



2026-27 Winter Readiness Workshop

October 28, 2026

Agenda

- Welcome (Tim Aliff, Executive Director, MISO)
- Assessments
 - Weather (Adam Simkowski/Ella Dankanics)
 - Generation (Jared Karban)
 - Transmission (Fisseha Zewdu)
- Seasonal Risk / Uncertainty Management
 - Uncertainty Management & Lessons Learned Winter 2025 (Matt Campbell)
- Emergency Procedures /Training
 - Operator Readiness (Gretchen Carlow)
 - EOP-002 Process Reminder (Don Hunter)
 - Load Shed Tool/CCE (Don Hunter)
 - LMR Deployment Procedure Reminder (Don Hunter)
 - Transmission System Emergency Procedure Changes (Dan Pacilio)
 - DOE Emergency Order Efforts (John Marhoefer)
- Q&A

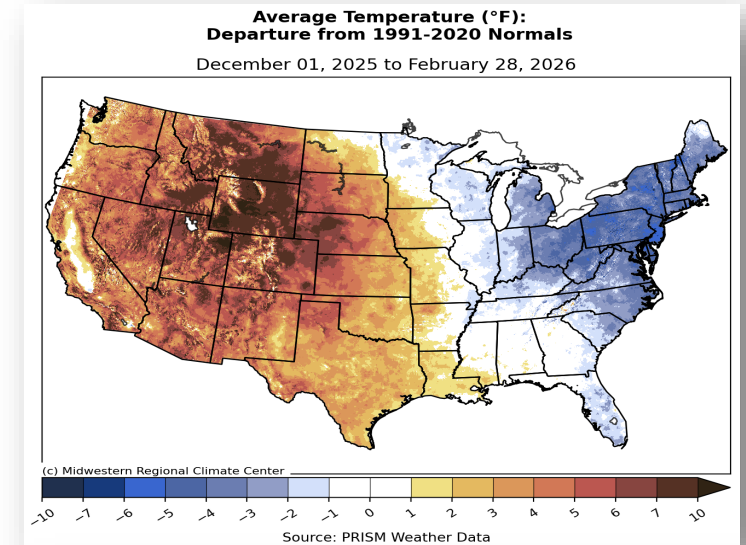
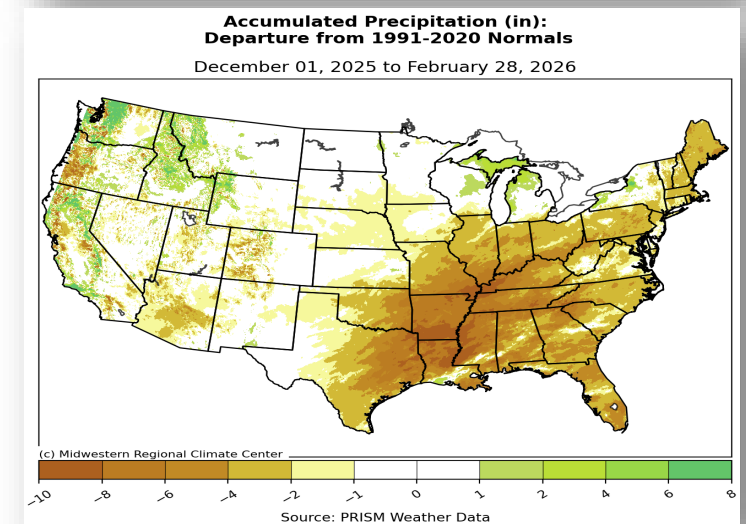


Seasonal Assessment: Weather

Adam Simkowski and Ella Dankanics, MISO Meteorologists

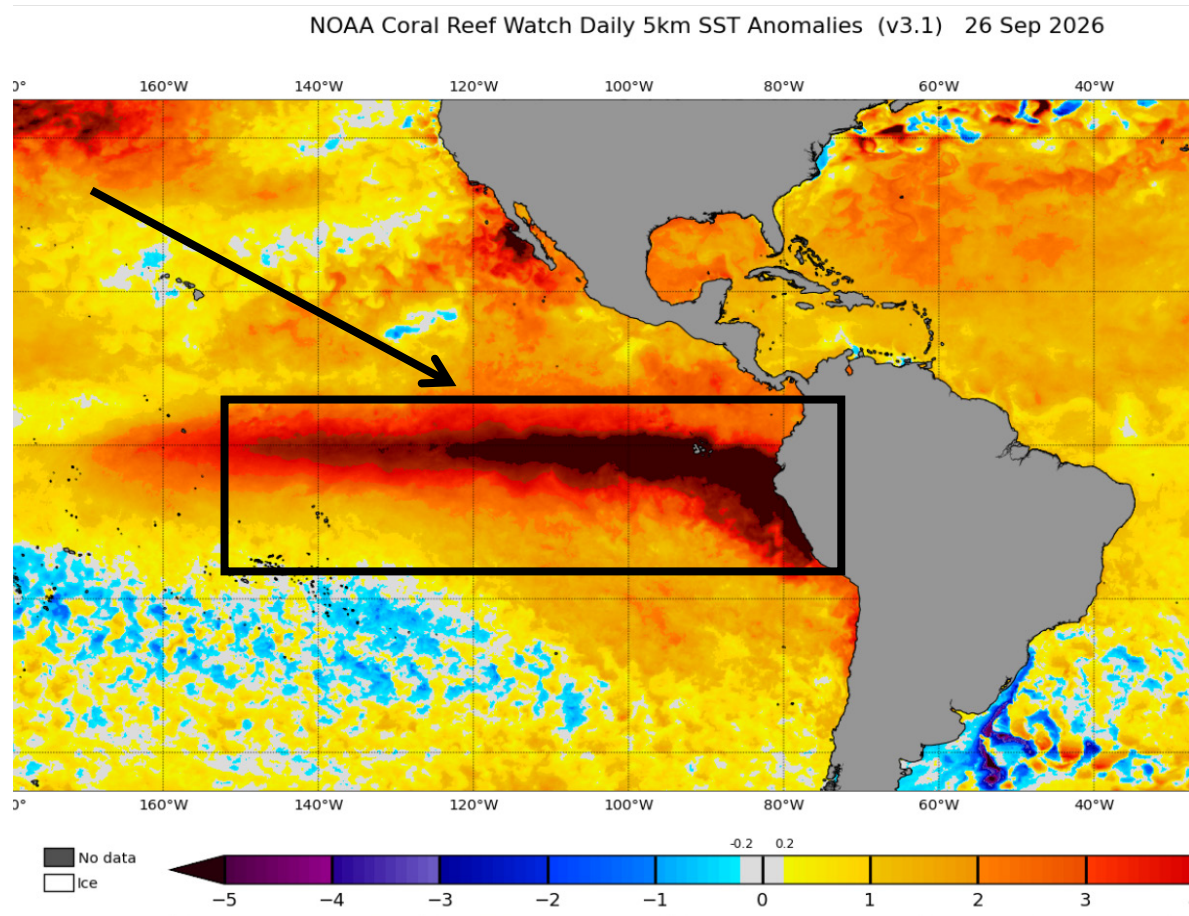
Last winter featured a weaker La Niña, but we still saw periods of significant cold

- Last winter is **not** considered an analog for this upcoming winter.
- **Near- to/below-normal** temperatures occurred across much of MISO, particularly the North and Central Regions.
- MISO experienced **7 days** with systemwide temperatures $\leq 10^{\circ}\text{F}$, including **5 days during Winter Storm Fern**.
- Similar to Winter Storm Enzo the year prior, Winter Storm Fern demonstrated that significant winter impacts can still occur despite the overall seasonal pattern.
- **Below-normal** precipitation was prevalent across much of the **Central** and **South** Regions.
- Given the **weak** La Niña, short-duration cold extremes were still a significant feature of the winter.



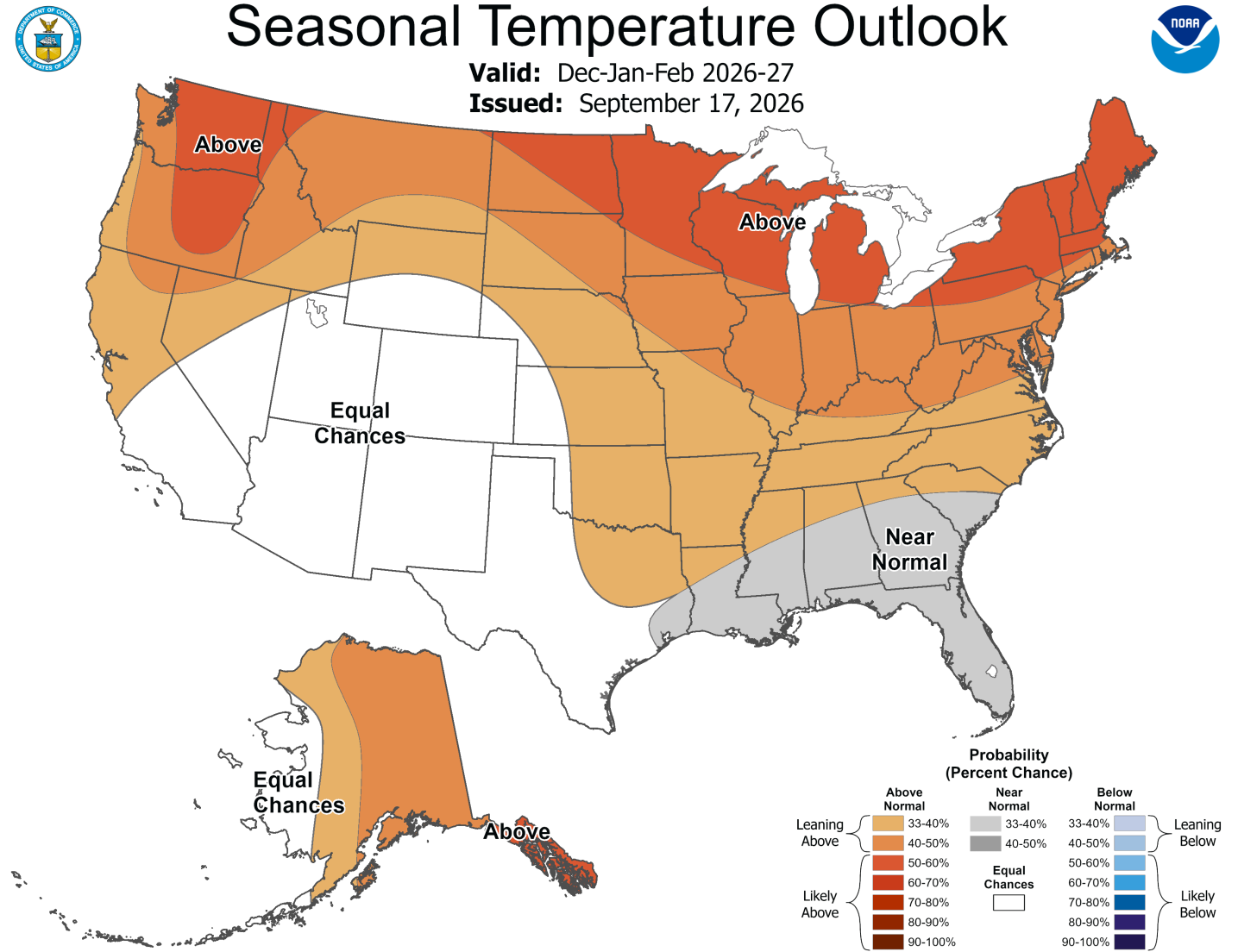
Stronger El Niño winters usually produce above normal temperatures in MISO's North and Central Regions

What is El Niño?



- **El Niño is the warm phase of ENSO**, characterized by warmer-than-normal ocean temperatures across the central/eastern equatorial Pacific.
- **Trade winds weaken**, allowing warm surface water that is normally concentrated in the western Pacific to shift eastward.
- This shift changes **tropical convection and atmospheric circulation**, which can alter the jet stream and weather patterns across North America.
- El Niño typically **develops during summer/fall, peaks during winter, and weakens the following spring**.

NOAA's outlook favors above-normal temperatures across much of MISO's footprint, while Louisiana is expected to see temperatures closer to seasonal normals



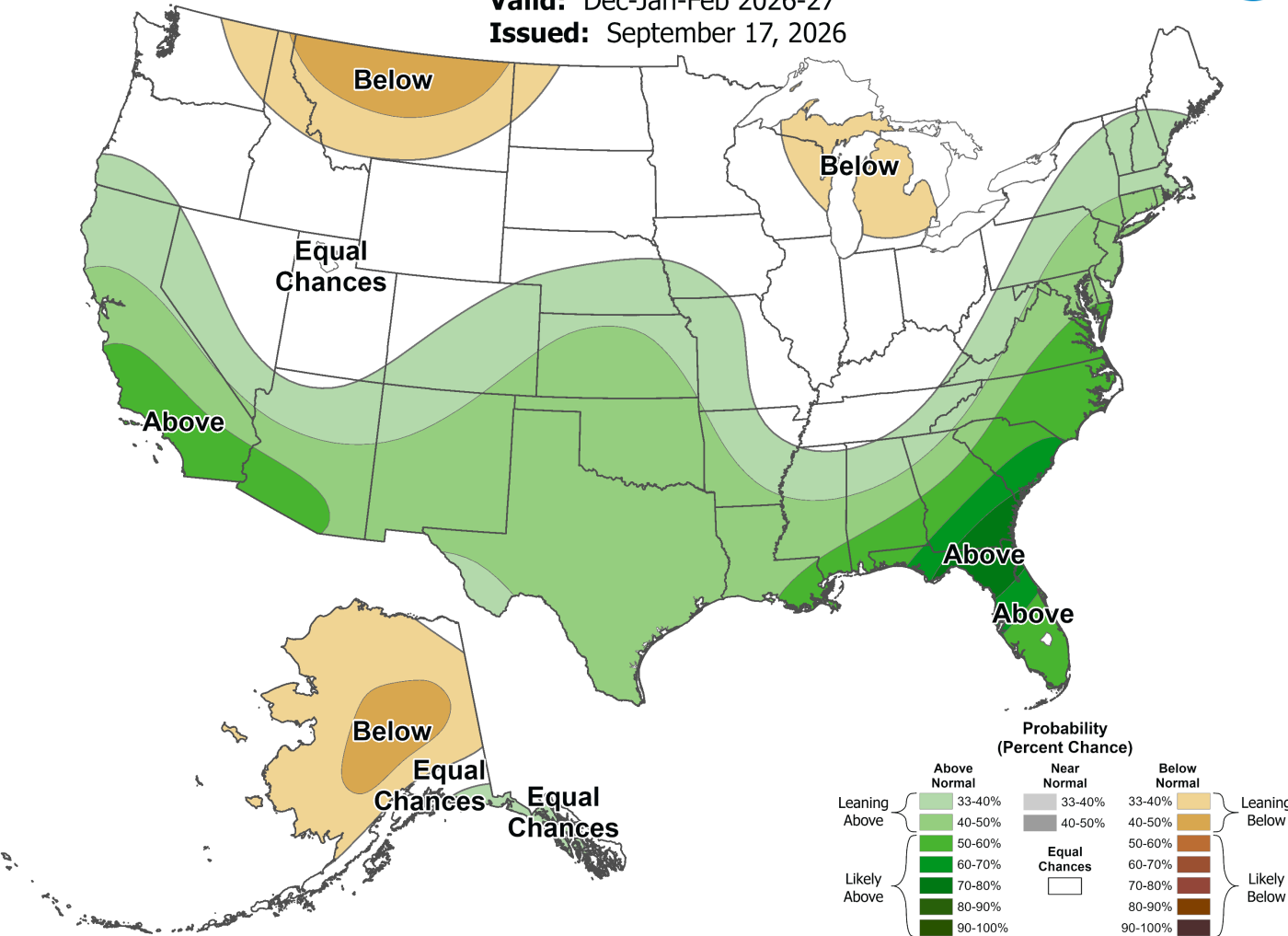
NOAA anticipates above normal precipitation for MISO's South Region, with below normal precipitation for the Great Lakes this winter



Seasonal Precipitation Outlook

Valid: Dec-Jan-Feb 2026-27

Issued: September 17, 2026



Historical (reference) analog years selected by MISO’s weather vendors, with top matches circled by MISO, indicate the most likely expectation for this winter

Analog for winter 2026-27				
Year(s)	Vendor A	Vendor A Rank	Vendor B	Vendor B Rank
	2015-16	1	2015-16	1
	1997-98	2	1997-98	2
	2023-24	3	2023-24	3
	2009-10	4	1982-83	4
	1982-83	5	1991-92	5
	1991-92	6	1972-73	6
	1957-58	7	1986-87	7
			2006-07	8
			2002-03	9
			2009-10	10

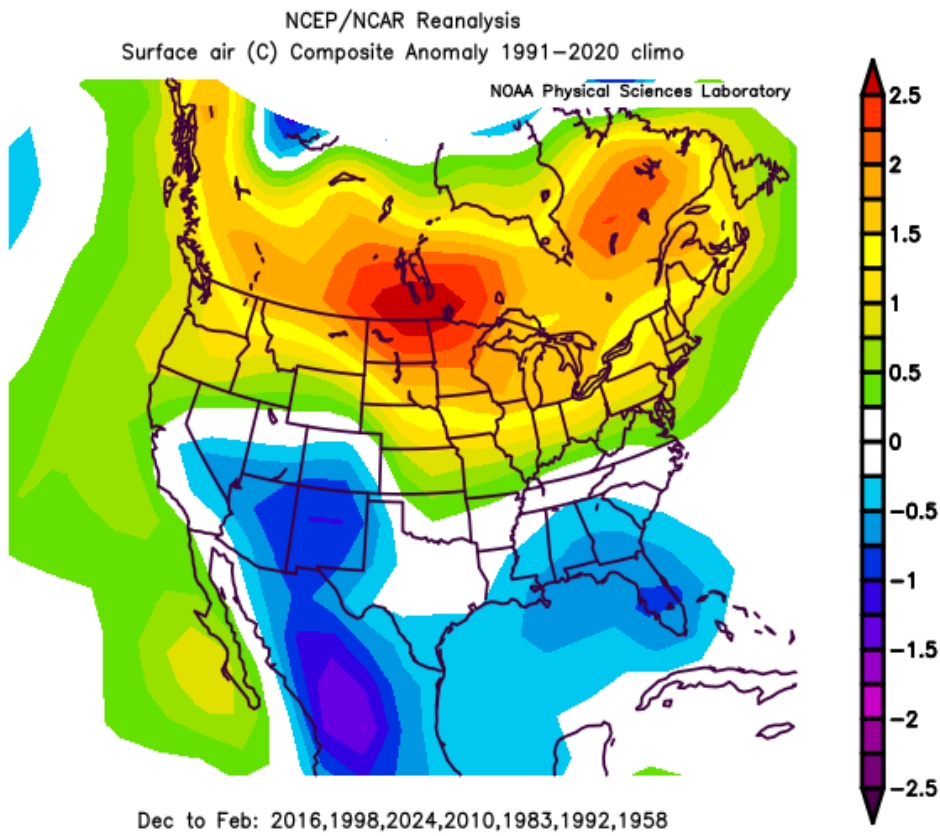
Cold MISO Winter

Warm MISO Winter

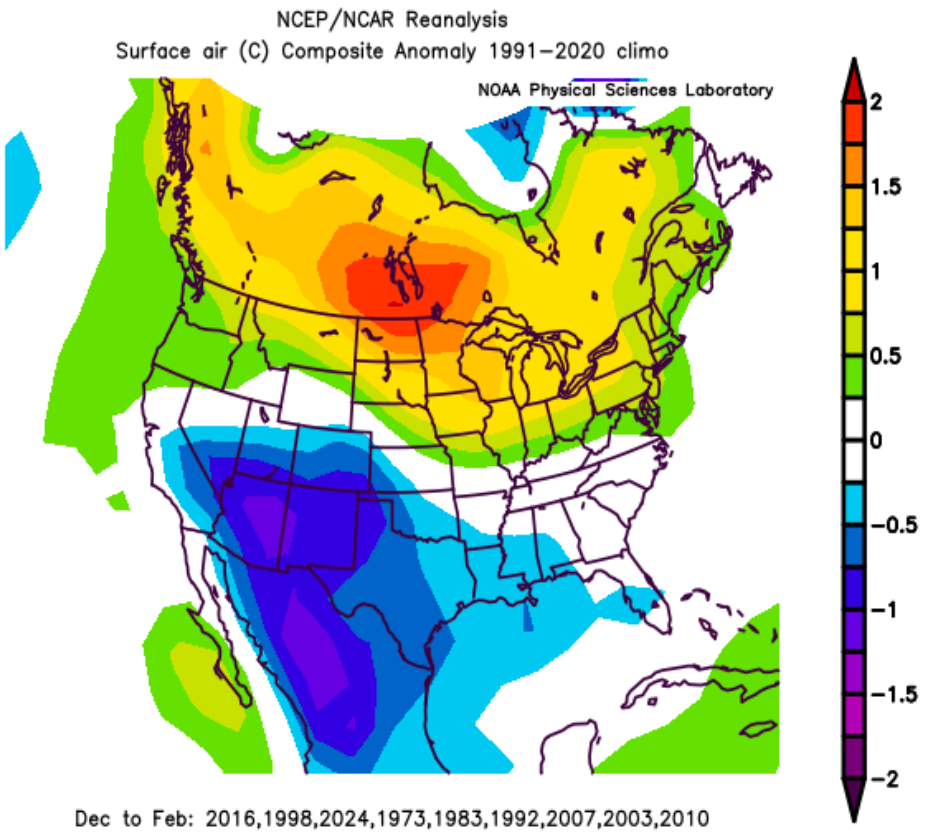
Normal MISO Winter

The average temperature composites for December through February, derived from analog years identified by MISO's weather vendors, reveal a pronounced El Niño signal driving above normal temperatures in MISO's N/C Region

Vendor A

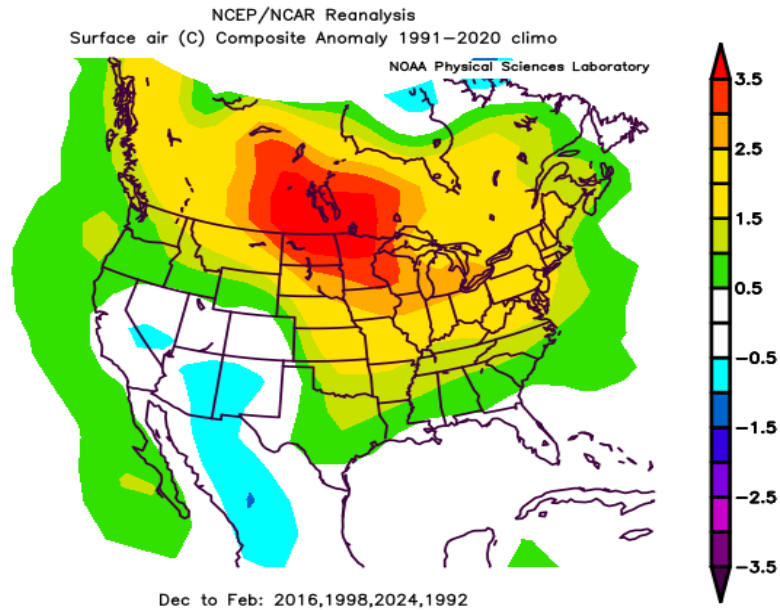


Vendor B



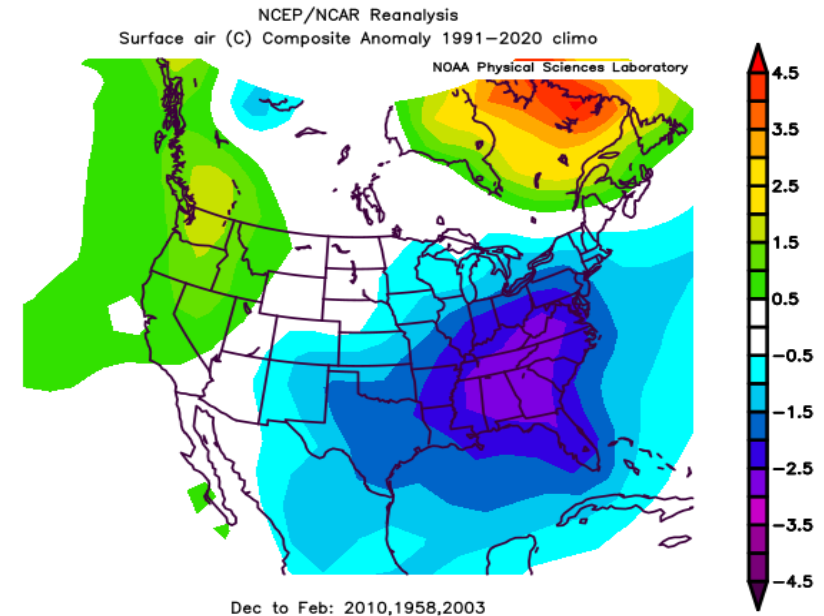
Risks to the Forecast Differentiated by El Niño Strength

Warmer Risk(higher probability)



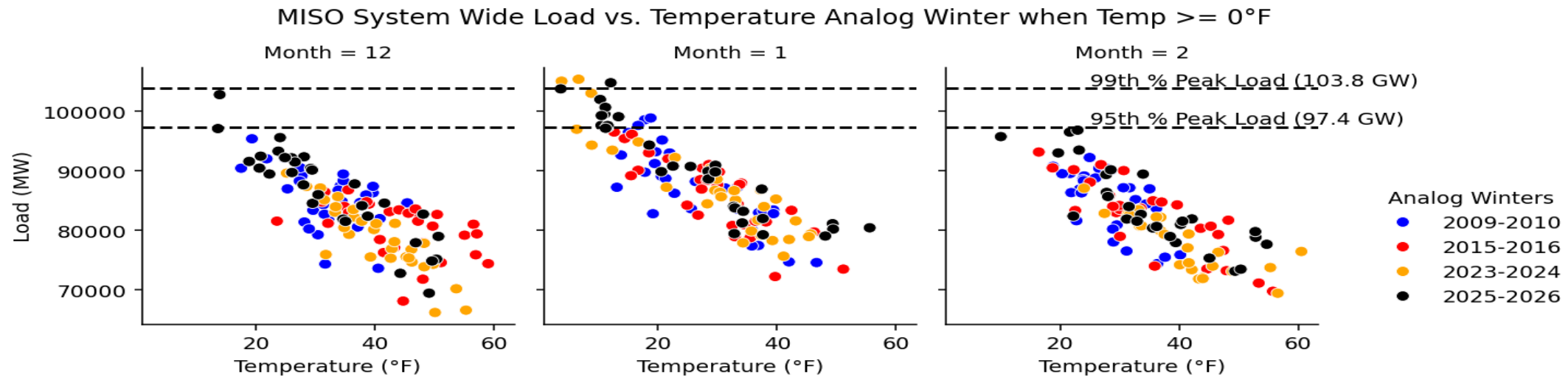
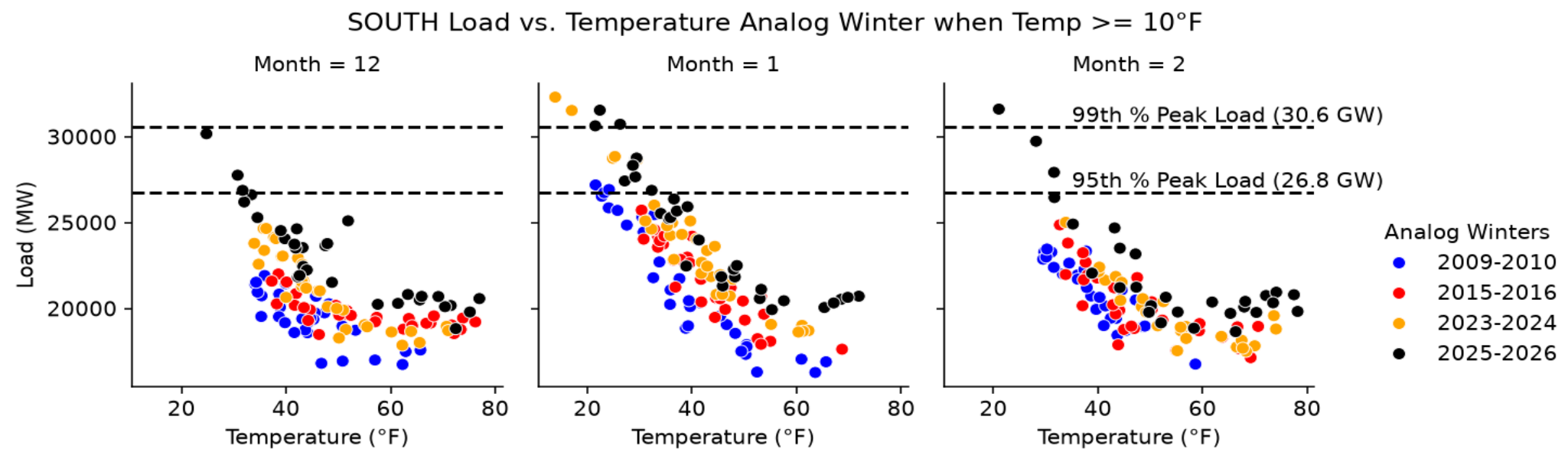
- A Super El Niño strongly favors warmer temperatures across the North and Central Regions.
- The most significant warmth would be focused across the Upper Midwest and Great Lakes.
- Prolonged periods of above-normal temperatures could substantially reduce cold-weather demand.
- Sustained Arctic air becomes less frequent

Colder Risk (lower probability)



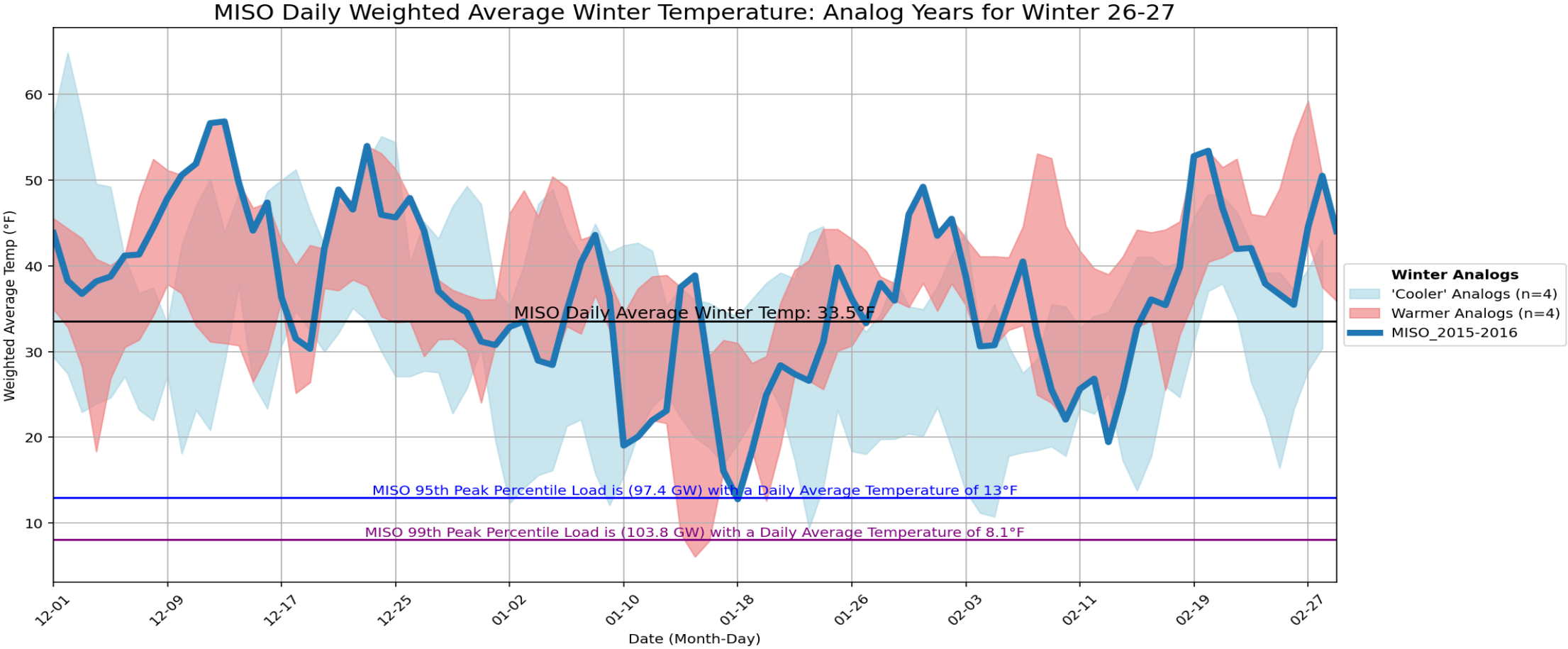
- El Niño weakens or fails to strongly influence the atmospheric pattern.
- Other atmospheric patterns become the dominant driver of the winter.
- Colder air reaches further south and persists across the Central and South Regions.
- Icing risk is greater

Historical El Niño Years: Systemwide peak load reaches 95th percentile, ~97.4 GW, but is rare to reach 99th percentile, ~103.8 GW



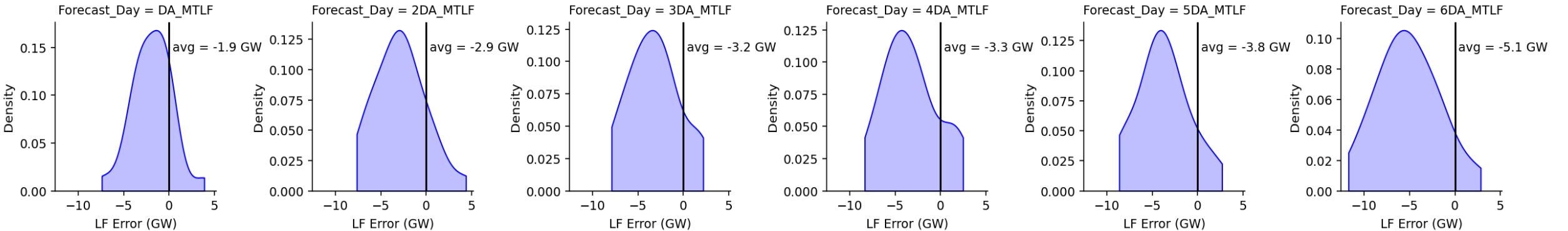
With robust historical temperature records, all analog years can be plotted as MISO winter daily average temperatures with a separation between “warmer” and “cooler” analogs

Outside of winter storm Heather in Jan. 2024, no analog reaches ~99th percentile peak load

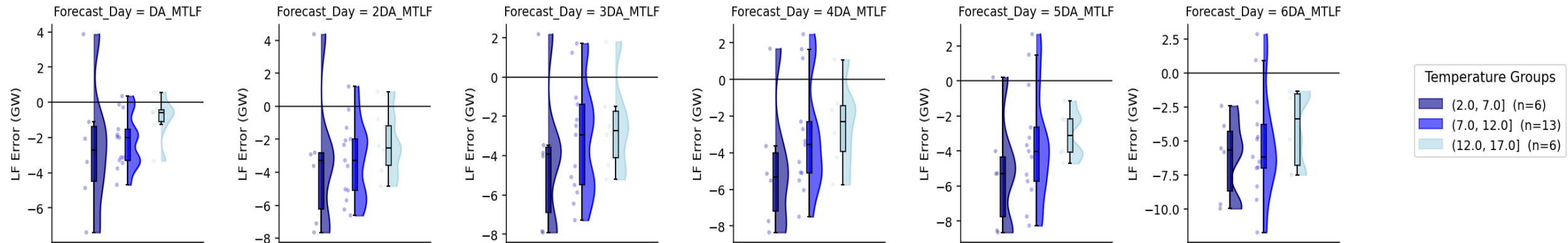


Seasonal Load Forecast Bias: consistent under-forecast bias from ND to OD+6, primarily driven by temperature forecast error

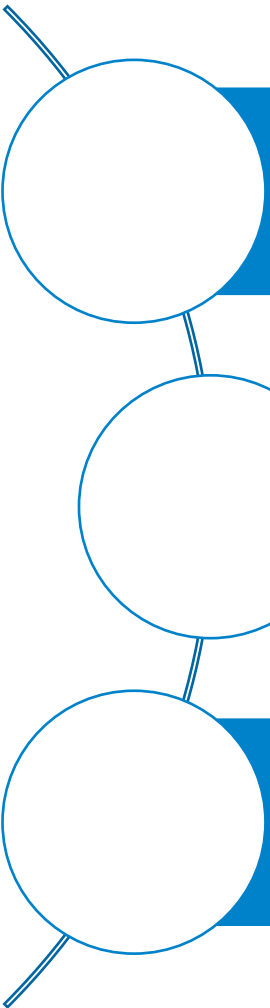
MISO Peak Winter MTLF Forecast Bias (Forecast - Actual) where Actual Load >= 97 GW (2021-2026) | 26 unique days



MISO Peak Winter MTLF Forecast Bias (Forecast - Actual) by Temperature Group where Actual Load >= 97 GW (2021-2026)



Winter weather can have major impacts to real-time operations of renewable resources



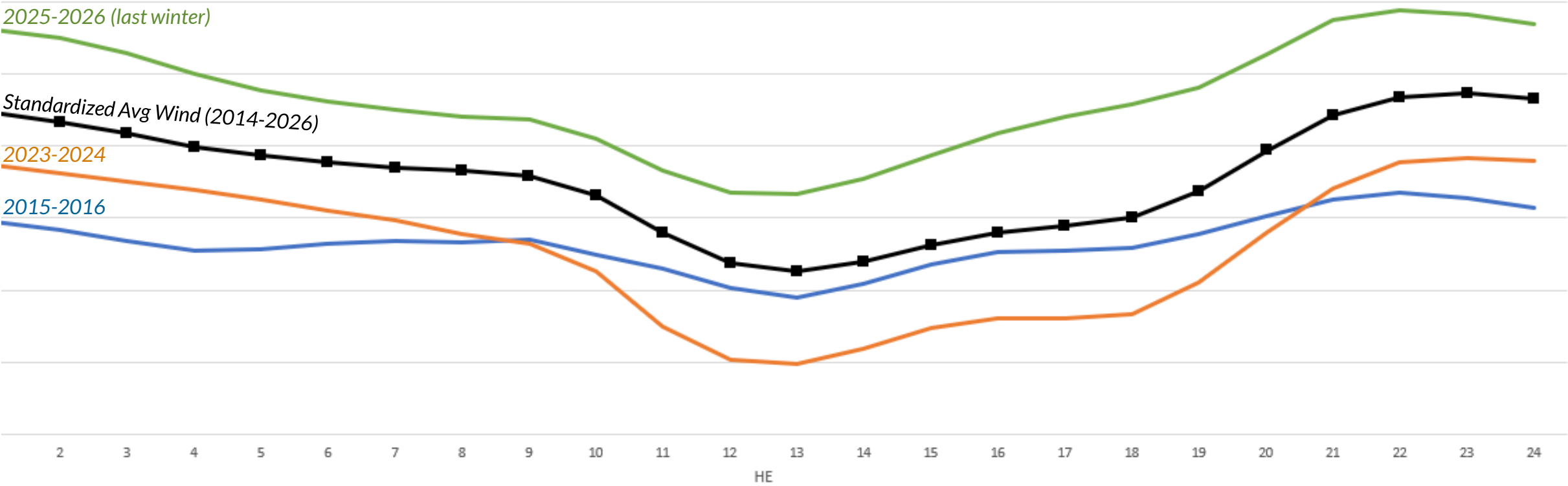
MISO has used historical winter events to collaborate with vendors and market participants

MISO's potential power loss of wind is 29.8 GW when temperatures $\leq -30^{\circ}\text{F}$

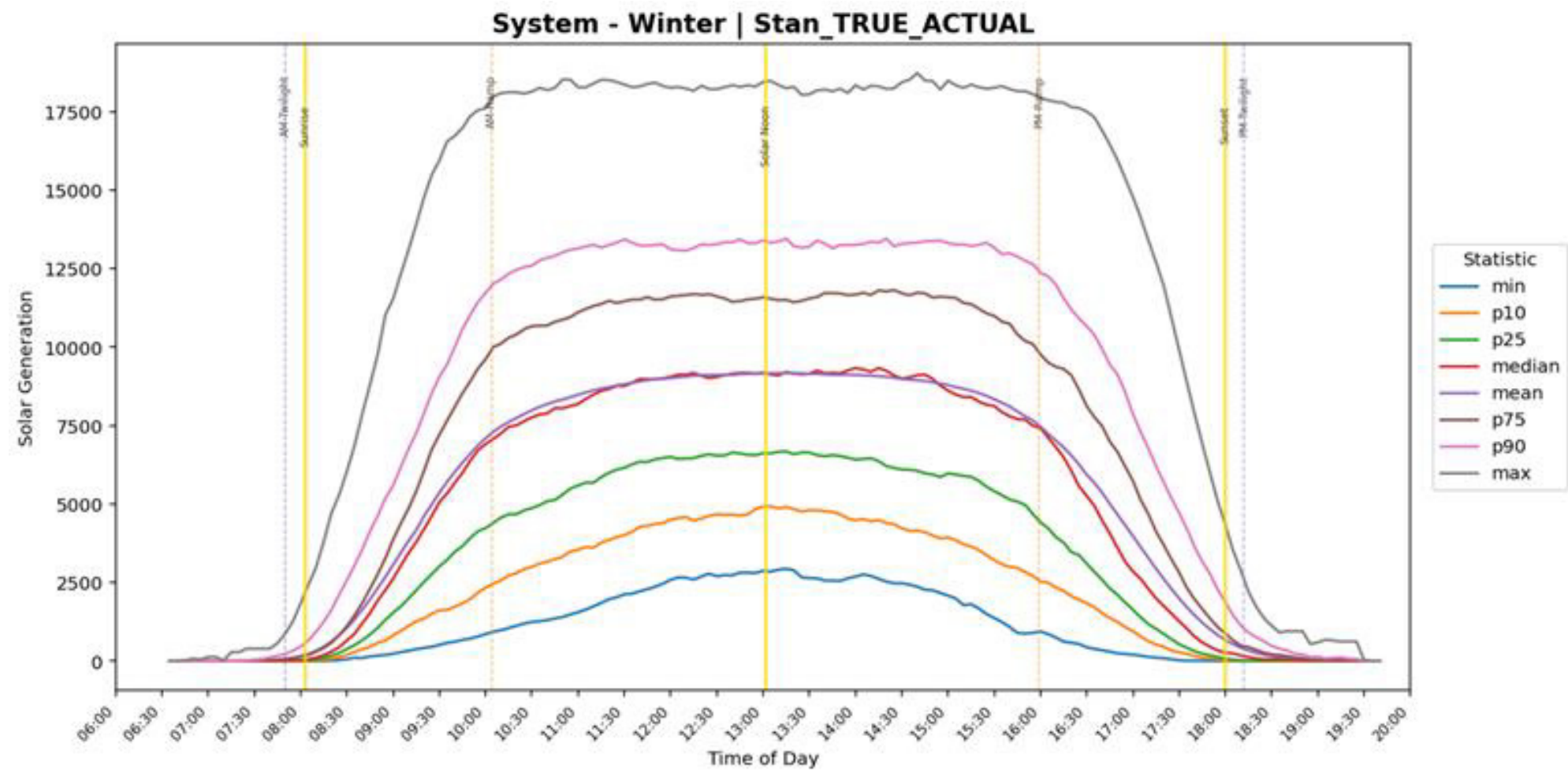
MISO's forecasts consider icing and snow cover for solar panels, MISO considers the associated risks

Top analog winters indicate below normal wind generation this winter, which contrasts with last winter

MISO Winter (Dec-Feb) Hourly Standardized Wind Generation (2026 Pmax Base)



With rapidly growing solar, what does solar generation look like in winter at the latest MISO Pmax?



Adam and Ella's Opinion

- The El Niño (*ocean-atmosphere signal*) is expected to be strong this winter, driving the underlying warmer pattern. Cold air outbreaks have a lower likelihood.
- Monitoring other atmospheric and oceanic signals will be less impactful to the MISO footprint this winter, rather we will continue to watch for the possibility of an El Niño weakening—especially closer to Feb.
- The polar vortex is expected to be more stable this winter, lowering the likelihood of prolonged arctic air outbreaks.
- A normal winter in the South Region is expected driven by cooler daytime high temperatures rather than colder minimum temperatures.
- Precipitation is expected to be elevated in MISO's South Region due to a strong subtropical jet stream. We will monitor the possibility for increased icing across MISO South and Central Regions.

Summary

- N/C Region expected to be warmer this winter.
- N/C Region temperatures could be impacted if the polar vortex becomes disrupted, allowing arctic air to push further south, but probability for this occurring is lower.
- Normal temperatures are expected in the South Region on average
- A drier pattern is expected with normal-to below-normal precipitation across the Great Lakes.
- Wetter conditions expected across much of the South Region throughout the winter.



Seasonal Assessment: Generation

Jared Karban, Advisor, MISO Resource Adequacy

Seasonal capacity outlook for winter 2026/27

LRZ	Price (\$/MW-Day)
1-10	\$35.97

Initial PRMR	ZRC Offered + FRAP	Final PRMR
127,476	134,737	131,983

- Initial PRMR represents the traditional 1-in-10 LOLE Requirement
- Final PRMR is set under the RBDC based off offers received
- Resources offered exceeded the initial requirement, resulting in procurement of additional resources

Planning Resource	Offered (ZRC)	Cleared (ZRC)
Generation	119,296	117,053
External Resources	3,942	3,911
Behind the Meter Generation	3,228	3,228
Demand Resources	8,272	7,790
TOTAL	134,737	131,982

MISO’s RBDC improves price signals, reflecting the increased value of accredited capacity beyond seasonal reliability targets

Auction cleared above seasonal initial reliability targets, representing additional reliability value at cost-competitive prices

2026 Planning Resource Auction Initial Target vs. Final Cleared		Additional Reliability	Auction Clearing Price
Summer	Initial, 7.90%	+3.5%	\$424.30 (N/C)
	Cleared, 11.40%		\$384.10 (LRZs 8,10) \$412.10 (LRZ 9)
Fall	Initial, 11.60%	+5.7%	\$33.92
	Cleared, 17.30%		
Winter	Initial, 18.90%	+4.2%	\$35.97
	Cleared, 23.10%		
Spring	Initial, 23.40%	+4.7%	\$7.61
	Cleared, 28.10%		
			Annualized
			\$126.19 (N/C)
			\$116.06 (LRZs 8, 10)
			\$123.12 (LRZ 9)

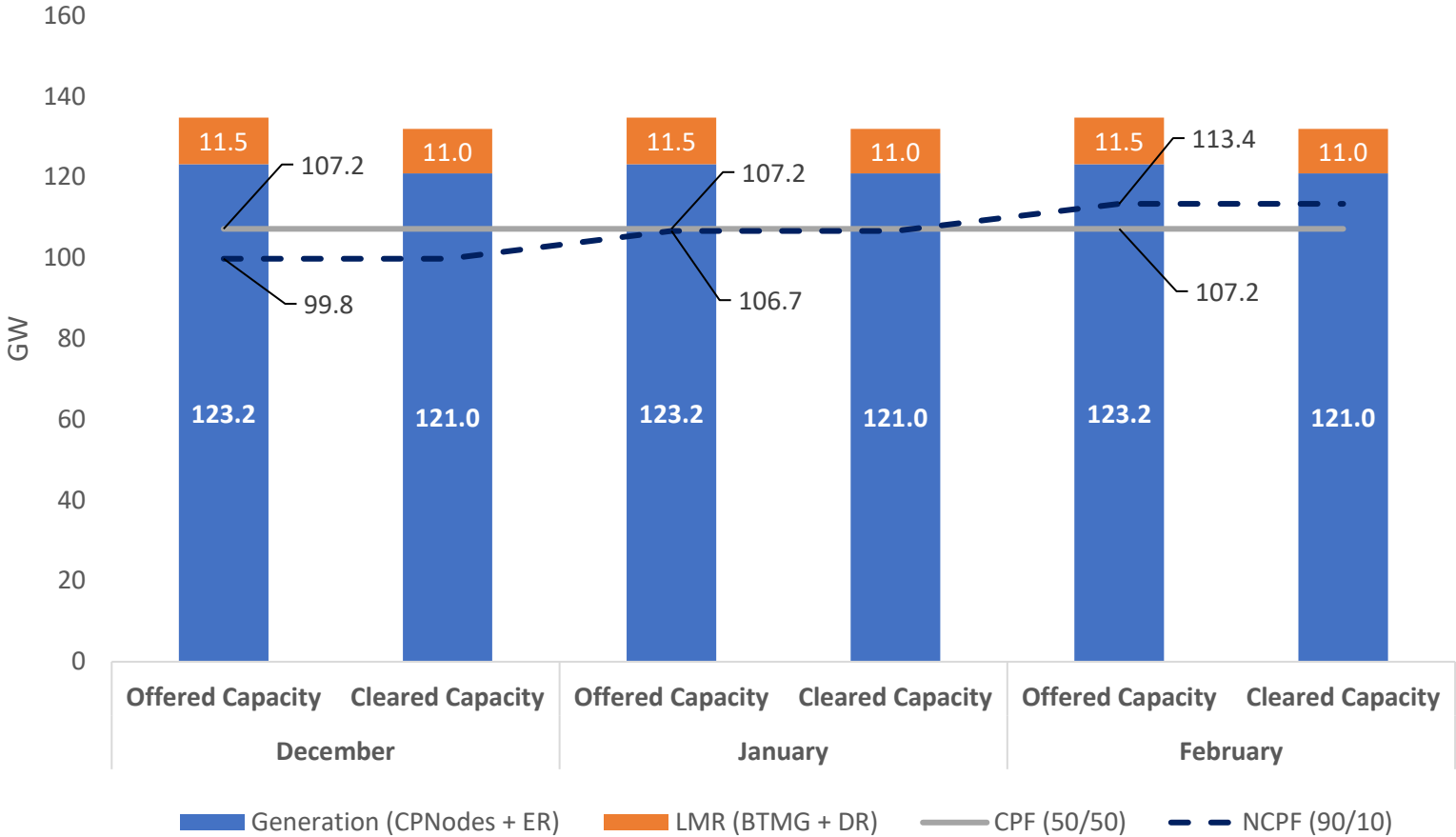
MISO systemwide accredited capacity compared to demand submitted by LSEs

Coincident peak forecast is submitted by MISO LSEs relative to the MISO seasonal peak and calculated on a seasonal basis

Non-coincident peak forecast is the peak load submitted by each LSE per month

Both coincident and non-coincident peak include transmission losses

Winter 2026-27 Generation vs. Load, Systemwide



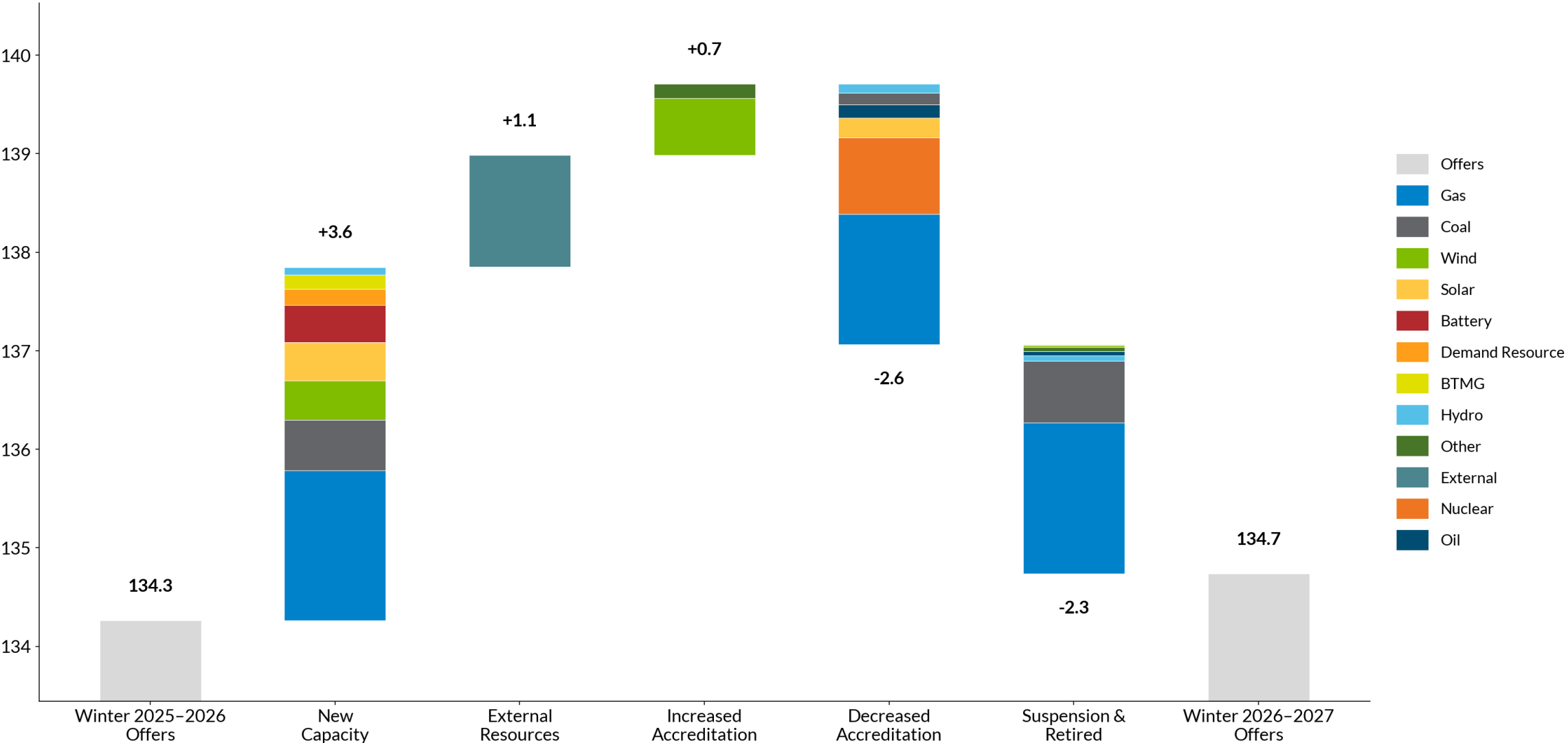
LMR: Load Modifying Resource
BTMG: Behind the Meter Generation
CPF: Coincident Peak Forecast

CPNodes: Commercial Pricing Nodes
DR: Demand Resource
NCPF: Non-Coincident Peak Forecast

ER: External Resource
LSEs: Load Serving Entities

New capacity additions outpaced decreased accreditation and suspensions/retirements

Capacity Offered Winter 2026–2027 vs. Winter 2025–2026 Offer (GW) — System



BTMG: Behind the Meter Generation. Capacity indicated is offered accredited value.



Seasonal Assessment: Transmission

Fisseha Zewdu, Sr. Engineer, MISO Operations Planning FRES

The Coordinated Seasonal Assessment study is used to identify potential issues and develop plans before these issues occur in real time



Purpose:

Evaluate expected conditions across
MISO footprint for winter season

Identify potential limitations and issues
for upcoming season and develop
operating plans

Coordinate with MISO members



Study Focus:

Steady-State Analysis

Bidirectional Transfer Studies

Load Pocket Studies

The 2026 winter model was built from the Eastern Interconnection base case with MISO transmission projects and planned outages applied

Base Case

- Built on the 2026/27 Winter ERAG MMWG model
- Generator retirements approved on or before May 1, 2026, are offline
- Outages: Transmission and generator outages are modeled if they are greater than or equal to two months between the months of December through February
- TOs can recommend outages outside the period if deemed necessary

MOD Projects

- MTEP Appendix A – Planned
- All the generation interconnection projects applied

Generation Assumptions

- Renewables: Wind and solar units dispatched at their capacity credit levels
- Qualified Facilities (QFs) and MISO South Load Pocket Op Guides honored

Steady state AC contingency analysis did not reveal any contingencies without operating plans for the winter season

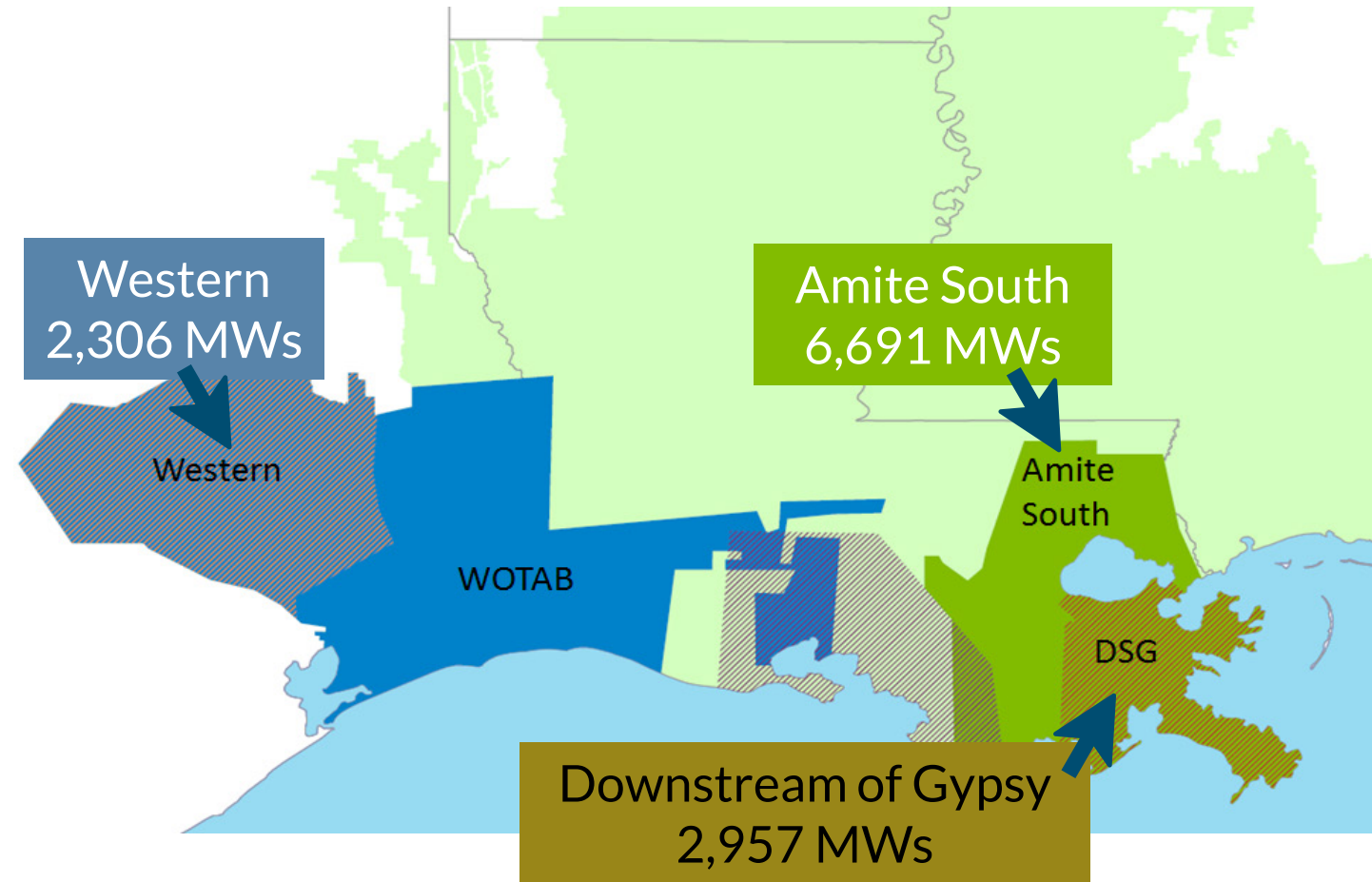
Approximately 19,000+ contingencies were studied

NERC defined Category P1 contingencies

- **P1.1** – three phase faulted generator (>50 MW)
- **P1.2** – three phase faulted transmission circuit
- **P1.3** – three phase faulted transformer
- **P1.4** – three phase faulted shunt device
- **P1.5** – single line to ground dc pole

MISO regularly runs import studies for the load pockets in the South Region

- The peak load conditions for the three MISO load pockets are simulated:
- Transfer studies into the pockets are performed
- Results are used to identify import limits for the pockets



Load pocket transfer results indicate that import limits are in line with current operating guides

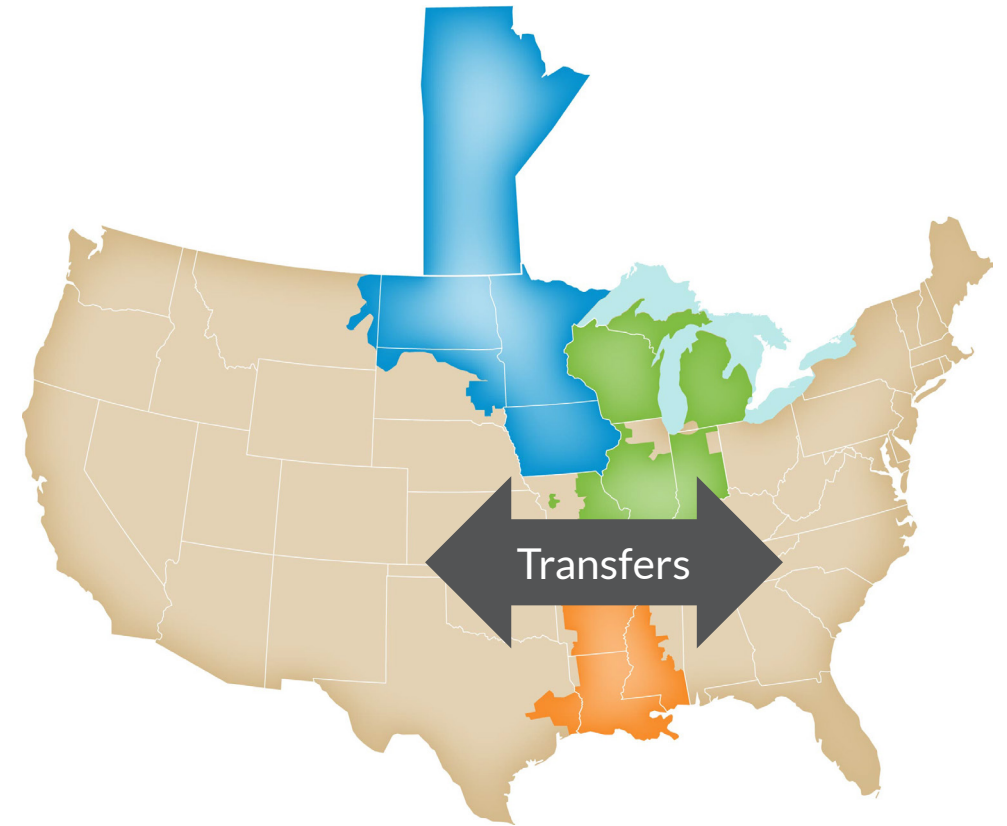
Load Pocket	Monitored Element	Limiting Contingency	Violation Type	Import Capability (MW)
AMITE SOUTH	Slidell – Front Street 230kV	Amite – Gillsburg 230kV and Ninemile Full Station	Thermal	3,708
DSG	Clayton – North Norco 230kV	Little Gypsy – Wesco 230kV and New Orlean Power Full Station	Thermal & Voltage	3,145
*Western	Grimes – Mt. Zion 138kV	*China – Dayton Sw. Station 230kV and MCPS Full Station	Thermal & Voltage	1,453

* Additional generation or reactive resources are required to maintain voltage/reactive balance under this contingency.
 * The limit is with Frontier generation at full capacity during winter peak loading condition. N1G1 would not solve without it.

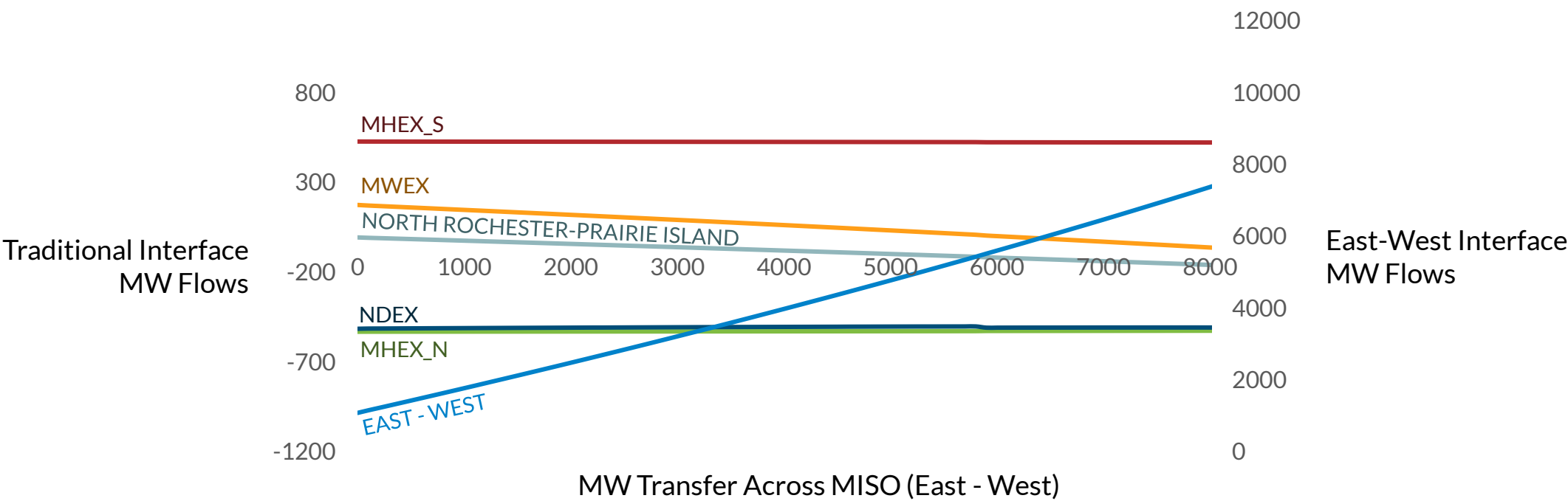
Public

Bidirectional transfer studies across the MISO footprint to identify main constraints with transfers between MISO neighbors

- Transfers across MISO between east and west systems:
 - East system – PJM, SERC (without AECI)
 - West system – SPP and AECI
- Transfer value selected above realistic transfers to identify leading constraints
 - 15,000 MW used
- Flows measured at all tie points and lines bypassing MISO

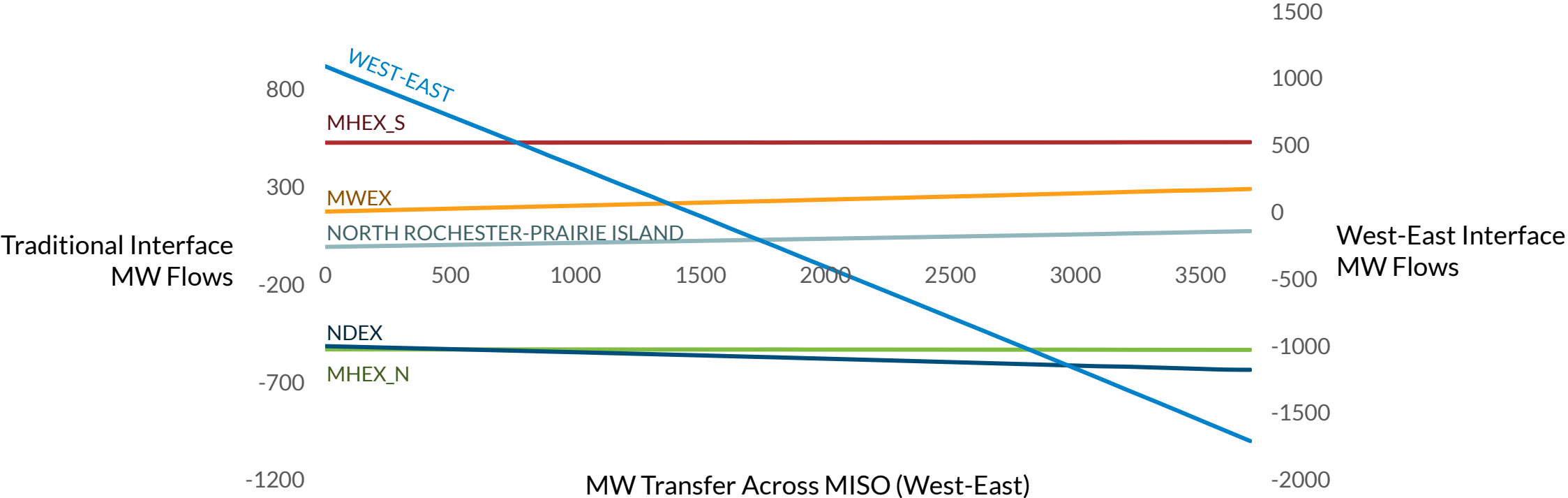


East to west transfer leading constraints and interface flows identified during study



Monitored Facility	Rating	Area	Contingency Name	DC TrLim	AC TrLim
MORO - LACLEDE STEEL NORTH TAP 138	329	AMIL	AMI34118: MORO - ROXFORD 345 (4519)	3,791.0	3,703.1
MCNEIL EHV - HARVEY COUCH SES 115	239	EES-EAI	EE50X63: ELDORADO 500/345 AT2 EL DOR-SAREPT	1,173.5	4,426.0
RUSSELVILLE EAST - RUSSELVILLE SOUTH 161	446	EES-EAI	EAOKE001: ARKANSAS NUCLEAR - FT SMITH 500	4,705.9	4,998.4
NUCOR STEEL - WHITESTOWN 345	1221	DEI	CIN34041: EDWARDSPORT - AMO 345 (34528)	5,791.6	5,473.1
GRANVILLE - BUTLER B1 138	364	WEC	WEC13347: BUTLER-GRANVILLE 138 (3453)	7,724.6	7,208.6

West to east transfer leading constraints and interface flows identified during study



Monitored Facility	Rating	Area	Contingency Name	DC TrLim	AC TrLim
NUCOR STEEL - WHITESTOWN 345	1221	DEI	CIN34019: AMO - QUALITECH 345 (34531)	886.3	2133.5
NUCOR STEEL - WHITESTOWN 345	1221	DEI	CIN34041: EDWARDSPORT - AMO 345 (34528)	955	3834.9
WABACO - ALMA 161	406.4	DPC	DPCGEN01: ALMA UNIT6 (399MW)	4157.1	4157.1
SMALLING - BAXTER WILSON 500	1940	EES-EMI/EES	EEGEN19: GRAND GULF NUCLEAR UNIT 1 (1275MW)	3601.2	4212.5
BUTLER B1 - BUTLER B2 138	717	WEC	WEC34002: CYPRESS-FOREST JUNCTION 345 971L51	5506.6	5312.2



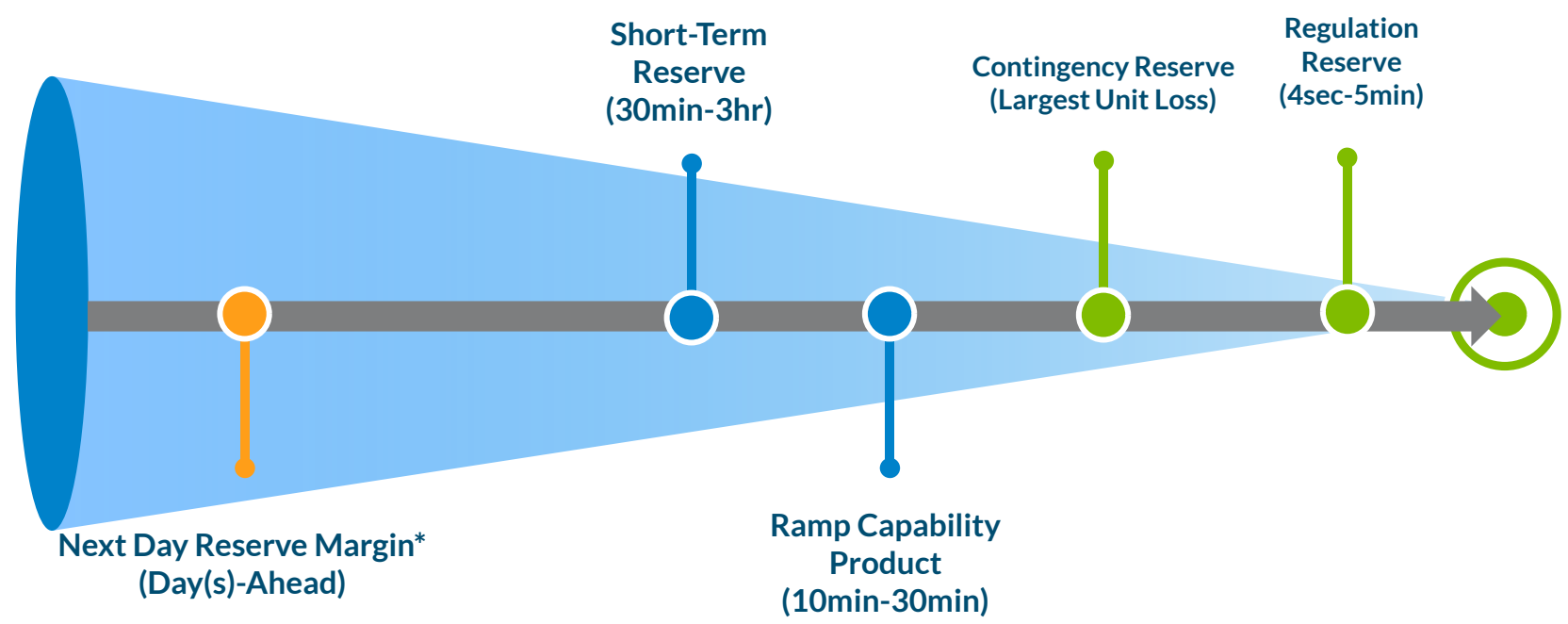
Seasonal Risk/Uncertainty Management

Matt Campbell, MISO Manager Operations Risk Assessment

All-Hour and Dynamic Reserve Products to Manage Uncertainty

- MISO recently moved ramp and reserve regulation reserve products into production to manage uncertainty and give more visibility into challenging conditions across all operating hours.
- Under the multi-year uncertainty management initiative, MISO revamps methodology to quantify uncertainty and implements dynamic reserve process.
- This endeavor is a progress towards MISO's commitment to quantified, data-driven decisions to enhance uncertainty management.

MISO's Energy and Ancillary Service market co-optimizes energy and reserve products that cover uncertainties across different timeframes



MISO is implementing Net Uncertainty Forecast and Dynamic Reserve process toward Short-Term Reserve, Ramp Capability Product and Regulation Reserve

* Currently managed by Next-Day (ND) Forward Reliability Assessment and Commitment (FRAC) Operating process. Not a market product.
Public

ND FRAC Net Uncertainty Forecast Model

PROD implementation January 1 , 2024

- Key updates in 2026
 - Implemented “ALL HOUR” process and establish Next-Day Commitment Threshold that varies by 24 hours to account for different forecasted uncertainty (L/M/H), load, and renewable levels.
 - Improvement in predicting in M/H uncertainty hours thru refined uncertainty quantification, as well as additional feature for forecasting task
 - A second net uncertainty forecast model (a classifier model) will be deployed in DEV environment for daily observation and comparison with current model

Sample day of 24 hours Commitment Threshold

Systemwide			
HE	FORECAST MTLF Input	FORECAST WIND Input	Commitment Threshold MW (By Hour) Version 2
1	72,293	14,937	5,600
2	71,566	14,539	5,600
3	69,930	13,877	5,600
4	69,223	13,270	5,600
5	69,295	12,536	5,600
6	71,347	11,537	5,500
7	75,197	10,643	5,600
8	77,297	9,877	5,500
9	78,285	8,664	5,500
10	79,587	7,067	5,700
11	81,230	6,280	5,700
12	82,632	5,850	5,900
13	83,742	5,372	6,200
14	84,532	5,057	6,300
15	84,505	4,951	6,300
16	83,897	5,030	6,400
17	83,516	5,171	6,200
18	82,974	5,381	5,800
19	81,882	5,934	5,500
20	80,552	6,940	5,500
21	78,742	8,096	5,500
22	75,714	9,079	5,500
23	72,109	9,912	5,500
24	68,732	10,594	5,800

Regulation Uncertainty Forecast/Classifier Model

PROD implementation August 25 , 2026

- Model runs and makes prediction once a day
 - Model recommendations sent each morning
 - Market Ops Web validation
 - *No uncertainty over-write*
- Model re-trained every month
 - Offline process

Run Information

Prediction Day	2026-10-02
Environment	OPAPPS_PRD
Model	Regulation October 2026 XGB Margin
Run ID	64
Start Time (EST)	2026-10-01 07:00:05.613503
End Time (EST)	2026-10-01 07:00:51.620936
Elapsed Run Time	46 seconds
High Hours	2, 3, 4, 5, 6, 16, 17, 18

Hourly Predictions

Hour Ending	Prediction	Reg Req	Override
1	Low	850	
2	High	850	950
3	High	800	900
4	High	800	900
5	High	950	1050
6	High	1000	1100
7	Low	900	
8	Low	850	
9	Low	1050	

Ramp Uncertainty Forecast/Classifier Model

PROD implementation September 24 , 2026

- Model runs and makes prediction once a day
 - Model recommendations sent each morning
 - Market Ops Web validation
 - *No uncertainty over-write*
- Model re-trained every month
 - Offline process

Run Information

Prediction Day	2026-10-02
Environment	OPAPPS_PRD
Model	Ramp October 2026 XGB Margin
Run ID	65
Start Time (EST)	2026-10-01 07:00:06.850123
End Time (EST)	2026-10-01 07:00:45.043309
Elapsed Run Time	38 seconds
High Hours	1, 2, 3, 4, 5, 6

Hourly Predictions

Hour Ending	Prediction	Ramp Req	Override
1	High	1150	1250
2	High	900	1000
3	High	750	850
4	High	750	850
5	High	800	900
6	High	850	950
7	Low	900	
8	Low	1000	
9	Low	1100	

All-Hour and Dynamic Reserve Products to Manage Uncertainty

- Dynamic Reg and Ramp products and all-hours uncertainty model recommendations position MISO to manage uncertainty and drive unit commitment decisions with higher confidence especially during more challenging system conditions.
- With better visibility into each hour of the operating day, MISO expects that there could be an increase in capacity advisories or higher reserves to manage those challenging hours to ensure we are able to meet our commitment thresholds.
- All- hour process not only identifies peak and 'worst hour' but provides uncertainty recommendations and insight into all hours.
- When commitment thresholds cannot be met or high-uncertainty exists, regulation requirements change along with additional STRs.

Risk, Lessons and Experiences to Manage Uncertainty

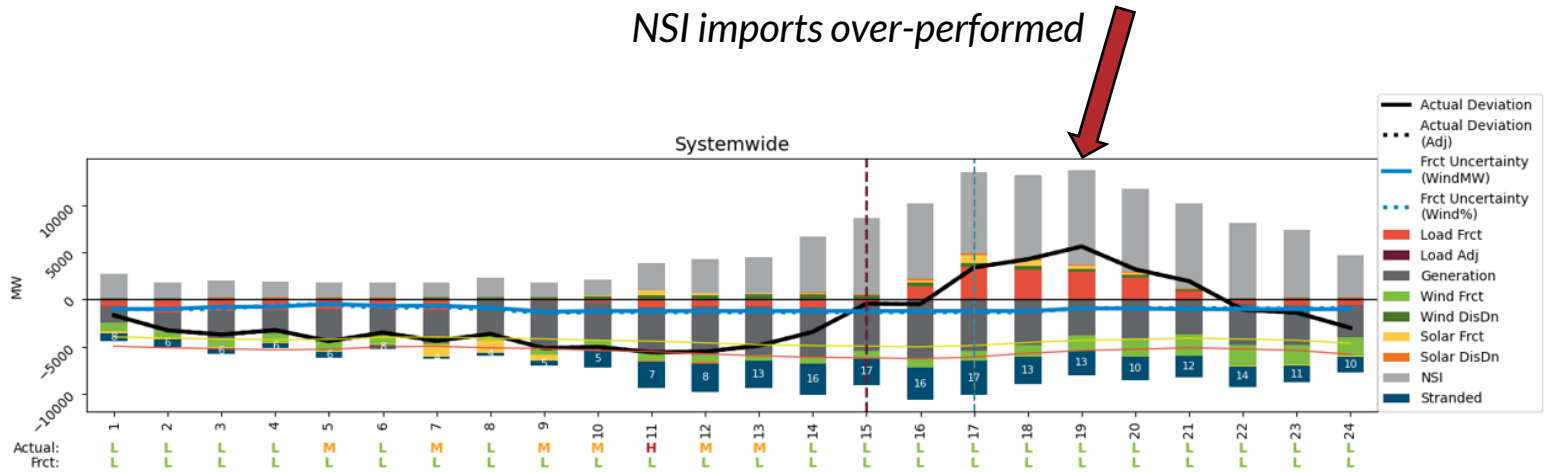
Over the last 12 months, the winter and summer seasons of 2026 has provided MISO with learning opportunities to improve forecasting accuracy, enhance the net-uncertainty model, and leverage the dynamic ramp and reserve product in our seasonal outlook.

- Framing the right amount of risk and uncertainty on emergency ranges – what is the reality on the challenging hours and how best can 12GW LMRs be utilized. When LMRs have been requested, historically 6-7GW responded, with 1-3GW typically being self-scheduled
- Anticipating response when calling on AMEs
- NSI Uncertainty

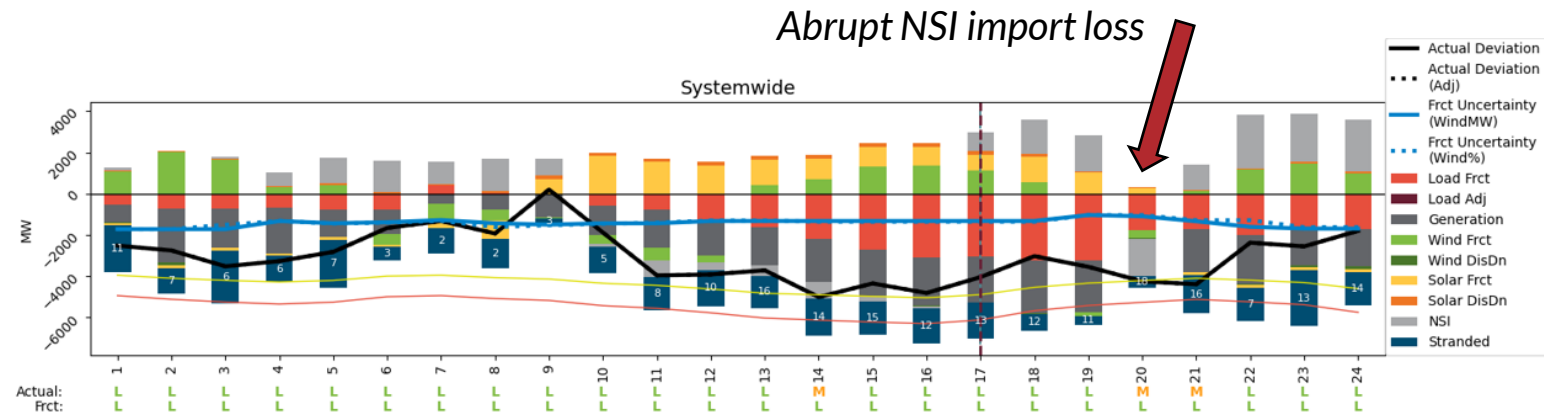
Risk, Lessons and Experiences to Manage Uncertainty

NSI Uncertainty on 7/15 and 9/2

July 15: Considerable ND thru RT uncertainty. ~7GW forecasted, imported near peak ~18GW. N/C sufficiency escalated to EEA2 and LMR deployment which were recalled shortly after when NSI imports over-performed.



September 2: ND medium NSI uncertainty but overall uncertainty remained low. PJM imports and TLRs caused abrupt import loss ~9GW forcing MISO EEA2 declaration.





Contact:
OperationsRiskAssessment@misoenergy.org



Operator Readiness & Development Update

Gretchen Carlow, Sr. Manager, MISO Operator Readiness & Development

MISO & Member Winter Readiness & Preparation

Power System Restoration Drill



- **Full-footprint restoration drill:** Two-day simulation where operators practice system recovery across the entire MISO region.
- **Core restoration skills:** Strengthen situational awareness, use 3-part communication, and execute key restoration strategies through guided activities and simulations.
- **Islanding & interconnection focus:** Hands-on practice identifying, stabilizing, and reconnecting system islands using MISO's Interconnection Checklist.
- **Procedure-aligned execution:** Navigate restoration priorities, manage critical paths, and perform synchronization steps consistent with MISO restoration procedures.

MISO Operator Scenarios



- **Strengthens operator decision-making** discipline by refining judgment, communication rigor, and situational awareness during complex reliability events.
- **Uses real-world scenarios** from the MISO, PJM, and SPP footprints to elevate **cross-regional readiness** and response consistency.
- **Reinforces enterprise-critical behaviors:** clear communication, coordinated action, and correct application of emergency and abnormal operating procedures.
- **Builds confidence and consistency in high-risk conditions** by immersing operators in structured discussions that mirror documented grid challenges and real operational pressures.

MISO Operator Scenarios

Cascading Transmission Outages

- **Shift posture rapidly to prevent SOL/IROL violations;** engage emergency tools and targeted redispatch early.
- **Enforce disciplined logging and cross-entity coordination** to accelerate mitigation and avoid load-pocket escalation.

Multi-Day Cold Weather Event

- **Anticipate compound failures across load, fuel, and equipment;** escalate (Cold Weather Alert → Conservative Ops → EEA) decisively.
- **Manage directional flow bias and seams coordination** to preserve reserves and grid stability under prolonged stress.

ICCP Failures/Outages

- **Detect and classify fast** (Inbound/Outbound/Both; full vs partial) and **initiate required notifications/compliance steps.**
- **Sustain reliability during telemetry/setpoint loss** via Backup Dispatch, manual inputs, and structured recovery/downgrade.



Seasonal Readiness: Emergency Procedures

Don Hunter, MISO Manager of Shift Managers

SO-P-EOP-11-002 Market Capacity Emergency Updates

Summary of SO-P-EOP-11-002 and Corresponding Operator Interface Changes

Effective June 1, 2026

Maximum Generation Alert

The Max Gen Alert has been removed from the procedure.

Two-Way Messaging

Two-Way Messaging was moved from the MISO Communication System to Operator Interface.

Step Consolidation

The previous five steps were consolidated into three steps to align with the EEA escalation levels.

Public Appeals

A new Public Appeals declaration has been added to provide clearer communication when voluntary energy reduction is needed.

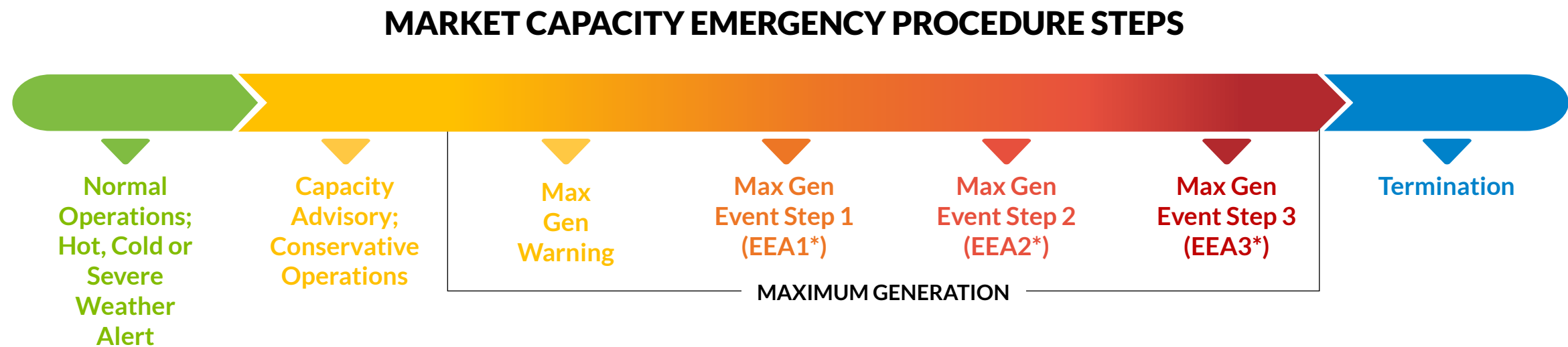
Declarations

Declarations now display Member Actions, MISO Actions, and General Information separately for improved clarity.

Transmission Warning

A new Transmission Warning declaration was created to improve situational awareness during elevated transmission reliability risk.

Market Capacity Emergency Procedure Steps



Emergency procedures escalate as capacity conditions tighten; associated actions are designed to balance the real-time supply of energy with demand on the system

*See appendix for definitions

The Grid Conditions Gauge on the MISO website and app provides situational awareness for grid stability

GRID CONDITIONS AT A GLANCE

The Grid Conditions Gauge on MISO's Website

Green	Yellow	Orange	Dark Orange	Red
<i>Grid is stable and conditions are normal</i>	<i>Grid is stable and advisories or warnings are issued</i>	<i>Grid is stable and power demand could exceed supply available</i>	<i>Grid is stable and emergency power and/or reduced demand is needed</i>	<i>Power interruptions imminent or happening</i>
Hot Weather Alert	Capacity Advisory	NERC Energy Emergency Alert 1 (EEA1)	NERC Energy Emergency Alert 2 (EEA2)	NERC Energy Emergency Alert 3 (EEA3)
Cold Weather Alert	Maximum Generation Warning	Transmission Warning		Transmission Emergency
Severe Weather Alert	Conservative Operations			
Load Pocket Advisory	Transmission Advisory			

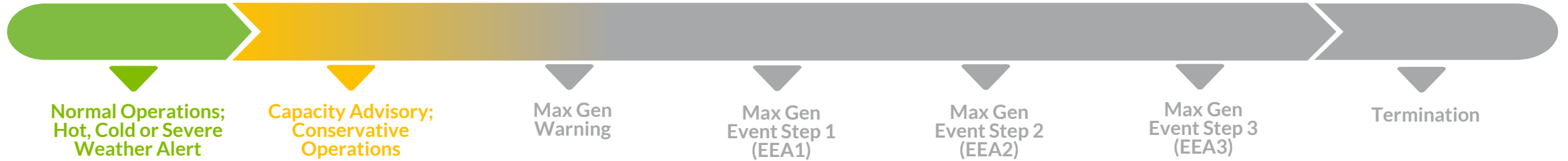
How the Grid Conditions Gauge Works

The gauge needle provides situational awareness and changes color according to [Grid Conditions at a Glance](#). The needle moves when the alert, advisory, warning, event or termination takes effect, *not when a real-time notification is sent.*



MARKET CAPACITY EMERGENCY PROCEDURE STEPS

(1 of 3)



STATUS	TRIGGER	COMMUNICATION	AVAILABLE MISO ACTIONS*	REGULATORY	STAKEHOLDER/MEDIA
Normal Operations	None	None	Normal operating procedures	None	None
Hot, Cold, or Severe Weather Alert	Could be approaching tight supply due to weather-related circumstances, like extreme heat or cold, or severe wind, storms, and tornados	Alert for situational awareness	<ul style="list-style-type: none"> Review outage plans for deferral or cancellation Normal pricing 	MISO alerts FERC, NERC, DOE, State Commissions, and Regional Entities	<ul style="list-style-type: none"> Message to members and neighboring RCs through Operator Interface and RCIS Notification posted to MISO website Email sent to Real-Time Market Mailing List
Capacity Advisory	Capacity shortage is forecast within the next few days	Advisory for situational awareness	<ul style="list-style-type: none"> Request market participants update offer data Allows MISO to line up LMRs that are unavailable under normal operating conditions Increase STR requirements Normal pricing 	Same as above	Same as above
Conservative Operations	Reliability issue possible for defined area (may be capacity-driven or caused by other abnormal circumstances)	Alert for situational awareness	<ul style="list-style-type: none"> Potentially suspend transmission maintenance Review outage plans for deferral or cancellation Define boundaries Suspend maintenance Normal pricing 	Same as above	Same as above

*MISO's Shift Manager determines which actions are needed and that is shared through Operator Interface.
See appendix for definitions

MARKET CAPACITY EMERGENCY PROCEDURE STEPS

(2 of 3)

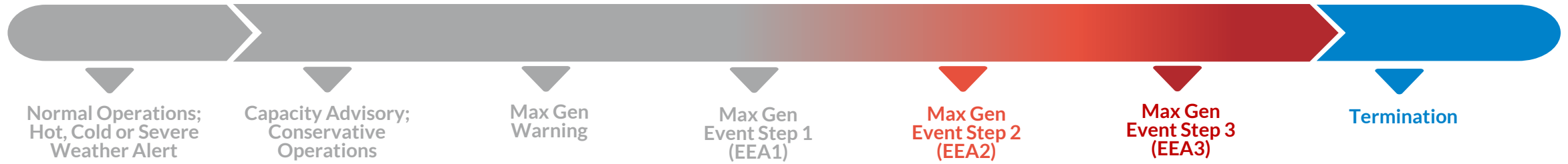


STATUS	TRIGGER	COMMUNICATION	AVAILABLE MISO ACTIONS*	REGULATORY	STAKEHOLDER/MEDIA
Maximum Generation Warning	Reserve margin shortage is forecast	Warning to prepare for possible event	<ul style="list-style-type: none"> • Declare <i>Conservative System Operations</i> • Prepare for potential Maximum Generation event • Schedule all available economic resources • Curtail non-firm exports • Reconfiguration • Commit emergency-only resources • Request environmental waivers • <i>Emergency Tier 1 Offer Floor</i> 	MISO alerts FERC, NERC, DOE, State Commissions, and Regional Entities	<ul style="list-style-type: none"> • Message to members and neighboring RCs through Operator Interface and RCIS • Notification posted to MISO website • Email sent to Real-Time Market Mailing List
Maximum Generation Event Step 1 (EEA1)	Reserve margin requirements cannot be met through normal economic resources; all available resources in use	Declare EEA1	<ul style="list-style-type: none"> • Activate emergency operating ranges • <i>Emergency Tier 1 Offer Floor</i> 	<ul style="list-style-type: none"> • MISO alerts FERC, NERC, DOE, State Commissions, and Regional Entities • EEA Notification • MISO NERC Alert • MISO contacts state/local leaders 	<ul style="list-style-type: none"> • Message to members and neighboring RCs through Operator Interface and RCIS • Notification posted to MISO website • Email sent to Real-Time Market Mailing List • MISO corporate communications initiates contact with impacted member communicators

*MISO's Shift Manager determines which actions are needed and that is shared through Operator Interface.
See appendix for definitions

MARKET CAPACITY EMERGENCY PROCEDURE STEPS

(3 of 3)



STATUS	TRIGGER	COMMUNICATION	AVAILABLE MISO ACTIONS*	REGULATORY	STAKEHOLDER/MEDIA
Maximum Generation Event Step 2 (EEA2)	Demand cannot be met; actions needed to reduce demand and/or acquire additional supply Attempting to maintain minimum Contingency Reserves All available MISO resources used	Declare EEA2	<ul style="list-style-type: none"> Instruct load to be reduced via LMMs-Stage 1 or Stage 2 and LMRs or EDRs Implement emergency energy purchases Instruct LBAs if public appeals needed** Implement spinning and supplemental reserves Request and implement environmental waivers Initiate external emergency energy purchases <i>Emergency Tier 2 Offer Floor</i> 	<ul style="list-style-type: none"> MISO alerts FERC, NERC, DOE, State Commissions, and Regional Entities EEA Notification MISO NERC Alert MISO contacts state/local leaders 	<ul style="list-style-type: none"> Message to members and neighboring RCs through Operator Interface and RCIS Notification posted to MISO website Email sent to Real-Time Market Mailing List MISO corporate communications initiates contact with impacted member communicators
Maximum Generation Event Step 3 (EEA3)	Unable to maintain minimum Contingency Reserves	Declare EEA3	<ul style="list-style-type: none"> Coordinated load shed <i>VOLL pricing</i> 	Same as above	Same as above
Termination	Max Gen and, possibly, Capacity Advisory termination	Event terminated	<ul style="list-style-type: none"> Update stakeholder market data <i>Normal pricing</i> 	Same as above	Same as above

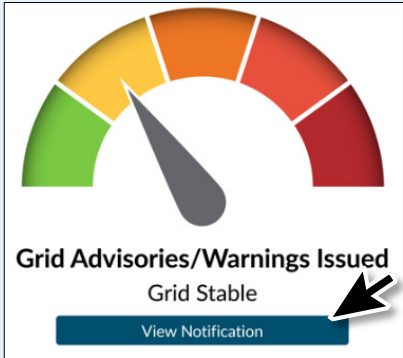
*MISO's Shift Manager determines which actions are needed and that is shared through Operator Interface.

**Public appeals to reduce demand is based on internal LBA procedures, system conditions and Event projections provided by MISO. A standalone notification will be shared publicly on the website, app and via email.

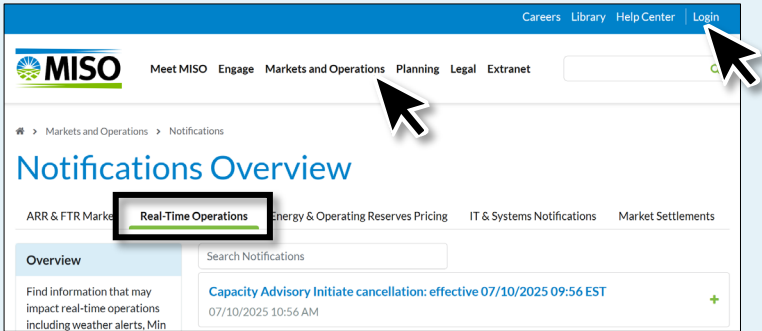
See appendix for definitions

View MISO's real-time grid status and subscribe to notifications

Website

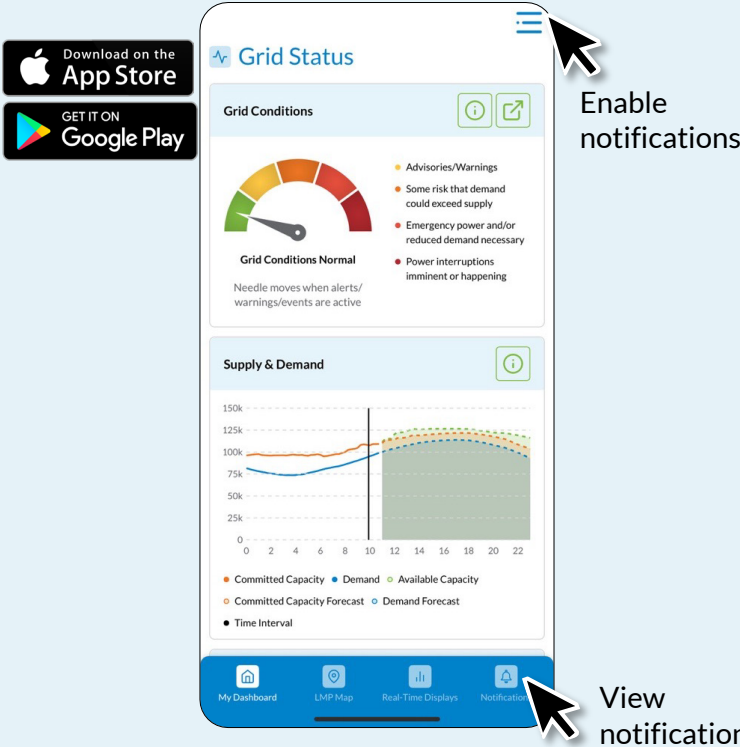


Grid Conditions Gauge (Homepage)



Real-Time Operations Notifications (Markets and Operations > Notifications > Real-Time Operations)
Login to subscribe to email notifications

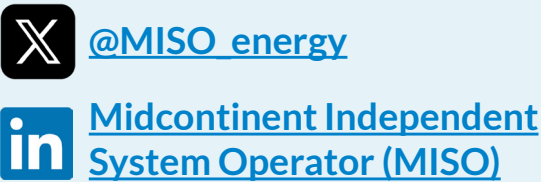
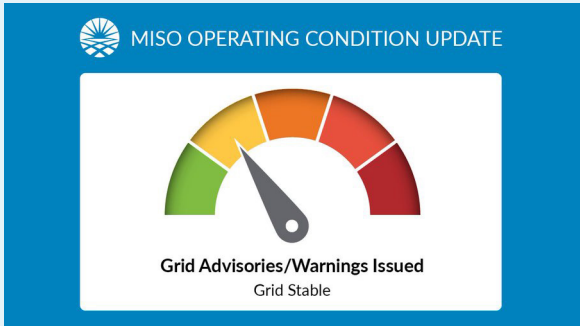
MISO App



Grid Conditions Gauge (My Dashboard)

Real-Time Operations Notifications (Notifications > Real-Time Operations)

Social Media



Public Notifications on Website & Email

- Public declarations include time and impacted region(s) and entity(ies)
- Notifications are posted to the website and sent via the Real-Time Notification email list
- Operating instructions are shared via Operator Interface only
 - Full and view-only access is managed by each LBA, TO or MP

Notification

Severe Weather Alert

04/04/2026 9:21 AM EST

MISO has issued a Severe Weather Alert due to High Winds and Heavy Rainfall.

Start Time: 04/04/2026 09:15 EST

End Time: 04/04/2026 20:00 EST

Affected Region(s):

- South Region - EES, CLEC, LAFA, SME, EAI, EMBA

This public notification is for awareness only. Impacted entities receive detailed instructions and information via the Operator Interface.

MISO issues separate notifications for Public Appeals. This action is at the discretion of the shift manager when in EEA2.

- Notifications will be posted to the website and sent via the Real-Time Notification email list

Notification

Public Appeal Notification

0X/0X/202X 7:17 AM EST

MISO has instructed the utilities listed below to issue a public appeal for electricity conservation due to reduced power supply and high demand.

Start Time: 0X/0X/202X 09:15 EST

Affected Region(s):

- North Region – DPC, GRE, MDU, MP, NSP, OTP, SMP

This public notification is for awareness only. Impacted entities receive detailed instructions and information via the Operator Interface.

Some declarations are *not* driven by capacity challenges

Transmission

Local Transmission Emergency

Notification that mitigation efforts needed outside of normal congestion management procedure. Does not meet PCE Criteria.

Potential Cascading Emergency

Notification that Multiple lines tripped or unsolved conditions or emergency rating exceedances. RC expects conditions to worsen.

Transmission Warning

Notification that system conditions present a credible risk to the BES, where mitigation actions are expected to be insufficient and more than 100 MW of load may be lost.

IROL Emergency

Notification of actual or imminent IROL exceedance requiring immediate emergency actions to maintain BES reliability and prevent widespread impacts.

System Status Levels

Indicates infrastructure failures at MISO or MISO Member facilities

SSL 0 Low – Green

System status is normal.
No adverse impacts

SSL 1 Elevated – Yellow

Short, minor impact to system, can be quickly remedied

Examples: Temporary infrastructure issue

SSL 2 High – Orange

Longer term, major impact to system, cause unknown

Examples: Loss of monitoring data or member infrastructure

SSL 3 Severe – Red

Major impact on MISO’s ability to reliably operate system or market

Examples: Hardware failure, bomb threat, sabotage, control center evacuation

Notification for a capacity emergency (EEA) is different from a transmission emergency

Capacity Emergency



Occurs when there is not enough generation to meet demand

Typically linked to extreme weather (summer or winter peak)

Follows MISO's Maximum Generation and NERC's Energy Emergency Alert (EEA) process

Supported with various communications including advisories, declarations, EEA Alerts and website updates

Transmission Emergency



Occurs when there is an actual or imminent IROL violation on the transmission system

Happens very quickly with no public declarations

Requires corrective action within 30 minutes to maintain grid stability

Follows MISO's Transmission System Emergency process

Operator Interface Load Shed Migration

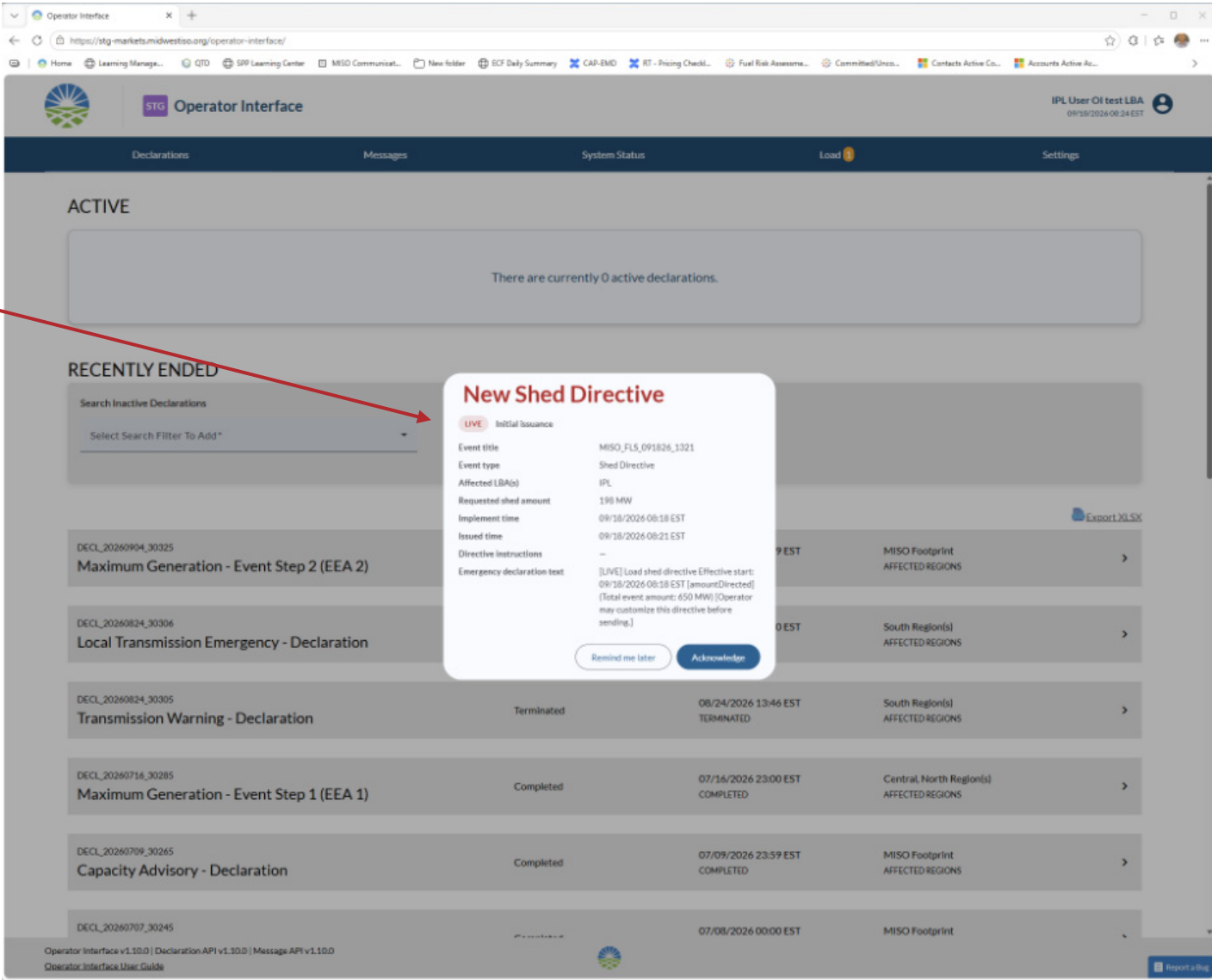
Firm Load Shed is migrating from the MISO Communication System (MCS) to Operator Interface (OI)

- MISO will migrate firm load shed functionality from MCS to OI as part of the effort to eventually retire MCS
- New functionality allows MISO to look ahead with more granularity (00:15, 00:30, 00:45... up to 4 hours)
- In general, members should not notice a lot of changes
- Please have operators begin testing the new functionality in the Customer Connectivity Environment (CCE) at <https://cce.midwestiso.org/operator-interface/>
- More information on the transition process and member testing will be announced through OI as we approach the cutover date



Load Shed Event in OI: Alerting

An audible pop up the OI will first alert members that a load shed directive is underway



Load Shed Event in OI: Initiation and Acknowledgement

- In this example, MISO initiated a load shed event which directed the member to shed 198 MW
- The member was alerted in OI to the load shed event and clicked to acknowledge the shed request

The screenshot displays the MISO Operator Interface (OI) for member IPL. The 'Active Events' section shows a 'LIVE EVENT' titled 'MISO_FL5_091826_1321' that started on 09/18/2024 at 08:18 EST. A table details the 'SHED' and 'RESTORE' phases. The 'SHED' phase shows a directed shed of 198 MW, which was acknowledged at 08:25 EST. The 'RESTORE' phase is currently empty. Below the table, the 'EVENT LOG' provides a chronological record of the event, including the acknowledgment by IPL, the directive sent to affected LBAs, the receipt of the directive, and the event's creation by Paul Neman. The 'Event History' section indicates no completed events are displayed for this event.

SHED				RESTORE				
LBA	Shed Time	Shed Directed	Shed Ack	Actual Shed	Restore Time	Restore Directed	Restore Ack	Actual Restore
IPL	08:18 EST	198 MW	1/1					
	08:25 EST		08:25 EST					
TOTALS		198 MW	1/1					

EVENT LOG

- 09/18/2024 08:25:31 EST - IPL (1718990000537@testlba) has acknowledged the Load Shed Directive
- 09/18/2024 08:21:23 EST - Load Shed Directive sent to 3 affected LBAs
- 09/18/2024 08:21:23 EST - Load Shed Directive received - Shed 198 MW
- 09/18/2024 08:21:23 EST - Load Shed Event created by Paul Neman

Event History

No completed events to display.

Load Shed Event in OI: Actual Amount Shed

- The member clicked on the actual shed box and responded that they had actually shed 202 MWs
- After leaving optional comments, the member clicked submit which notified MISO of the actual amount shed

The screenshot displays the MISO Operator Interface (OI) web application. The main content area shows an 'Active Events' section for a 'LIVE EVENT' (MISO_HLS_091826_1321) that started on 09/18/2024 at 08:18 EST. A table lists the event details, including the LBA (IPL), Shed Time (08:18 EST), Shed Directed (198 MW), and Actual Shed (198 MW). A modal dialog titled 'Enter Actual Shed Amount' is open, prompting the user to enter the actual shed amount (in MW) and providing a text area for optional comments. The user has entered '202' in the input field and 'Load blocks' in the comments field. The modal also includes a 'Cancel' button and a 'Submit' button. The background interface shows the 'Active Events' table and an 'Event Log' section with a list of events.

SHED				RESTORE			
LBA	Shed Time	Shed Directed	Actual Shed	Restore Time	Restore Directed	Restore Ack	Actual Restore
IPL	08:18 EST	198 MW					
Shed (IPL) - 08:18 EST	08:18 EST	198 MW					
TOTALS		198 MW					

Enter Actual Shed Amount

IPL: IPL
Directed: 198 MW
Actual Shed Amount (in MW): 202

Comments: Load blocks

Required when actual differs from directed.

Cancel Submit

Load Shed Event in OI: Restore Directive

- MISO requested load to be restored, 99 MWs of which was assigned to this member
- After being alerted to the load restoration request, the member acknowledged receiving the directive

The screenshot displays the STG Operator Interface. A modal titled 'New Restore Directive' is open, showing details for event MISO_FLS_091826_1321. The modal includes fields for Event title, Event type, Affected LBAs, Requested restoration amount, Restoration time, Issued time, Restoration instructions, and Emergency declaration text. A red arrow points from the 'Restore Time' field in the modal to the 'Restore Time' column in the 'Active Events' table.

Active Events

LBA	SHED				RESTORE			
	Shed Time	Shed Directed	Shed Ack	Actual Shed	Restore Time	Restore Directed	Restore Ack	Actual Restore
IPL	08:43 EST	198 MW				99 MW	1/1	102 MW
Shed IPL#1 - 08:58 EST	08:18 EST	198 MW				99 MW		
Restore IPL#1 - 08:42 EST						99 MW	1/1	102 MW
TOTALS		198 MW				99 MW	1/1	102 MW

EVENT LOG

- 09/18/2026 08:50:42 EST - IPL submitted actual restore amount of 102 MW
- 09/18/2026 08:45:40 EST - IPL (1718990030537) submitted actual shed amount of 198 MW
- 09/18/2026 08:37:47 EST - Load Restore Directive sent to 31
- 09/18/2026 08:37:47 EST - Load Restore Directive received from 31
- 09/18/2026 08:29:14 EST - IPL submitted actual shed amount of 202 MW

Event History

No completed events to display.

Operator Interface v1.10.0 | Declaration API v1.10.0 | Message API v1.10.0

Load Shed Event in OI: Completed Load Shed with Two Step Restoration



STG Operator Interface

IPL User Oil test LBA
09/18/2026 09:00 EST

DeclarationsMessagesSystem StatusLoadSettings

Active Events

MISO_FL5_091826_1321LIVE EVENT

Started: 09/18/2026 08:18 EST

	SHED				RESTORE			
LBA	Shed Time	Shed Directed	Shed Ack	Actual Shed	Restore Time	Restore Directed	Restore Ack	Actual Restore
IPL	08:50 EST	198 MW	1/1	202 MW		198 MW	2/2	198 MW
Shed IP #1 - 08:50 EST	08:50 EST	198 MW	08:55 EST	202 MW				
Restore IP #1 - 08:53 EST					08:53 EST	99 MW	08:55 EST	102 MW
Restore IP #2 - 08:50 EST					08:50 EST	99 MW	08:52 EST	96 MW
TOTALS		198 MW	1/1	202 MW		198 MW	2/2	198 MW

EVENT LOG

09/18/2026 08:50:50 EST - IPL submitted actual restore amount of 96 MW

09/18/2026 08:52:21 EST - IPL (1718990000537@oiltestlba) has acknowledged the Load Restore Directive

09/18/2026 08:52:05 EST - Load Restore Directive sent to 3 affected LBAs

09/18/2026 08:52:05 EST - Load Restore Directive received - Restores 99 MW

09/18/2026 08:29:14 EST - IPL submitted actual shed amount of 202 MW

Show All (9 total)

LMRs and the Deployment Process

Demand Resources

Customers who commit to reducing their load when needed during an emergency

Behind the Meter Generation

Generation resources normally not under MISO control that can be committed in an Emergency

Deployment Parameters



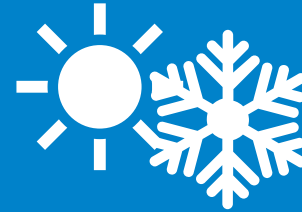
**Notification
Time:**

Max of 6 hours



**Quantity of MW
they can be
reduced by:**

Can be several
hundred MW per
resource



**Required to be
usable at least:**

5x in summer
5x in winter
3x in fall/spring



**LMRs are
required to be
deployable:**

Within at least 4
hours

When are LMRs used?

Commonly used during a capacity emergency

- May be deployed in anticipation of an EEA 2 declaration

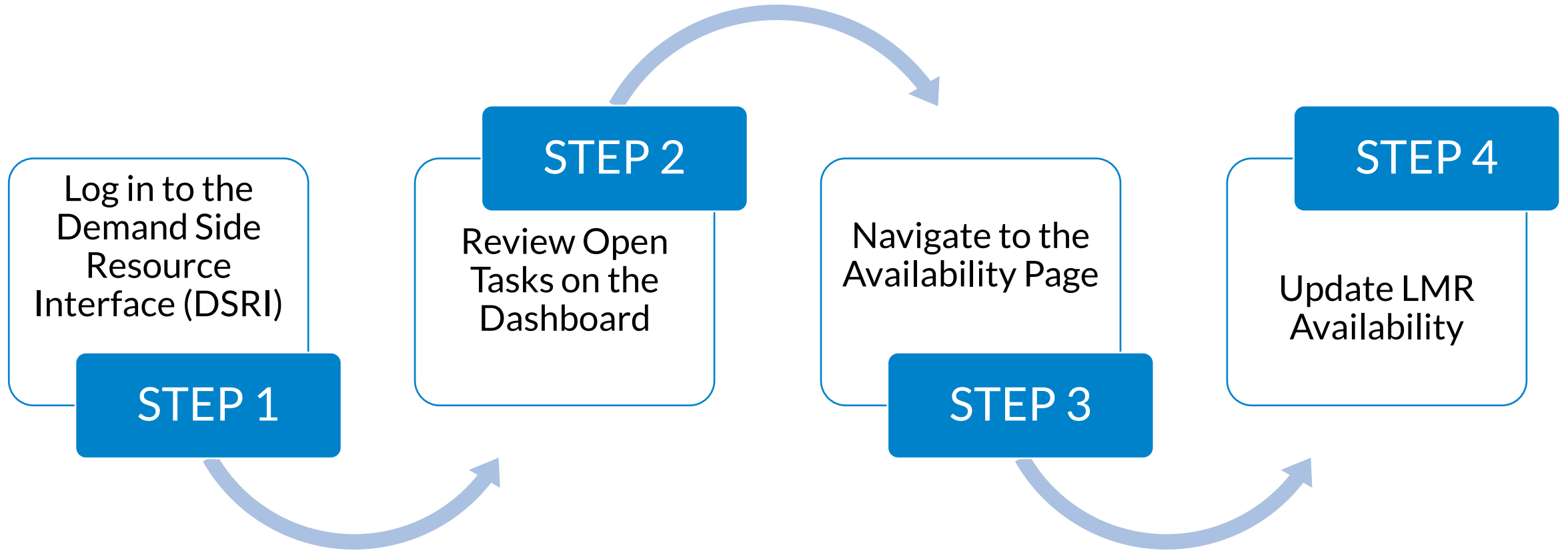
An emergency declaration must be made if LMRs will be deployed within the next 2 hours

- If it is clear LMRs are not needed, they will be called off

LMRs may be deployed during transmission emergencies

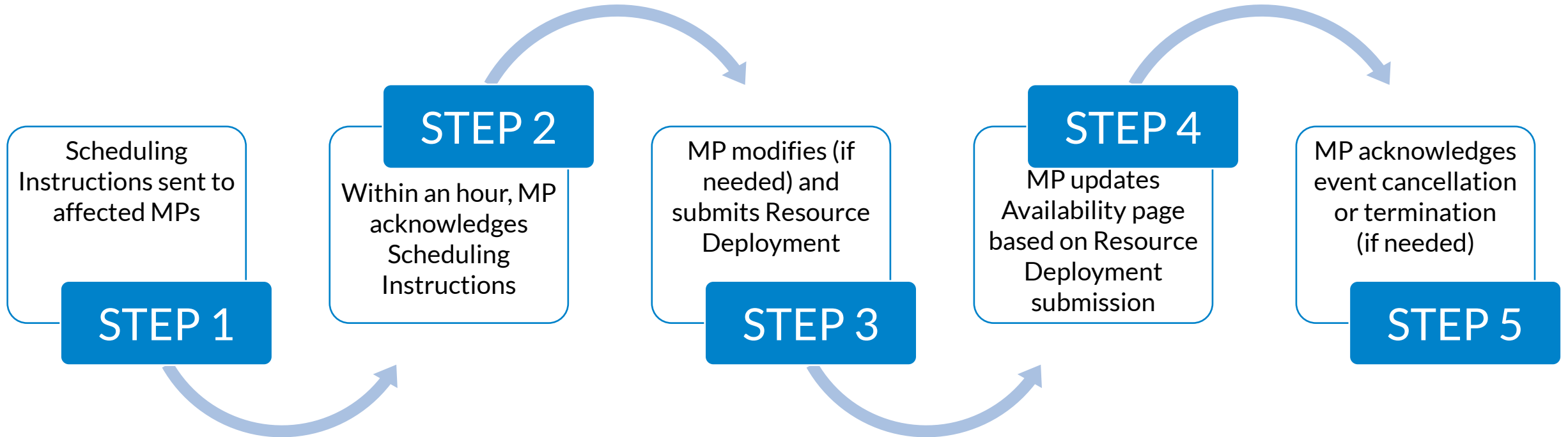
- When deployed for Local Transmission Emergencies (LTE), LMRs are deployed via phone calls to the LBA and NOT through OI

LMR Processes Overview – Non-Event



You will be notified that a capacity event is underway via the MISO OI;
the DSRI tool will be used for LMR management

LMR Processes Overview – During an Event



If the MISO Shift Manager does not cancel or terminate the event, the event will continue and end as scheduled.

LMRs in the Demand Side Resource Interface (DSRI)

How do I access DSRI?

CCE Environment: <https://cce.midwestiso.org>

PROD Environment: <https://markets.midwestiso.org>

How are LMR's selected?

- LMRs with longer notification times are utilized prior to shorter notification resources
- LMRs with the highest MW resources are selected first
- LMRs with the longest duration of run hours are utilized prior to short duration resources

What can you do in DSRI?

- Update LMR Availability
- Export LMR Data into Excel
- Acknowledge Scheduling Instructions
- Review Scheduling Instructions
- Submit Resources for Deployment
- Update Resource Availability
- View Event History



Transmission System Emergency Declaration Changes

Dan Pacilio, MISO Reliability Coordination Manager

Purpose & Key Takeaway

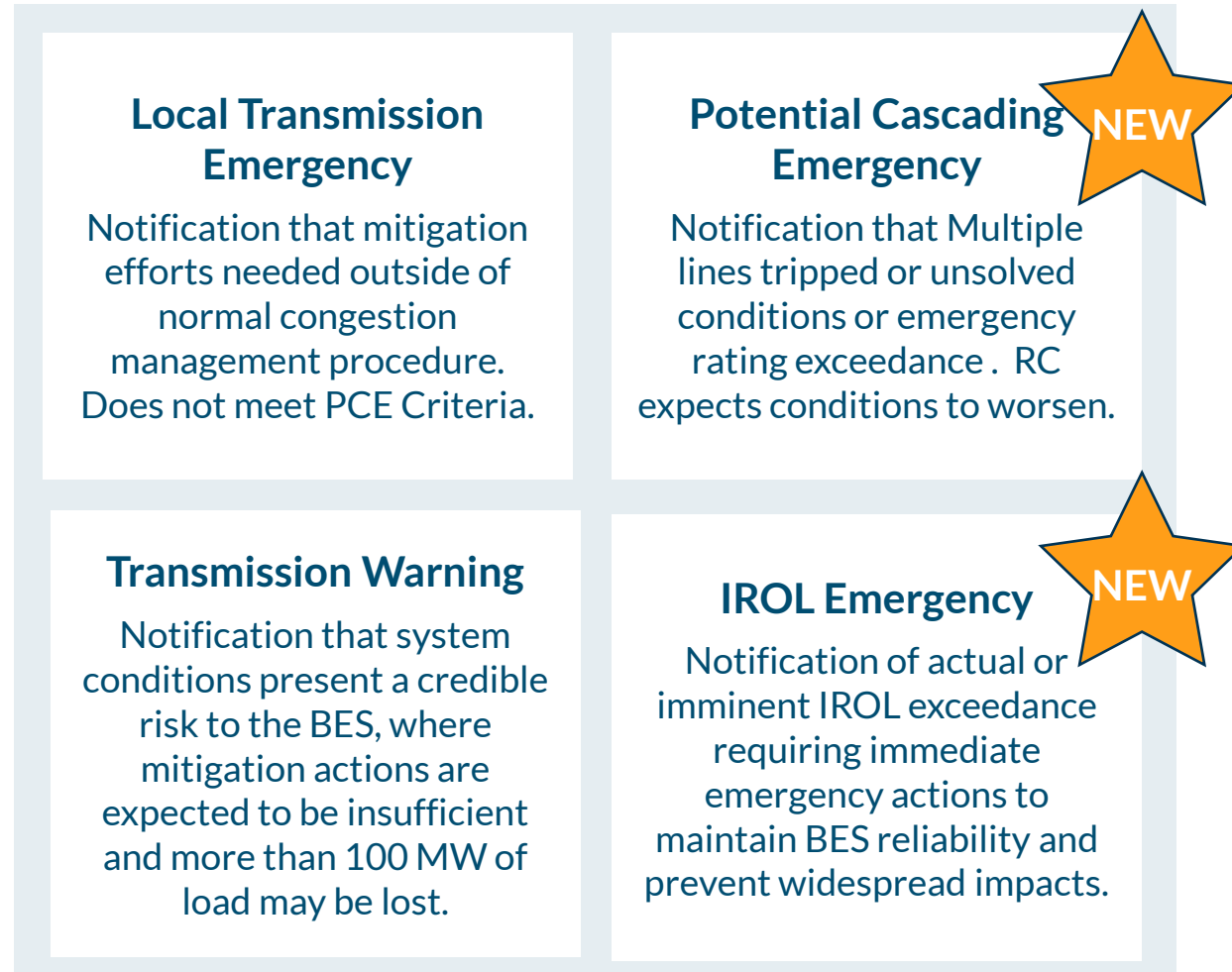
Purpose

Review updates to the emergency declarations in the Transmission System Emergency Procedure (SO-P-EOP-00-004)

Key Takeaways

- MISO's IROL definition does not change
- Temporary IROL designation and Transmission System Emergency declaration will be removed from the procedure
- IROLs will be defined in the forward-looking planning and operations-planning studies, not in Real-Time
- IROL Emergency will be a new real-time declaration indicating that an IROL has been exceeded
- Potential Cascading Emergency (PCE) will be a new real-time declaration indicating that a PCE has been identified by a real-time cascade analysis
- Updated procedure to be implemented by operations on **11/30/26**

Transmission System Emergency Declaration Summary



- Transmission System Emergency – removed from the procedure and is no longer a declaration
- All warning and emergency declarations will be communicated through the Operator Interface

Why make an Emergency Declaration?

Emergency declarations enable the use of emergency-specific operational actions, including:

- Emergency redispatch of generation (such as nuclear units)
- Starting emergency-only resources (e.g., AME units)
- Utilizing emergency operating ranges and limits
- Deploying demand response tools (EDRs and LMRs)
- Implementing Load Shedding
- Communicate externally

Transmission Warning

Transmission Warning

A Transmission Warning should be declared when all of the following conditions are met:

- There is 100MW or more of load at risk
- Normal congestion management tools have been exhausted and are not sufficient to mitigate risk
- Available emergency actions are not expected to be sufficient to mitigate risk (e.g. emergency ranges of units, emergency only units, LMRs, etc.)
- Facilities > 100kV have post-contingent flow greater than or equal to 115% of the highest emergency limit
- The RC determines that system conditions warrant heightened awareness of potential transmission system risk

IROL Emergency

MISO's IROL Definition Remains the Same

Cascading event with expected load loss of 1000 MW or more of load

- IROLs will be determined in the Expansion Planning and Operations Planning Horizon, and operating plans will be developed with TOPs as needed
- MISO's Expansion Planning team will complete IROL analysis using planning criteria
- MISO's Operations Planning team (FRES) will complete IROL analysis to determine if there are additional IROLs not defined by Expansion Planning based upon forecasted conditions for an operating day

An IROL Emergency happens when...

- A new real-time declaration indicating that a pre-defined IROL limit has been exceeded.
- The Reliability Coordinator declares an **IROL Emergency** when a predefined IROL is exceeded.
- Must be resolved in less than 30 minutes or Tv

Potential Cascading Emergency (PCE)

In real-time, Reliability Coordinators will complete cascade analysis and develop operating plans

- **Potential cascading event if 5 lines trip and ≥ 300 MW load loss**
 - The 300 MW load loss matches the DOE-417 reporting requirements
- Cascade analysis will occur when post-contingent flow is $\geq 115\%$ of the emergency rating (aligns with PRC-023)
 - If the cascade event criteria is met, then
 - MISO RC will request from TOP the highest rating prior to load shed, which may include the relay trip setting
 - Develop pre-contingent action plan, including load shed plan. **Actions based on the highest ratings before load shed are to be clear and executable**
- If the cascade event criteria is not met, then:
 - Continue cascade analysis when post-contingent flows are $\geq 125\%$ of the Emergency Rating

Potential Cascading Emergency

A Potential Cascading Emergency is...

- When a cascade analysis identifies a scenario where **5 lines trip and ≥ 300 MW load loss**.
- Cascade analysis will occur when post-contingent flow is **$\geq 115\%$ of the Emergency Rating**.
- When unsolved contingencies or stability limit exceedances indicate an unknown operating state with **a potential loss of 300 MW**, per RC discretion.
- Any operating condition where it is reasonable for the RC to expect that conditions will worsen and will **potentially meet the criteria of a PCE**.
- If the cascade event criteria is not met, then cascade analysis will be continued through the IROL Analysis Tool and manually by SOE and RC as needed.
- Not bound by the 30 minute or Tv resolution requirement of an IROL but is to be mitigated without intentional delay.

Local Transmission Emergency (LTE)

Local Transmission Emergency

A Local Transmission Emergency (LTE)...

- Should be declared when conditions do not meet PCE criteria and only exceed SOLs, in which the **MISO RC expects NOT to be able to mitigate using normal procedures** in a timely fashion in coordination with the TOP.
- Can be used to **increase situational awareness** for neighboring areas.
- Is used to be able to apply emergency mitigation tools.



DOE Emergency Order Efforts

John Marhoefer, MISO System Operations Lead Generation and Interchange

Emergency Orders Under Section 202(c)

DOE Authority

Section 202(c) lets the Department of Energy (DOE) order generators to operate during an emergency, such as a major demand spike or generation shortfall



Environmental Relief

When DOE orders a generator to operate under Section 202(c), the generator is relieved from environmental restrictions during the emergency

How Emergency Orders Have Been Used

Other RTOs/ISOs have requested 202(c) relief in two general situations:

1. Higher Generator Output

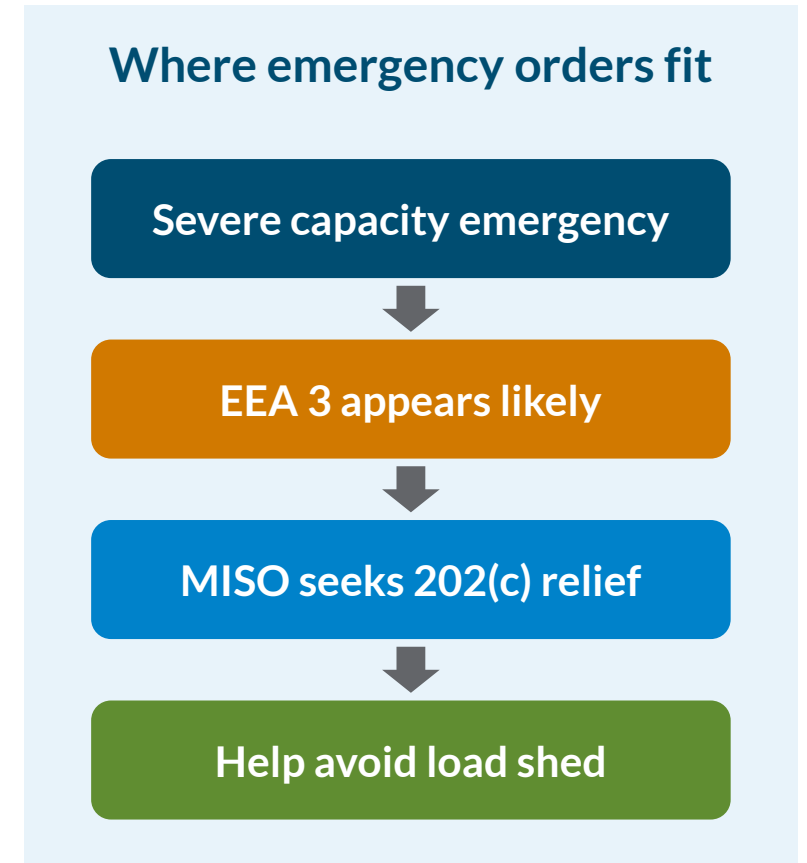
Allowing generators to operate at higher output levels than environmental limits would normally permit (e.g., a generator with rolling average emission limitations)

2. Customer Backup Generation

Allowing large customers (e.g., data centers, hospitals, universities, industrial facilities) with onsite backup generation to run those units when environmental limits would otherwise restrict their use

Why Emergency Orders May Be Relevant to MISO

- 1 MISO views 202(c) as a potential tool for helping avoid load-shed during severe capacity emergencies
- 2 MISO is developing a framework for how it would request 202(c) relief, recognizing that any request would depend on real-time system conditions
- 3 MISO expects it could seek 202(c) relief when an EEA 3 appears likely to otherwise occur



What MISO Is Evaluating

Identifying Participants

MISO is assessing how to efficiently identify generators or large customers with backup generation to be included in a potential 202(c) request

Procedure Updates

MISO is also considering whether updates to the EOP-002 Market Capacity Emergency Procedure are needed

1

Stakeholder Review

MISO expects to bring a DOE emergency order process and related procedure to a stakeholder group for discussion and feedback



2

Winter Readiness

Depending on conditions this winter, MISO may rely on its emergency order framework on an as-needed basis