South Region Operations Report

- Operations Overview
  - Peak Demand Summary
  - Operating Conditions
- 2023-2024 Winter Preparedness
  - Weather Outlook
  - Winter Readiness
- Drills, Exercises & Workshops
  - Power System Restoration
  - Winter Readiness Workshop
  - GridEx VII
MISO’s South Region reliability, markets, and operational functions performed as expected from July through October 2023**

**Data is for the South Region Only from July 1 – October 31, 2023 (unless noted)**

### Monthly Peak Demand (GW)

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<th>Month</th>
<th>Demand (GW)</th>
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### MISO System Peak – 124.9 GW (08/23/2023)
All-time MISO Load Peak 127,125 MW (07/20/2011)

### MISO South Region Peak – 35.2 GW (08/23/2023)
NEW: All-time South Load Peak 35,226 MW (08/23/2023)

### Energy Fuel Mix (%)

- **2020**: 22 (Coal), 9 (Gas), 65 (Nuclear), 17 (Solar), 66 (Other)
- **2021**: 22 (Coal), 17 (Gas), 65 (Nuclear), 12 (Solar), 66 (Other)
- **2022**: 20 (Coal), 12 (Gas), 65 (Nuclear), 20 (Solar), 22 (Other)
- **2023**: 21 (Coal), 10 (Gas), 66 (Nuclear), 21 (Solar), 23 (Other)

### Average Load (GW)

- **2020**: 20
- **2021**: 21
- **2022**: 22
- **2023**: 23

### SOLAR PEAK
3.3 GW
August 31, 2023, served 4.0% of load

### WIND PEAK
24.1 GW
November 30, 2022, served 30.1% of load

### OPERATING CONDITIONS

#### JULY 2023

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#### AUGUST 2023

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#### SEPTEMBER 2023

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#### OCTOBER 2023

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With footprint average temps at 95+ and potential record peaks for Aug. 24th, MISO issued the following alerts, advisories, & declarations:

- Capacity Advisory: 8/21
- Hot Weather Alert: 8/20 - 8/24
- Conservative Operations: 8/21 - 8/24
- Maximum Generation Alert: 8/24
- Maximum Generation Event (EEA-2): 8/24
  - Forced generation outages, above normal temps, & higher than forecasted load
  - Neighboring BAs also observed similar system conditions throughout the week

*New South Region Peak – 35,226 MW on 8/23/23*
2023-2024 Winter Weather Outlook for MISO South

- **Normal to slightly below** normal temperatures are expected for Winter across MISO South.

- It is imperative to note that these cooler temperatures are expected to be driven by cooler daytime highs with increased cloud cover and precipitation, NOT arctic air.

- **Above normal precipitation** is expected in MISO South with increased icing chances across Arkansas.
Risk Modeling initiatives underway: MISO’s Uncertainty Platform

MISO UNCERTAINTY PLATFORM

Calculated and Predict Aggregate Uncertainty

Calculate Uncertainty Bands

Probabilistic Forecasts

Determine Confidence Intervals

Performance Metrics

Trend Visualization

RISK INPUTS
- Load
- Wind
- Solar
- Generation Availability
- Fuel
- Net Scheduled Interchange (NSI)
- Transmission Congestion

RISK OUTPUTS
- Forecast Scenarios
- Reserve Requirements
- Reserve Margin Thresholds

COMMITMENT PROCESSES
- Capacity Sufficiency Analysis Tool (CSAT)
- Look Ahead Commitment (LAC)
- Forward Reliability Assessment Commitment (FRAC)
- Day-Ahead and Real-Time Markets (DA/RT)
An example of assessing risks leading into extreme cold weather

System Operations reviews seasonal risks and discusses the readiness plan.

- Monitor upcoming weather system (extreme cold, icing, pressure system, etc.)
- Evaluate Operating reserve margin based on 7-day FRAC
- Scenario analysis to account for uncertainty
- Pre-position for tight operation conditions

Update risks (e.g., wind drop, storm risk on load, etc.) and assess resource availability
- CSAT dynamically update available uncommitted and Emergency Resources
Lessons Learned applied from Winter Storm Elliott

Need for enhanced wind and load forecasting

Need for improved gas/electric coordination

Opportunity to improve staffing plans

Coordination with Neighboring RCs & Joint Parties
Fall Drills & Workshops completed

✓ 2023 Power System Restoration Drills
• Annual drills completed in October
  • Week 1 – 298 participants
  • Week 2 – 277 participants
• Drill included: System assessment, restoration plans, low voltage simulation, voltage & reactive table-top, etc.

✓ Winter Readiness Workshop
• Conducted on October 31st
  • Workshop was recorded
• Agenda & presentations can be found on the MISO website.
GridEx VII Exercise

- Happening **November 14th-15th** ~ 8am – 4pm ET
- National exercise hosted by NERC’s E-ISAC that drives coordination between various industries that are dependent on each other for disaster response
Questions?

tshort@misoenergy.org
South Region All-time Peaks

(Values displayed in MW)

Note: Blue reflects 2023 Peaks
Winter 2023-2024 Resource Adequacy Projections
MISO System-wide

Under typical demand and generation outages, MISO is projecting sufficient firm resources to cover winter peak load forecasts.

A combination of both high load and high outage scenario could cause a strain on the system in the month of January. LMRs and other Operating Reserves would most likely need to be called upon in that scenario.

LMR – Load Modifying Resource
April 8, 2024: Total Solar Eclipse

- 31 million people in the U.S. live inside the path of the total eclipse. A few cities encountering total obscuration include:
  - Indianapolis, IN – 3m 46s, total duration
  - Poplar Bluff, AR – 4m 08s, total duration
  - Little Rock, AR – 2m 33s, total duration
  - Mt Vernon, IL – 3m 40s, total duration

- MISO has captured lessons learned from the 2017 and 2023 solar eclipses
  - Temperatures drop around 2-6°F ranging from 70% to 95% obscuration
  - Cloud cover mitigates the eclipse effect to load when >=70% (lower thick clouds)
  - Balancing and congestion management are the most challenging areas
  - MISO's actions to include:
    - Increasing Regulation Reserves
    - Increasing Short Term Reserves
    - MCS messages before and during the operating day of the eclipse
    - Further analysis prior to eclipse
Updated MISO Website Coming December 2023

Energy Emergency Alert 2 (EEA2)
Emergency power and/or reduced demand necessary

NEW: Grid Conditions Gauge
MISO’s Mobile App:
Your source for MISO’s Market & Grid Awareness

- 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
MISO’s operating procedures ensure reliability and gain access to additional resources during extreme situations.

**MARKET CAPACITY EMERGENCY PROCEDURE STEPS**

- **Normal Operations**
  - **Capacity Advisory**
    - Advance notice of forecasted capacity shortage, requests
    - Stakeholders update offer data
  - **Alert**
    - Define boundaries/suspend maintenance
- **Warning**
  - Schedule in external resources, curtail export transactions, activate reconfiguration
- **Event Step 1**
  - Commit emergency resources, declare NERC (Energy Emergency Alert) EEA 1, activate emergency limits
- **Event Step 2**
  - Declare NERC EEA 2, implement Load Modifying Resources (LMRs), Load Management Measures (LMMs) Stage 1, commit Emergency Demand Response (EDR) resources, emergency energy purchases, public appeals
- **Event Step 3**
  - Utilize operating reserves and LMMs Stage 2
- **Event Step 4**
  - Reserve call and emergency reserve purchases
- **Event Step 5**
  - Declare NERC EEA 3, firm load shed, and set Locational Marginal Prices (LMPs) and Market Clearing Prices (MCPs) to the VOLL
- **Termination**
  - Terminate Max Gen and possibly Capacity Advisory

**MAXIMUM GENERATION**

- **Emergency Pricing**
  - Tier 0
    - Offer Floor
  - Tier I
    - Offer Floor
  - Tier II
    - Offer Floor

**Normal Pricing**

**Value of Lost Load (VOLL) Pricing**

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Data Source: SO-P-EOP-002 Rev 14 MISO Market Capacity Emergency