncertainty
 - Reliability issues requiring new penalties to ensure units follow curtailments

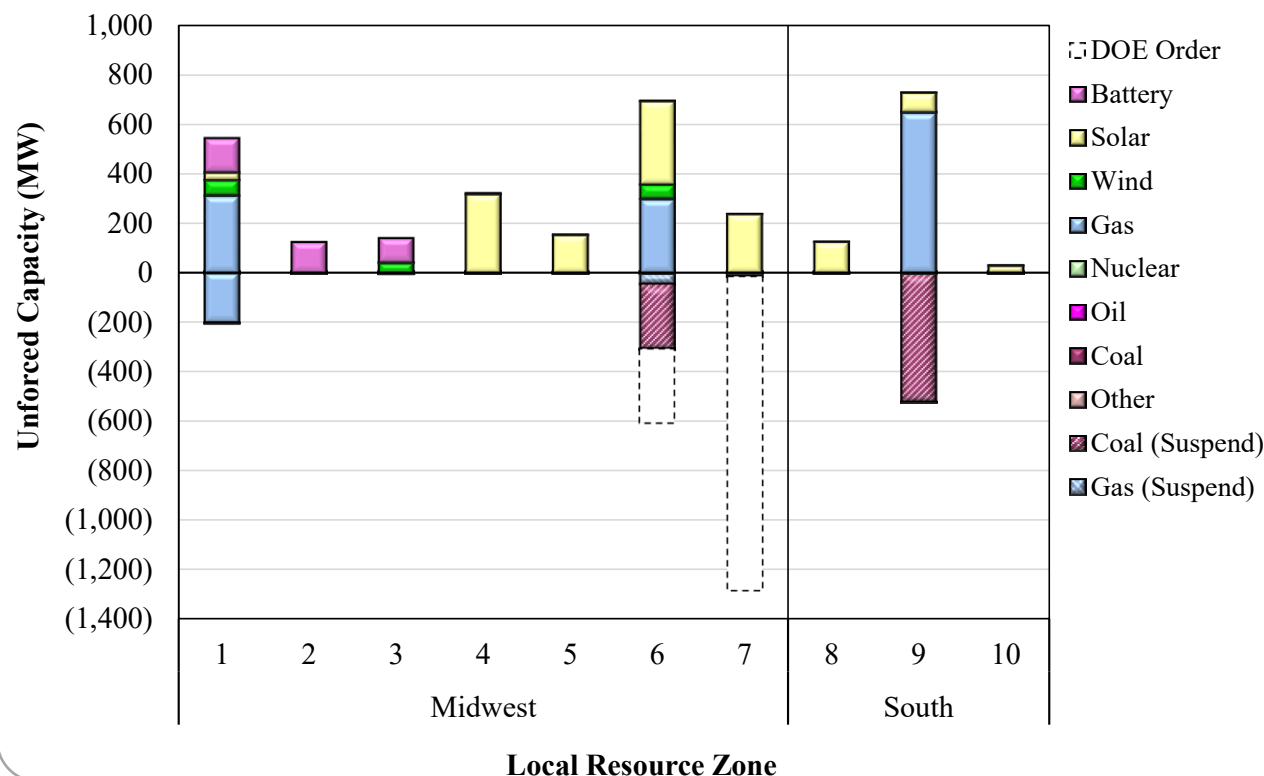


- Voltage/system support limitations inherent with inverter-based resources. MISO is partly addressing with new interconnection requirements
- Falling capacity value – addressed with marginal accreditation that will change incentives and planning

Future System Needs

Resource Additions and Retirements in 2025

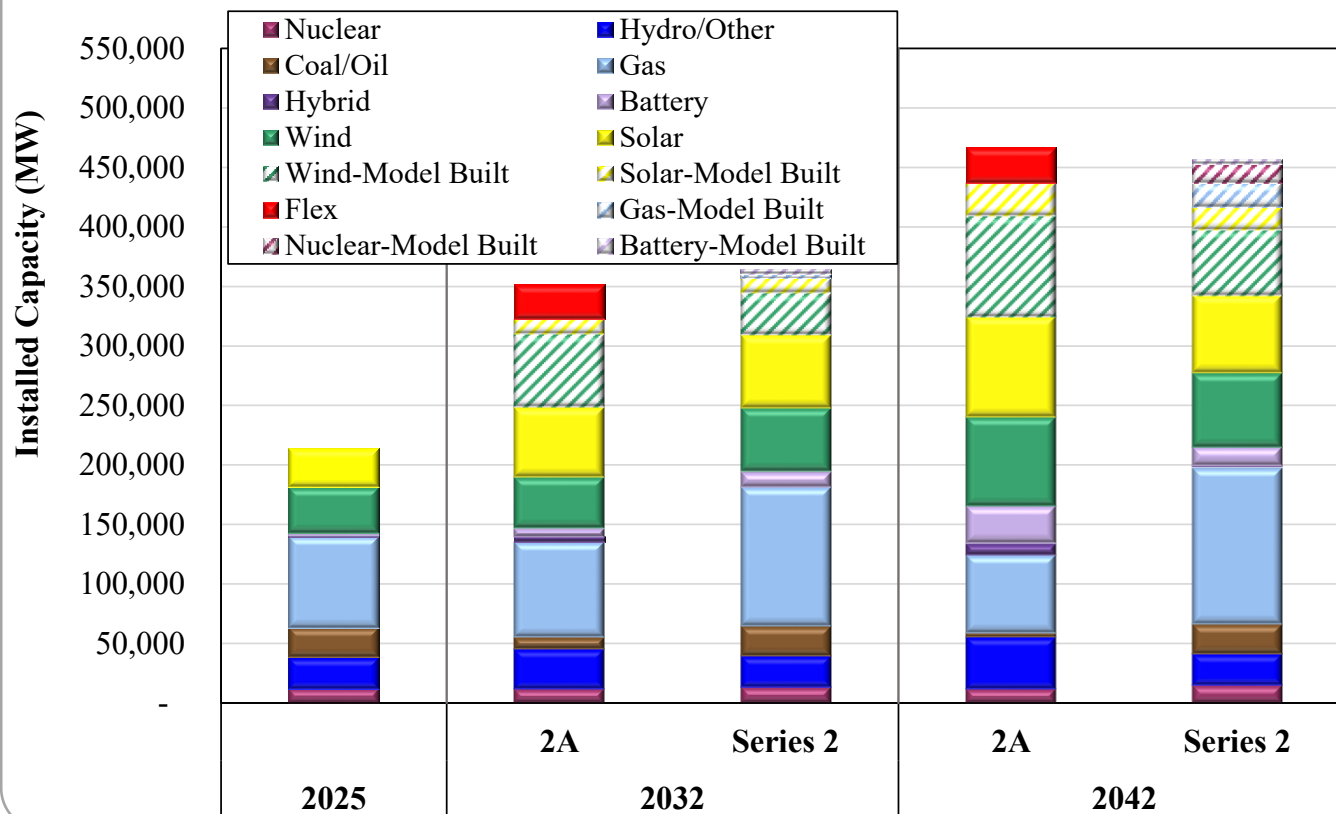
- 1.1 GW retired/suspended in 2025, mostly coal and gas steam units – MISO has not designated any new SSRs to prevent their retirement
 - The DOE directed 2.2 GW of coal-fired resources to remain online
- 3.1 GW of new capacity entered – 1.3 GW of solar units, bringing the total to 18 GW (nameplate), and > 1 GW of gas and 370 MW of storage



- Because the reliability value of solar and wind (accreditation) will fall sharply over time, continued investment in dispatchable generation will be essential for MISO to maintain reliability

Planning for Future System Needs

- We have been providing feedback on MISO's new Futures Cases, and they are a substantial improvement over Future 2A:
 - Dispatchable gas/coal resources roughly doubled and renewable resources fell by almost 30 percent – consistent with MISO's new accreditation (DLOL) and our comments on Future 2A



- Series 2 meets all goals and needs at much lower cost
- Total generation is lower in 2042 even with higher load – because the case builds higher-value resources
- Opportunities: (1) underinvestment in storage, (2) modeling affordability

New and Key Existing Recommendations by Area

Recommendations: Energy and Reserve Markets

New Recommendations

2025-1: Develop criteria for retroactive repricing to mitigate harm

- MISO's Tariff requires it to re-price market outcomes after certain errors occur
- Retroactive repricing can produce settlements inconsistent with market participants' decisions and binding contracts – and so cause real harm
- We recommend MISO develop Tariff criteria that limit market repricing to corrections of localized errors

2025-2: Reduce make-whole and reserve payments for deviating resources

- Overall control performance has declined over the past several years
- We've identified two concerns with deviating resources:
 - When resources do not follow dispatch, it likely indicates they are not capable of deploying reserves when needed
 - Resources producing above their dispatch instruction into their reserve range are paid for both energy and reserves for the same MW – this is a gaming concern
- Reducing/eliminating reserve and RSG payments to units that are deviating strengthens incentives to follow dispatch and addresses gaming

Recommendations: Energy and Reserve Markets

Key Existing Recommendations

2023-2: Enforce STR requirements in the load pockets

- MISO incurs substantial uplift costs to satisfy Local Reliability because they are not satisfied and priced through the market
- To address these concerns, we recommend that MISO develop and enforce STR requirements in load pockets that have VLR needs
- This will provide more efficient economic signals for investment in generation and transmission in these load pockets in the long term

2020-1: Develop a real-time capacity product for uncertainty

- Provides access to real-time resources through the market that can start in up to 2 or 4 hours
 - This will set prices more efficiently when conditions are tight
- By procuring and pricing this through the market, out of market actions and the associated RSG costs will be reduced

Recommendations: Market Operations and Congestion

Key Existing Recommendations

Most Valuable Transmission Congestion Improvement

- Although the Order 881 deadline was extended to 2028, we encourage MISO to work with TOs to implement real-time AARs as soon as possible
 - We estimate savings exceeding \$320 million in 2025

2021-4: Develop a look-ahead dispatch and commitment model to optimally manage fluctuations in net load and the use of storage resources

- The 5-minute dispatch does not efficiently manage upcoming ramp demands or energy storage with intertemporal limitations
- This will be increasingly crucial for renewable and storage integration

2019-4: Optimize CTS schedules every five minutes based on the RTOs' alternative real-time load scenarios (interchange optimization)

- Optimizing interchange every five minutes can virtually eliminate transitory shortages in each market as they are rarely short at the same time
- We estimate this would lower average prices in each market by ~\$2 per MWh
 - This would lower the market costs of energy by roughly \$1.4 billion annually

Recommendations: Resource Adequacy

New Recommendations

2025-3: Ensure alignment of capacity obligations with LMR capability and ensure that anticipated large loads are in the load forecast

- It is critical for all LMRs/DR to be represented on the demand side of the PRA
 - Allowing load that is not in the capacity demand to sell capacity leaves MISO short
 - This misalignment could grow as large loads enter and register as LMRs
- All large loads should immediately be included in the capacity demand, which MISO's processes do not currently ensure

2025-4: Replace CRNCC rules with a daily capacity balancing settlement

- MISO's current capacity replacement penalty framework creates inefficient outage scheduling incentives
- We propose a Capacity Replacement Settlement (CRS) that would require a cleared capacity resource to buy substitute capacity each day it is unavailable
 - During times of ample surplus capacity, prices for replacement capacity would be low or zero, generally rising during scarce-capacity periods
 - Eliminates incentives to seek capacity revenue for unavailable resources or those that provide very little reliability value to the system

Recommendations: Resource Adequacy

New Recommendation

2025-5: Improve capacity accreditation

We propose four changes to improve capacity accreditation

1. MISO should correct its maintenance margin calculation
 - MISO uses the maintenance margin to approve exempt planned outages so they do not affect a resource's accreditation
 - We have identified some assumptions that cause the maintenance margin to be inaccurate that we recommend MISO modify
2. Use actual output in accreditation calculations for resources running off-control
 - MISO cannot access the capacity above the current output of off-control units
 - Accreditation rules should be modified to not account for this unavailable capacity
3. The DLOL accreditation approach, slated to begin in PY 2028-29, should consider gas resources with firm and non-firm supply separately
 - In the winter season, gas-fired resources without firm supply (such as dual fuel capability) may not be able to buy gas and contribute to reliability
4. Modify the hours used to accredit solar resources to address the current over-accreditation of existing resources

Recommendations: Resource Adequacy

New Recommendation

2025-6: Impose penalties on units not performing in their emergency ranges

- In recent events, we have frequently observed generators not following dispatch instructions into their emergency ranges. This may reflect:
 - A decision to not provide the emergency energy; or
 - Incentives to overstate the emergency maximum to raise accreditation
- No penalties exist for units not providing their emergency output during emergencies or overstating their emergency capabilities
- We recommend MISO implement penalties when suppliers fail to provide emergency output that are comparable to recently approved penalties for LMRs that fail to perform – both are only available during emergencies
- We estimated the size of the proposed penalties for generating resources
 - \$5.6 million of penalties for emergency ranges on coal resources – 27% of the capacity payments made for all coal-fired emergency ranges
 - More than \$12 million of penalties for gas and oil resources – 24% of the capacity payments made for all gas and oil-fired emergency ranges

Full List of Recommendations

List of Recommendations

SOM Number	Recommendations	High Benefit	Near Term
Energy and Operating Reserve Markets and Pricing			
2025-1	Develop criteria for retroactive repricing of the market to mitigate the harm of repricing.		✓
2025-2	Reduce make-whole and operating reserve payments for deviating resources.		✓
2024-1	Modify RDT demand curve steps and RPE binding limits.		✓
2023-1	Align aggregate pricing nodes from the FTR market through real-time.		✓
2023-2	Enforce STR requirements in the load pockets.		✓
2021-2	Evaluate improvements to the emergency pricing assumptions applied to LMR curtailments.		
2020-1	Develop a real-time capacity product for uncertainty.	✓	
2012-3	Remove external congestion from interface prices.		✓
2012-5	Introduce a virtual spread product.		

List of Recommendations

SOM Number	Recommendations	High Benefit	Near Term
Transmission Congestion			
2024-2	Shift a large share of transmission capability from the annual ARR allocation and FTR auction to seasonal and monthly auctions.		
2023-3	Develop tools to recommend decommitting resources committed in the day-ahead market.		
2022-1	Expand the TCDCs to allow MISO's market dispatch to reliably manage network flows.	✓	✓
2021-1	Work with TOs to identify and deploy economic transmission reconfiguration options.		
2019-1	Improve the relief request software for market-to-market coordination.		
2019-2	Improve the criteria for testing market-to-market constraints.		
2016-3	Enhance authority to coordinate transmission and generation planned outages.		
2014-3	Seek joint operating agreements with neighboring control areas to improve congestion management and emergency coordination.		

List of Recommendations

SOM Number	Recommendations	High Benefit	Near Term
Market and System Operations			
2024-4	Improve constraint management and dead bus criteria for Forced Off Asset Events.		
2023-5	Require descriptions in new or updated CROW tickets.		
2021-4	Develop a look-ahead dispatch and commitment model to optimally manage fluctuations in net load and the use of storage resources.	✓	
2020-2	Align transmission emergency and capacity emergency procedures and pricing.		✓
2019-4	Optimize CTS schedules every five minutes based on the RTOs' alternative real-time load scenarios (interchange optimization).	✓	
2016-6	Improve the accuracy of LAC recommendations and record operator responses to them.		✓

List of Recommendations

SOM Number	Recommendations	High Benefit	Near Term
Resource Adequacy and Planning			
2025-3	Ensure alignment of capacity obligations with LMR capability and ensure that anticipated large loads are in the load forecast.		
2025-4	Replace CRNCC rules with a daily capacity balancing settlement.	✓	
2025-5	Improve capacity accreditation by reforming: 1) maintenance margin, 2) treatment of resources that are off control, 3) separate DLOL treatment of firm and non-firm gas resources, 4) the hours used to accredit existing solar resources.	✓	✓
2025-6	Develop penalties similar to LMR non-performance penalties for resources that offer emergency ranges and do not perform during emergencies.		
2023-6	Implement zonal capacity demand curves and near-term improvements in local clearing requirements.		
2022-4	Improve the LRTP processes and benefit evaluations.	✓	✓
2022-5	Implement jointly optimized annual offer parameters in the seasonal capacity market.		
2015-6	Improve the modeling of transmission constraints in the PRA.		
2014-6	Define local resource zones based on transmission constraints and local reliability requirements.		