



Operations Report

Entergy Regional State Committee
(ERSC)

February 13, 2023



South Region Operations Report

- Operations Overview
 - Peak Demand Summary
 - Operating Conditions
- Upcoming Drills & Exercises
- Overview of Winter Storm Elliott

MISO's reliability, markets, and operational functions in the South Region performed well from November through January

System-Wide Monthly Peaks (GW)

November – 88.1
December – 106.6
January – 92.5



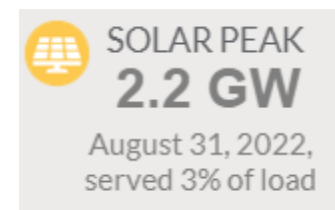
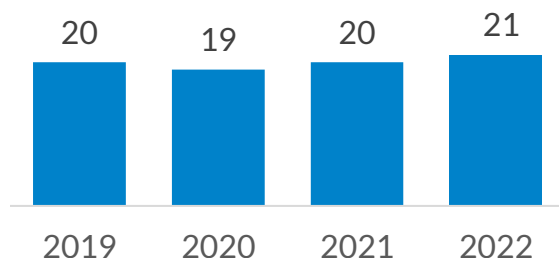
MISO System Wide Peak – 106.6 GW (12/23/22)

- All time MISO Peak 127,125 MW (7/20/11)

MISO South Region Peak – 32.0 GW (12/23/22)

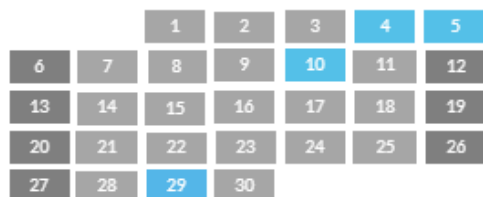
- All time South Peak 32,926 MW (6/24/22)

South Region Yrly Avg. Load (GW)



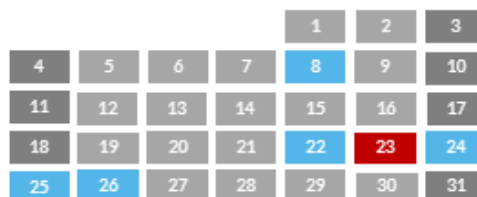
MISO SOUTH OPERATING CONDITIONS

NOVEMBER 2022

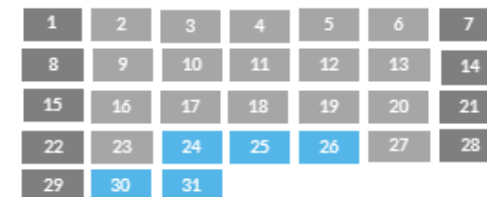


HE = Hour ending

DECEMBER 2022



JANUARY 2023



■ Awareness and Weather

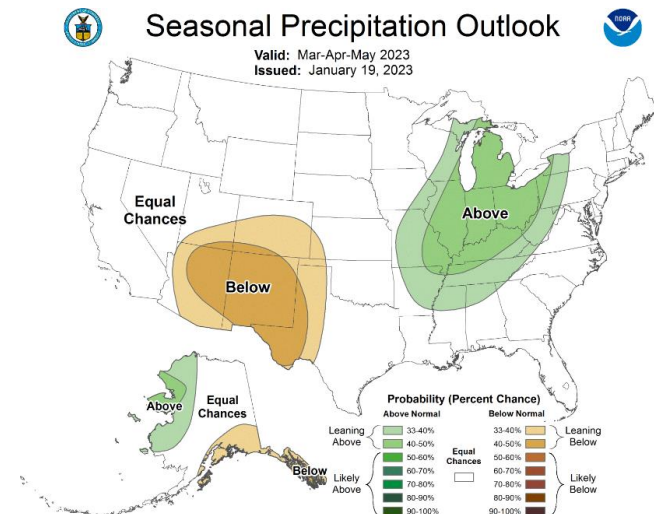
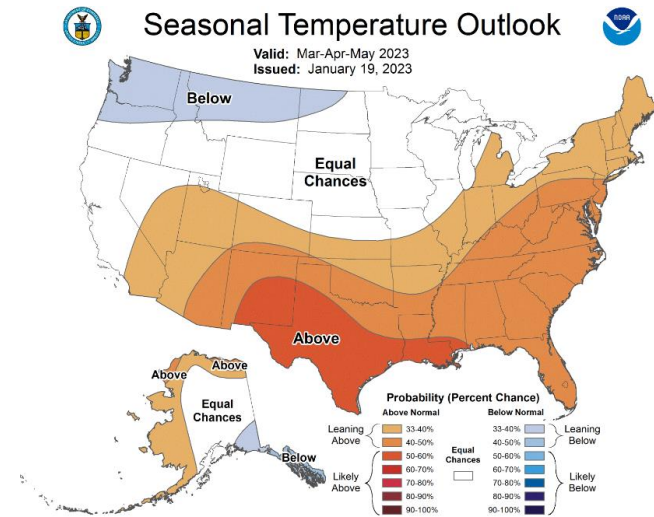
■ Alerts and Warnings

■ Reliability Actions and Events

All data November 1 – January 31, unless noted

2023 Spring Weather Outlook

- Normal to below normal temperatures in the North region with a mix of normal to above normal in the Central
- Predominantly above normal temperatures are expected across MISO South
- An active storm pattern continues across the MISO footprint with above normal precipitation expected in MISO Central and South
- Late season icing risk to wind generation is elevated along with severe storm chances in the South



2023 Annual Spring Drills & Exercises

- **MISO Market Capacity Emergency Drill**
 - April 12, 19, 26 & May 10 from 9:00 am – 3:00 pm Eastern time
 - Participants are eligible to earn 5 CEHs per drill. As in prior years, participants can attend the drill twice.
- **Member Hurricane Exercises**
 - April 11 & 25 from 9:00 am - 4:00 pm EST

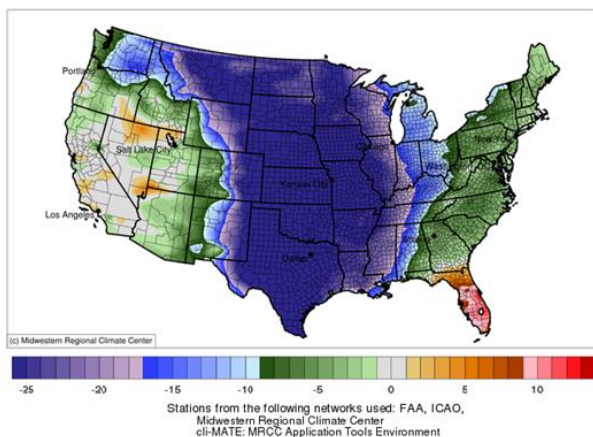


Overview of Winter Storm Elliott

On December 23, Winter Storm Elliott brought significantly below normal temperatures to MISO, driving high demand for heating; drawing similarities to Winter Storm Uri in 2021

WINTER STORM URI FEBRUARY 12-18, 2021

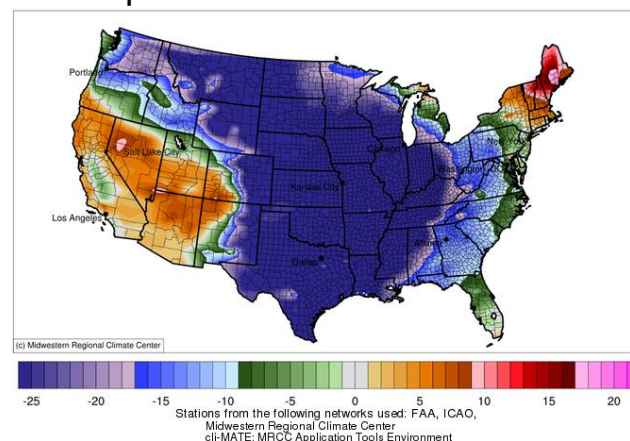
Average Temperature:
Departure from 30-Year Normal



System Peak Load	103 GW
Unplanned Outages (South)	18 GW
Scheduled Load Modifying Resources*	531 MW
RDT Max Flow & Direction	3.2 GW N-S
Precipitation: <i>Abundant snowfall across MISO's South and Central regions</i>	

WINTER STORM ELLIOTT DECEMBER 23, 2022

Average Temperature:
Departure from 30-Year Normal



System Peak Load	107 GW
Unplanned Outages (<i>additional from previous day system-wide</i>)	19 GW
Scheduled Load Modifying Resources*	1.2 GW
RDT Max Flow & Direction	2.7 GW N-S
Precipitation: <i>Modest snowfall across MISO's North and Central regions</i>	

Emergency operations were required to access additional capacity to mitigate uncertainty and support our neighbors

ALERTS

Cold Weather Alert (South)

DEC 22, noon EST – DEC 26, noon EST

Unseasonably cold weather expected across MISO

WARNINGS

Maximum Generation Warning (South)

DEC 23, 9:15 a.m. – 12:45 p.m. EST

Conservative Operations (South)

DEC 23, 9:15 a.m. EST – DEC 26, midnight EST

Tightened conditions due to unit trips and failures to start (~2 GW), higher-than-forecast South load (~2.5 GW), and reduced RDT flow limit N-S (to 1.5 GW)

Maximum Generation Warning (Footprint)

DEC 23, 4:30 p.m.

Conservative Operations (Footprint)

DEC 23, 9 p.m. EST – DEC 24, noon EST

Tighter conditions due to higher-than-forecast system-wide loads, forced outages driven primarily by fuel supply issues and units that failed to start

EVENTS

Maximum Generation Event, Step 1b (Footprint)

DEC 23, 5:30 p.m.

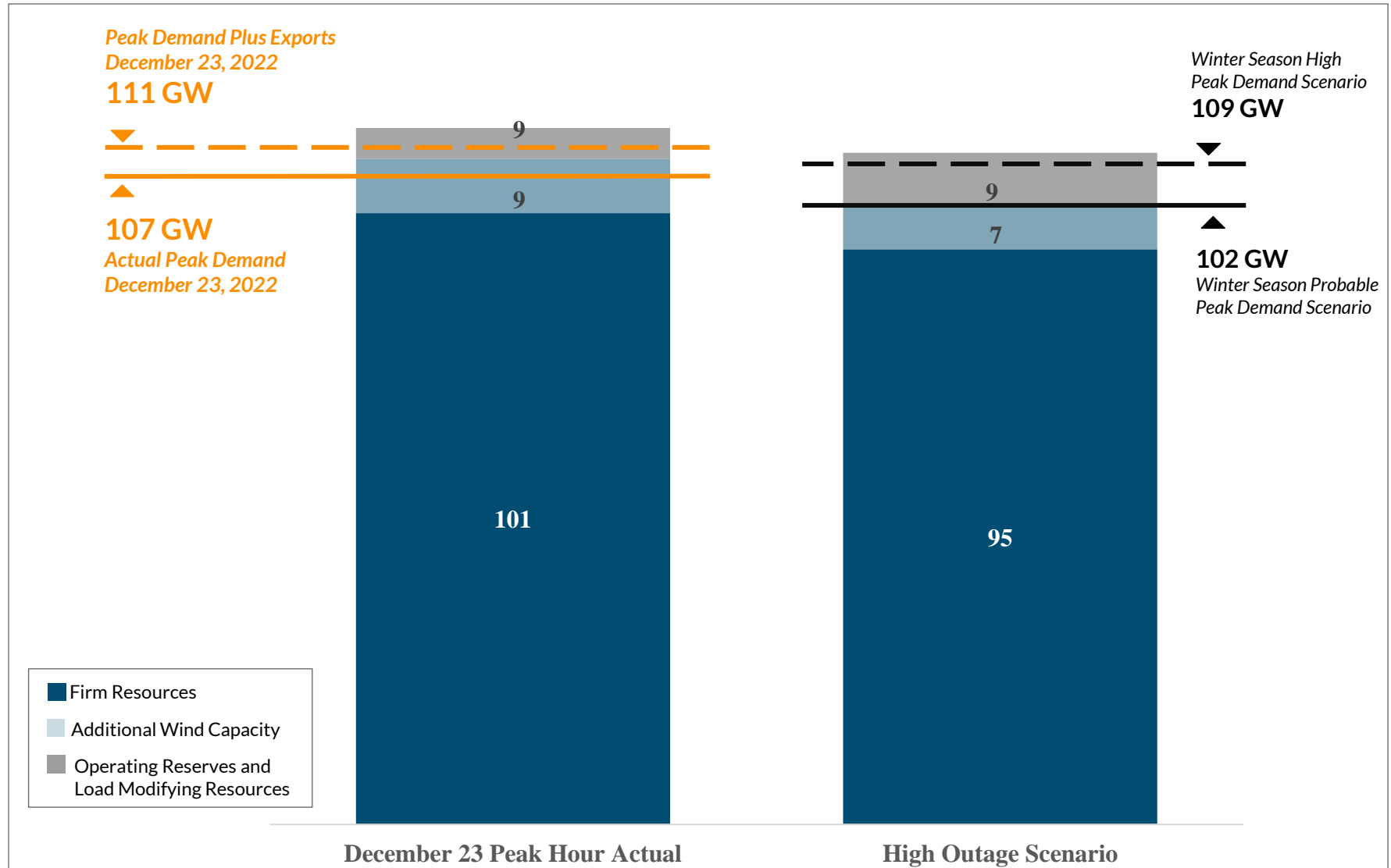
Tight conditions worsened with real-time transmission congestion and diminishing generation deliverability

Maximum Generation Event, Step 2a (Footprint)

DEC 23, 6 p.m. – 9 p.m. EST

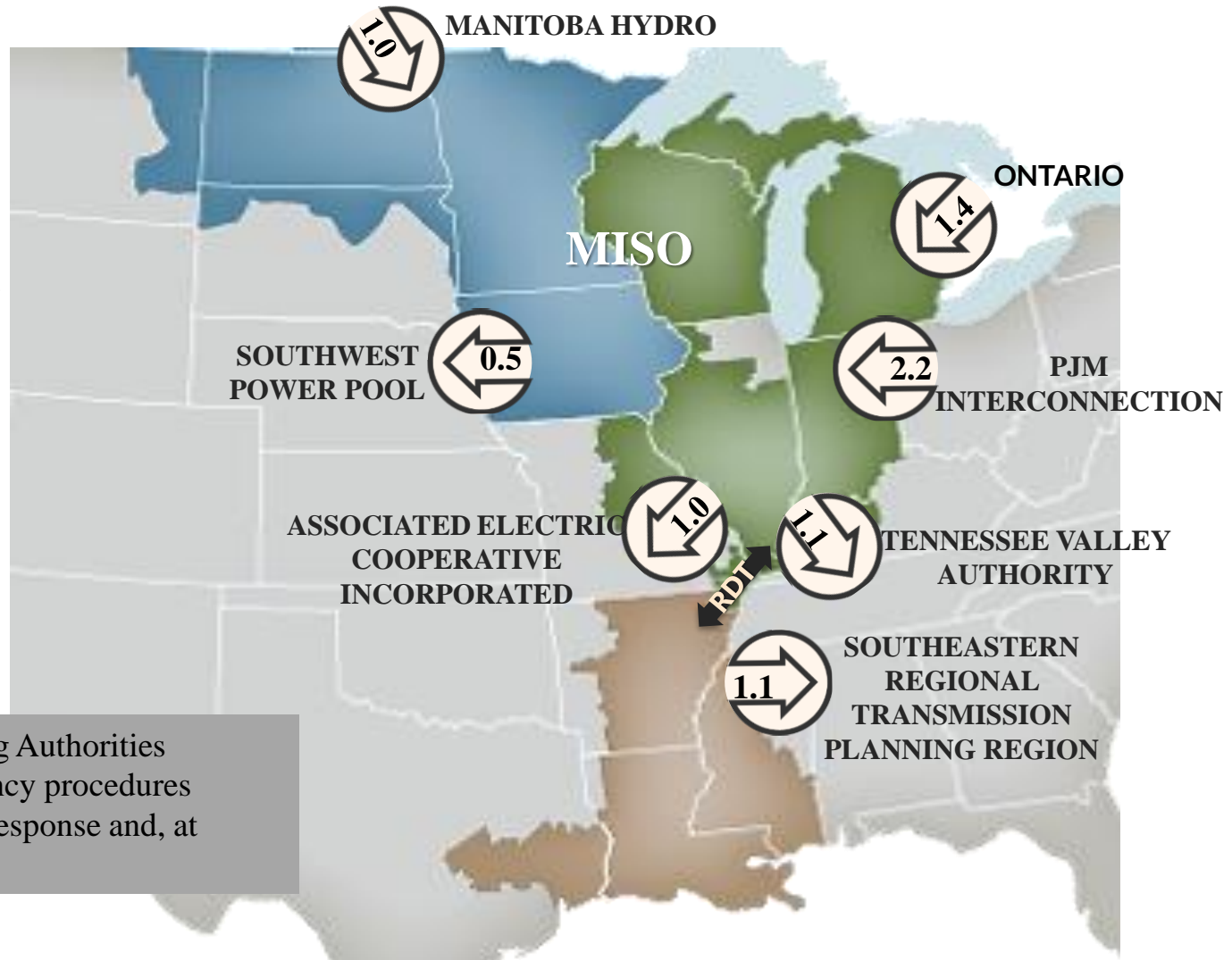
Emergency procedures allowed access to demand response, which reduced the peak demand

Reserve capacity was closely monitored, and exports would have been curtailed if conditions had worsened



MISO consistently exported power to southern neighbors with a maximum value of nearly 5 GW

Net Scheduled Interchange (GW)



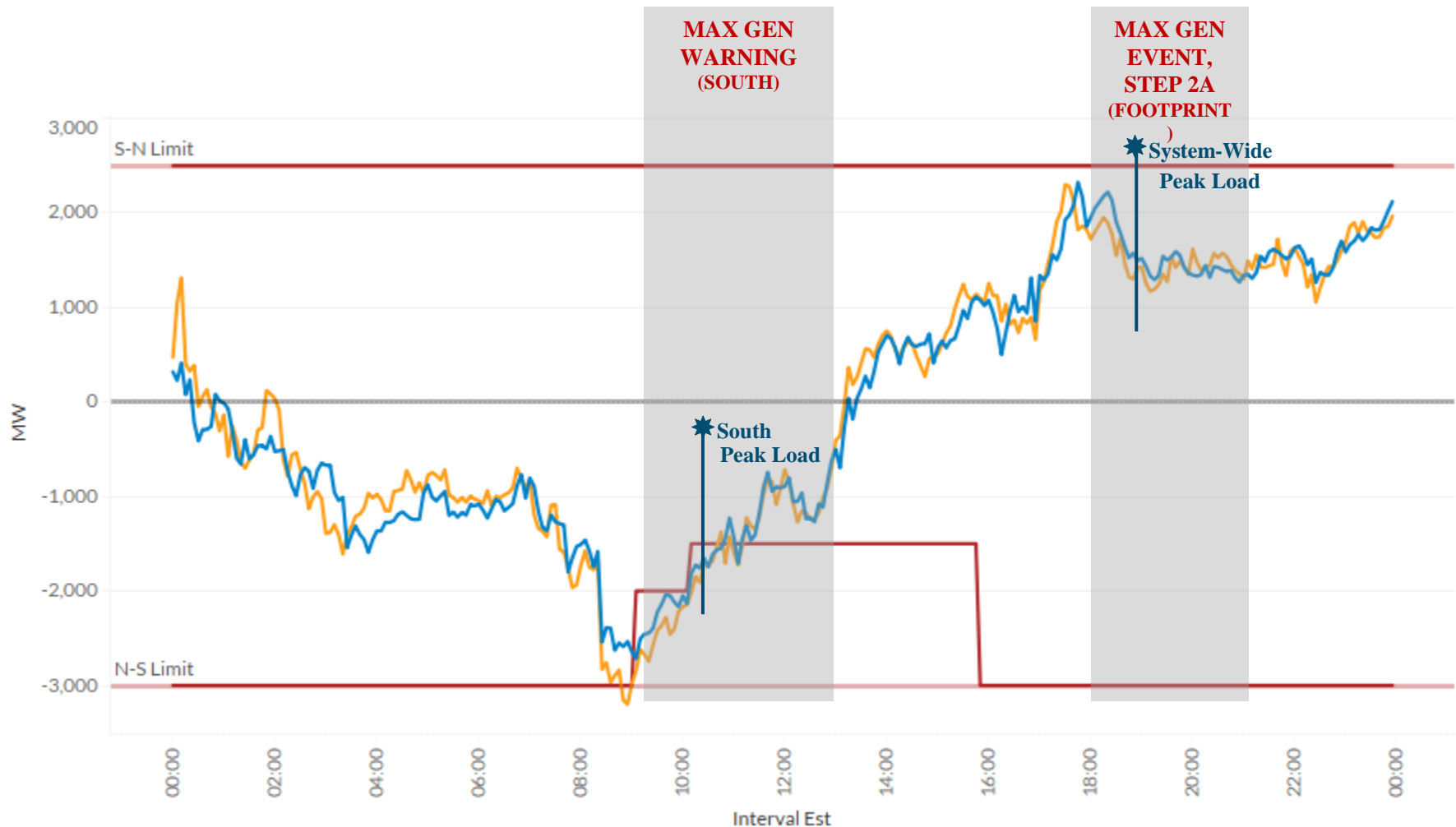
Multiple Balancing Authorities employed emergency procedures utilizing demand response and, at times, load shed

Image represents average flows into and out of MISO December 23, 2022

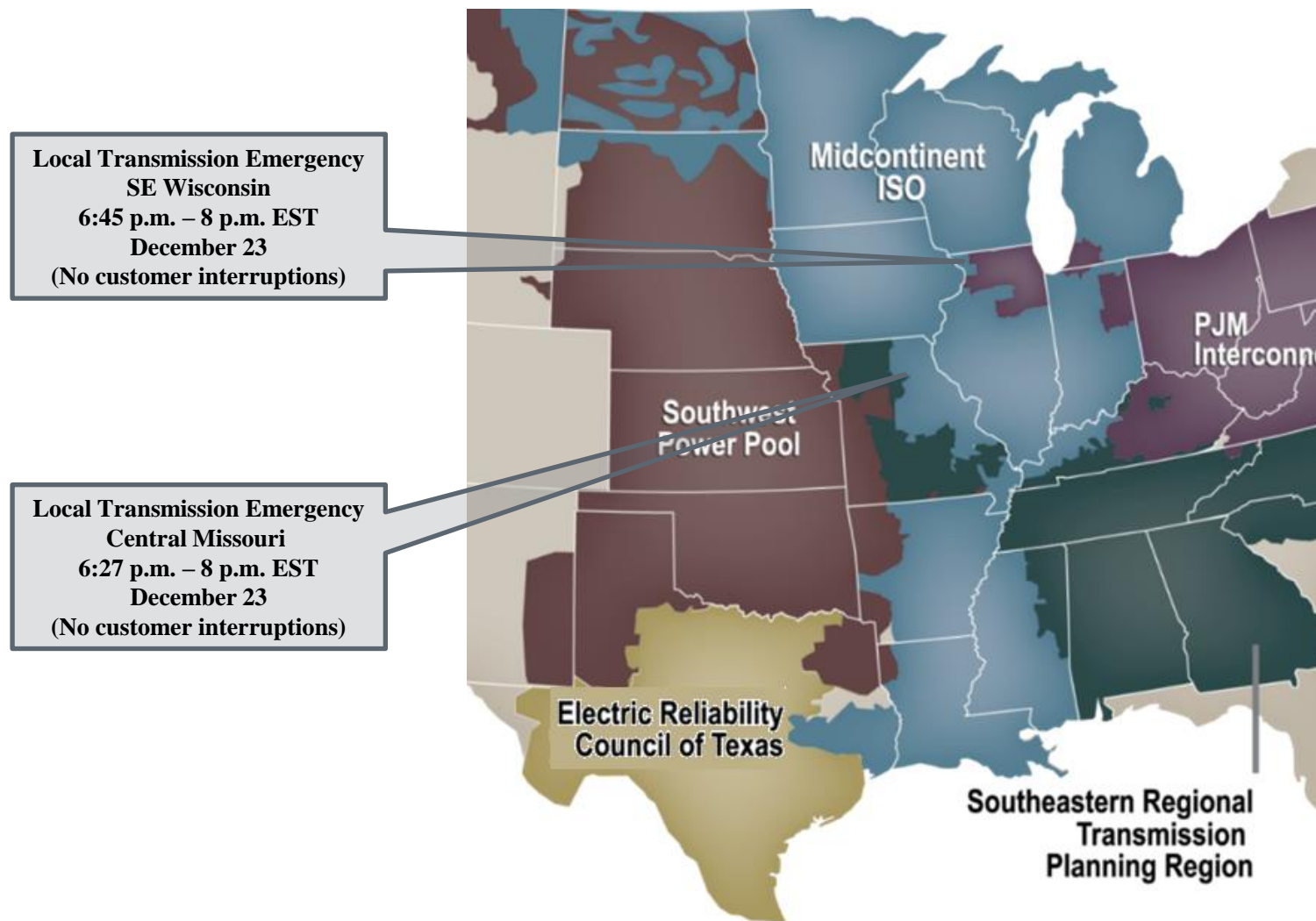
RDT = Regional Directional Transfer, which has a North-South limit of 3.0 GW and South-North limit of 2.5 GW

MISO complied with Joint Parties requests to reduce flows by 1,500 MW during the morning peak, which contributed to an emergency declaration in the South and a recall of non-firm exports

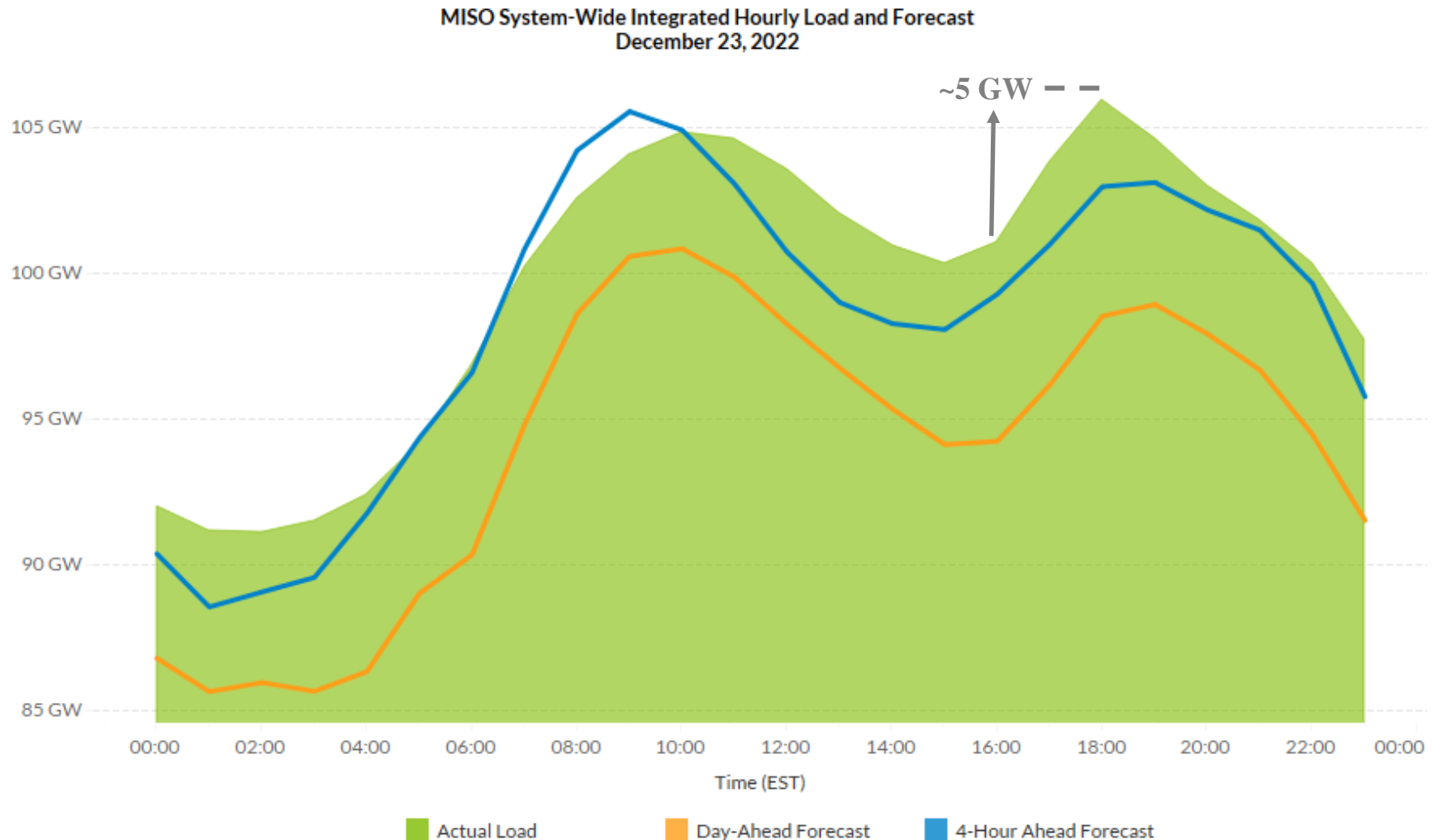
Regional Directional Transfer Flow for December 23, 2022



Two local transmission emergencies were declared to manage severe congestion on transmission lines

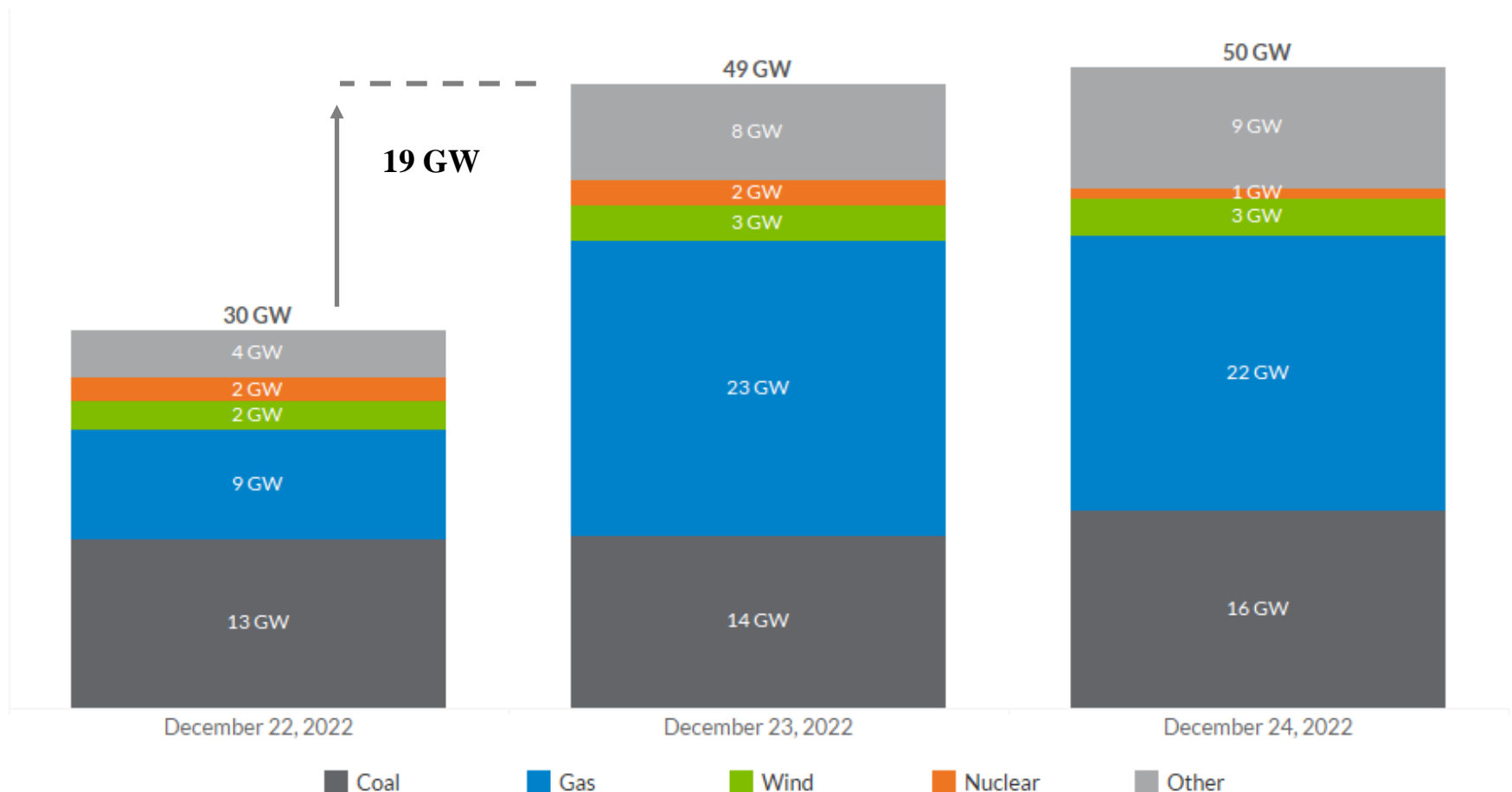


Abnormally high load forecasting errors occurred due to a lack of historical data for similar extreme conditions in December



Gas supply availability contributed to increased unplanned outages, particularly in the afternoon, that pushed MISO into emergency procedures

MISO System-Wide Daily Average Unplanned* Generation Outages by Fuel



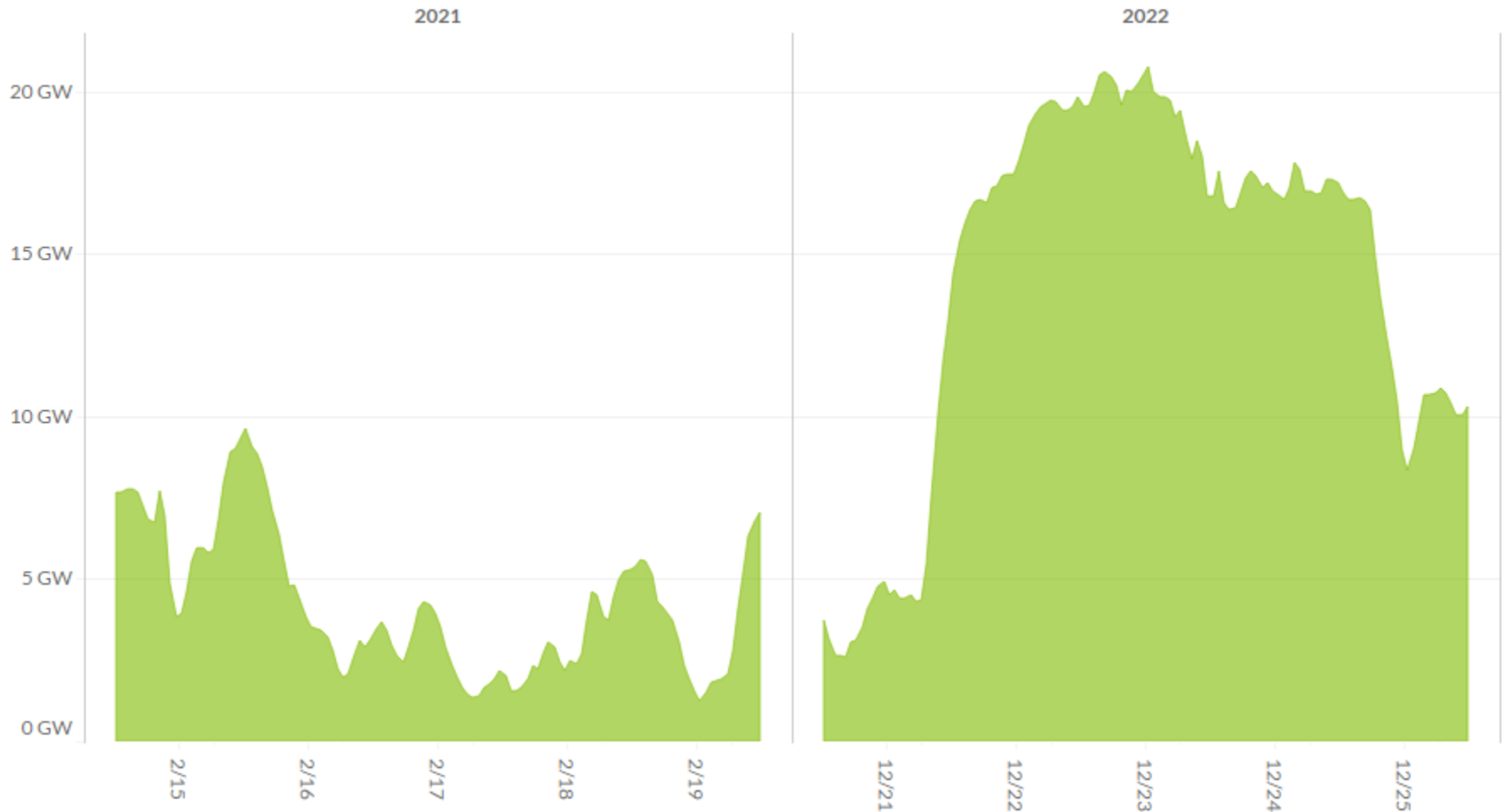
*Unplanned = forced outages and derates

Charts reflect data in the CROW outage system on January 5, 2023

Wind often reported as derated over the time period

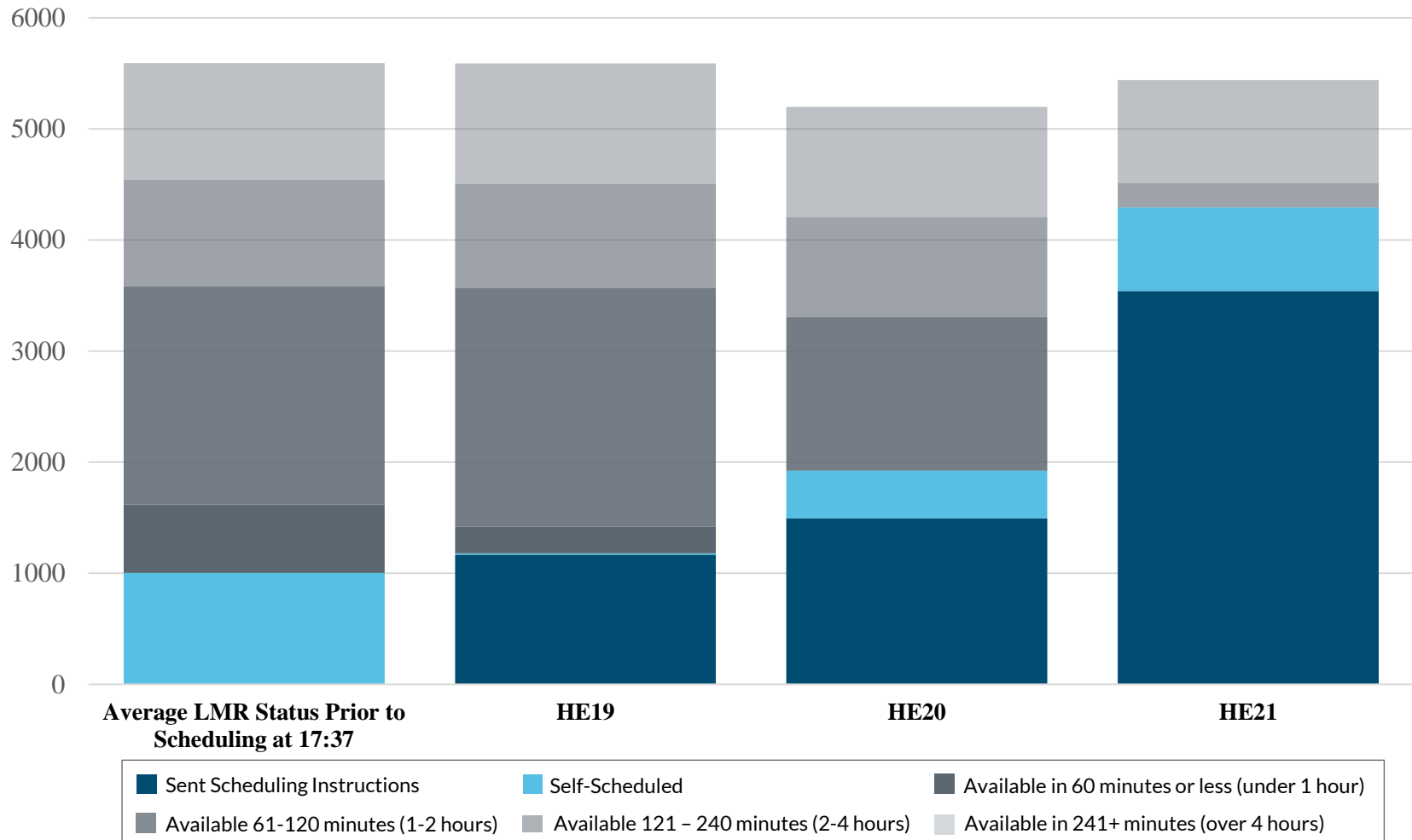
Wind production remained high during Winter Storm Elliott, providing support to the transmission system

MISO System-Wide Actual Wind Generation
Storms Uri (2021) and Elliott (2022)



Requested 3 GW of Load Modifying Resources at 17:37 to meet increasing load and continue exports to neighbors

**Load Modifying Resources (MW)
December 23, 2022**



While each storm is unique, lessons learned from Winter Storm Uri in 2021 contributed to successful operations during Elliott

REFINED WINTER READINESS ACTIVITIES

- Increased focus on extreme scenarios
- Improved understanding of generator winter preparedness through coordinated seasonal assessment and fuel and consumables data requests
- Implemented cold weather-specific operator drills in addition to emergency procedure drills and winter readiness workshops

PROCESS IMPROVEMENTS

- Process Improvements to Unit Commitment Processes and Operator Situational Awareness improved our ability to respond to changing risk profile during the operating day

IMPROVED COORDINATION

- Improved coordination activities with our neighbors that resulted in quicker decision making during the storm



Questions

Appendix

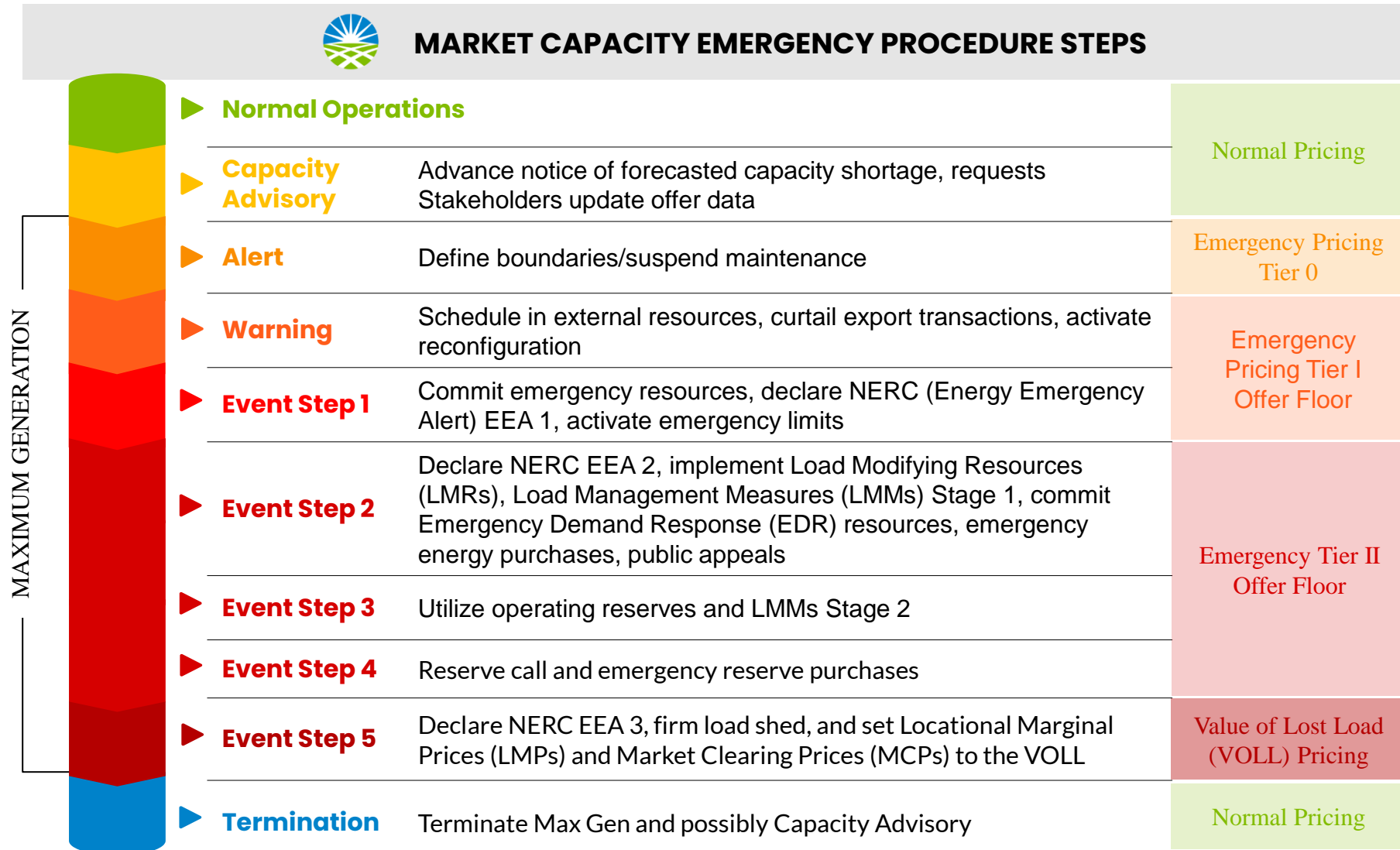
Details of the South Region Operating Conditions

- **January**
 - 1/24-25 – South Region: Severe Weather Alert
 - 1/26 – Footprint-wide: System Status Level 2
 - 1/30 – 2/2 – South Region: Severe Weather Alert
- **December**
 - 12/8 – Footprint-wide: System Status Level 1
 - 12/22-12/26 – South Region: Cold Weather Alert
 - 12/23-12/26 – South Region: Conservative Operations
 - 12/23 – South Region: Maximum Generation Warning
 - 12/23 – Footprint-wide: Maximum Generation Warning, Maximum Generation Event Step 1b, Maximum Generation Event Step 2a
- **November**
 - 11/4-5 and 11/29 – South Region: Severe Weather Alert
 - 11/10 – Footprint-wide: System Status Level 3

Monthly Operations Drill Schedule

- Firm Load Shed Drill:
 - First Wednesday of each month at 1300 EST
- LMR / LMM Drill:
 - Second Tuesday of each month at 1000 EST
- Emergency Demand Response Drill:
 - Second Thursday of each month at 1000 EST
- Back-up Dispatch Drill (Formerly XML Drill):
 - Last Wednesday of each month at 1300 EST

MISO's operating procedures ensure reliability and gain access to additional resources during extreme situations



MISO Fact Sheet (New)



JANUARY 2023



MISO's reliability footprint and regional control center locations.

CONTACT

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Little Rock, AR
Washington, DC

Media Inquiries
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317-249-5650
media@MISOenergy.org

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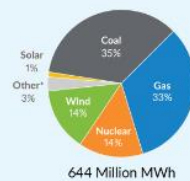


Fact Sheet

MISO is an independent, not-for-profit, member-based organization responsible for keeping the power flowing across its region reliably and cost effectively. MISO focuses on **three critical tasks**:

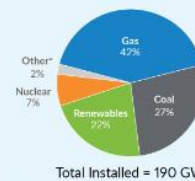
- 1 Managing the flow of high-voltage electricity across 15 U.S. states and the Canadian province of Manitoba
- 2 Facilitating one of the world's largest energy markets with more than \$40 billion in annual transactions
- 3 Planning the grid of the future

GENERATION MIX Jan-Dec 2022



644 Million MWh

MARKET CAPACITY December 2022



Total Installed = 190 GW

*Other: Hydro, Diesel, Biomass, Storage, Demand Response Resources

KEY FACTS

Area Served	15 U.S. States and Manitoba, Canada
Population Served	45 Million
Transmission Line	68,000 Miles
Generating Units	6,800+
Record Demand	127.1 GW 7/20/2011
Wind Peak	24.1 GW 11/30/2022
Solar Peak	2.2 GW 8/31/2022
Members	56 Transmission Owners
	134 Non-transmission Owners
Market Participants	+500
Carbon Reduction	Approximately 32% since 2014

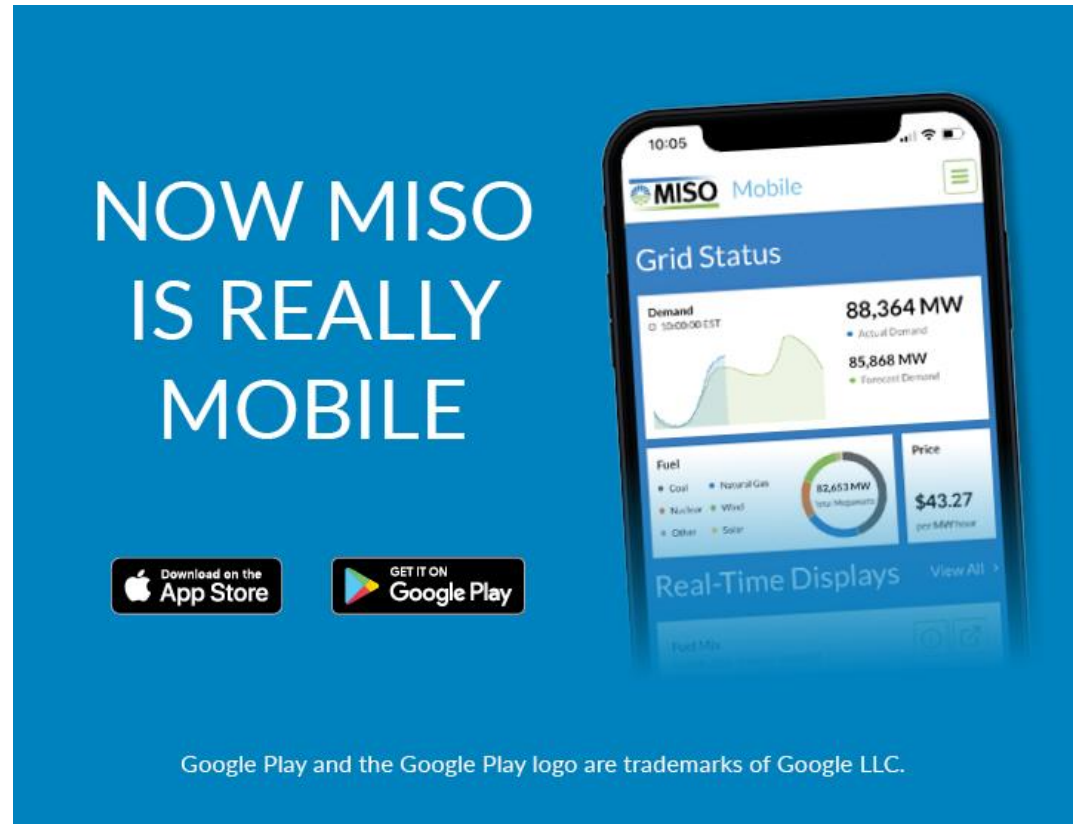
MISO TRANSMISSION EXPANSION PLAN (MTEP)

	LRTP Tranche 1*	MTEP22
Approved New Projects	18	382
Miles of New Transmission Line	2,000	838
New Project Investment	\$10.3 billion	\$4.3 billion

*LRTP Tranche 1 - Long Range Transmission Plan addendum to MTEP 21

Get connected with MISO's Mobile App

- Real-Time Data
 - LMP
 - Contour Map
 - Real-Time Total Load
 - Fuel Mix
 - ACE Chart
 - Wind & Solar Forecast
- News & Notifications
 - Weather
 - System declarations
 - Market information
- Available on both the Google Play store for Android and the Apple App store



NOW MISO
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Grid Status

Demand 10:00:00 EST

88,364 MW

Actual Demand

85,868 MW

Forecast Demand

Fuel

Coal

Natural Gas

Nuclear

Wind

Other

Solar

82,653 MW

Price

\$43.27

per MWh

Real-Time Displays

View All

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