MISO Resource Adequacy Reforms

PJM Resource Adequacy Senior Task Force
November 30, 2022
Purpose & Key Takeaways

Purpose: Review and discuss the foundational elements of MISO’s Resource Adequacy (RA) reforms.

Focus areas:

• Evolving system needs and MISO’s Reliability Imperative

• FERC Approved Resource Adequacy reform:
  • Seasonal requirements
  • Resource accreditation
  • Planning Resource Auction and Day-Ahead Performance Obligation
MISO’s response to the Reliability Imperative requires coordinated efforts in markets, planning, operations, and systems.

- **Coal**: 7% in 2005, 13% in 2020, 7% in Future 1 (2030)
- **Wind/Solar**: 4% in 2005, 3% in 2020, 20% in Future 1 (2030)
- **Gas**: 13% in 2005, 17% in 2020, 13% in Future 1 (2030)
- **Nuclear**: 33% in 2005, 34% in 2020, 55% in Future 1 (2030)
- **Other**: 7% in 2005, 7% in 2020, 7% in Future 1 (2030)

MISO is actively pursuing multiple workstreams to ensure ongoing reliability and value creation.
Since 2018, the Resource Availability and Need program has worked to increase system reliability and will continue to do so through market redefinition.

<table>
<thead>
<tr>
<th>Progress to Date</th>
<th>Identify Reliability Needs</th>
<th>Planning Horizon</th>
<th>Operating Horizon</th>
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<tbody>
<tr>
<td>2020-21 Focus</td>
<td>• Five RAN whitepapers</td>
<td>• Outage coordination</td>
<td>• Multiday Operating Margin (MOM) forecast</td>
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<td>• Stakeholder engagement and workshops</td>
<td>• Load Modifying Resources (LMR)</td>
<td>• Emergency pricing filing</td>
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<td>Ongoing Market Redefinition Focus</td>
<td>• Define system reliability needs and capabilities</td>
<td>• LMR accreditation</td>
<td>• Further enhancements to MOM forecast</td>
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<td>• Improved modeling approaches and risk characterization</td>
<td>• ICAP deliverability</td>
<td>• Propose emergency and scarcity pricing reforms</td>
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<td>• Evaluation of severe weather risk</td>
<td>Accreditation</td>
<td>Additional scarcity pricing reforms</td>
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<td></td>
<td>• Evaluation of other required capabilities/ attributes</td>
<td>• Evaluation of ELCC for renewables</td>
<td>• Uncertainty management market approaches</td>
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<td></td>
<td></td>
<td>• LMR/ DR availability</td>
<td>• Seams improvements</td>
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<td>• AME resources</td>
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ICAP = Installed Capacity  
PRA = Planning Resource Auction  
ELCC = Effective Load Carrying Capability  
DR = Demand Response  
AME = Available Maximum Emergency
MISO’s declaration of emergencies more frequently and during non-traditional times is evidence of the changing risk profile and need for RA reforms.

Chart indicates the number of days under a max gen alert, warning or event.
The Resource Adequacy Construct reforms continue to better position MISO to meet the challenges of the Reliability Imperative

**Sub-annual construct:** Change from current annual summer-based construct to four distinct seasons
Outcomes: (1) Identify reliability needs unique to each season (2) Align resource availability with seasonal needs (3) Facilitate seasonal outages or partial year operations

**Improved accreditation:** Align resource accreditation with availability in the highest risk periods
Outcomes: (1) Increase confidence in capacity that MISO can count on (2) Provide improved signals for availability and coordination (3) Improve outage coordination processes
The Planning Resource Auction and performance obligation will be aligned and enhanced

**Planning Resource Auction**
- Demonstrate compliance

**Current Annual Construct**
- MISO conducts annual Planning Resource Auction (PRA) to meet annual PRM/LCR requirements

**New Seasonal Construct**
- MISO will conduct independent auctions for all seasons at one time to meet seasonal PRM/LCR requirements

**Day-Ahead Performance Obligation**
- Ensure availability

**Current Annual Construct**
- PRA cleared resources have a year-round, must-offer obligation, except for outages reported in the Control Room Operations Window (CROW)

**New Seasonal Construct**
- PRA-cleared resources have a must-offer obligation for the seasons for which they are cleared, except for outages reported in the CROW during those seasons

PRM = Planning Reserve Margin
LCR = Local Capacity Resource
MISO will calculate PRM/LRR requirements on a seasonal basis instead of one annual value for the current annual construct.

Current Annual Construct

MISO performs annual LOLE analysis to determine annual PRM/LRR requirements with realistic planned outage scheduling.

New Seasonal Construct

MISO will calculate four explicit PRM/LRR requirements on a seasonal basis with flexible planned outage scheduling, while monitoring impacts from accreditation changes and refining planned outage method.

Seasonal Requirements

- Season definition
- LOLE study requirements
- Seasonal capacity import/export limits (CIL/CEL)

Seasonal Requirements

Establish RA requirements

LOLE = Loss of Load Expectation
CIL = Capacity Import Limits
CEL = Capacity Export Limits
PRM = Planning Reserve Margin
LRR = Local Reliability Requirement
MISO proposes to accredit resources based on availability during times of greatest system need, reducing risk by aligning planning and real-time operations.

**Current Annual Construct**

- MISO accredits conventional resources annually based on a 3-year XEFORd excluding planned outages.

**New Seasonal Construct**

- MISO will accredit by season based on resources’ availability (SAC) with a two-tiered weighting structure to reflect general availability while emphasizing availability during times of need and utilize a UCAP/ISAC conversion ratio to align requirements and accreditation.

- Well-coordinated and long lead planned outages will continue to have exemptions, but accreditation impacts will be strengthened in some circumstances.

**Resource Accreditation**

Register resources and qualification

- Thermal resources
  - Defining RA hour
  - Tiered approach and weighting
  - Deliverability

- Intermittent and LMR resources

- Coordinated planned outage and exemptions

**Abbreviations**

- UCAP = Unforced Capacity
- SAC = Seasonal Accredited Capacity
- XEFOR = Equivalent Forced Outage Rate Demand Excluding Outside Management Control Events
Regulatory filings and resource links

- Seasonal, availability-based accreditation filing
  - Answer to comments and protests
  - Response to FERC Deficiency letter
- Conceptual Design document
- Posted Q&A
- Resource Adequacy Subcommittee (RASC) link
Contact Information

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Appendix
MISO’s accreditation proposal reflects findings from impact analysis and stakeholder discussion

<table>
<thead>
<tr>
<th>Design Elements</th>
<th>Proposal</th>
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<tbody>
<tr>
<td><strong>Hour Selection</strong></td>
<td>Top X% of tightest margin hours</td>
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<tr>
<td>Margin threshold</td>
<td>Yes</td>
</tr>
<tr>
<td>Seasons with no/ limited RA hours to meet 3% per season (65 hours)</td>
<td>Supplement deficient number of hours with annual average offered capacity over top 3% of tightest margin hours per year</td>
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<tr>
<td>Regionality (N+C/S) (tight margin and MaxGen hours)</td>
<td>Yes</td>
</tr>
<tr>
<td>Leadtime for offline units (tight margin calc)</td>
<td>12 hours</td>
</tr>
<tr>
<td><strong>Accreditation Calculation</strong></td>
<td>Annual verses seasonal 4 season</td>
</tr>
<tr>
<td>Tiered weighting</td>
<td>Tier 1 20%; Tier 2 80%</td>
</tr>
<tr>
<td>Leadtime for offline units</td>
<td>24 hours Tier 2 only</td>
</tr>
<tr>
<td>Real-time offer considered</td>
<td>Tier 1 &amp; Tier 2 Emergency Max</td>
</tr>
<tr>
<td><strong>Planned Outage Exemption</strong></td>
<td>RAN Phase I Enhancement</td>
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<td>Yes, with proposed three-level structure</td>
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Seasonal alignment for non-thermal resources is considered in the proposal; MISO will pursue further enhancements post-filing

<table>
<thead>
<tr>
<th>Resource Category</th>
<th>Current Annual Accreditation</th>
<th>Proposal</th>
<th>Further Enhancements Post-Filing</th>
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<tbody>
<tr>
<td>Wind</td>
<td>Annual ELCC and then allocate to individual wind resources based on performance over 8 peak summer days per year</td>
<td>Seasonal ELCC and then allocate to individual wind resources based on performance over 8 peak days per season</td>
<td>Develop ELCC methodologies or similar availability-based accreditation approaches</td>
</tr>
<tr>
<td>Non-wind intermittent resources, including solar</td>
<td>Three-year, historical availability-based hours 15,16,17 EST from June to August</td>
<td>Three-year, historical availability-based hours 15,16,17 EST for spring, summer and fall. Hours 8, 9, 19, 20 EST for winter</td>
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<td>LMRs*</td>
<td>Lead time &gt; 6 ≤ 12 hour credited 50% for ≥ 10 calls until 2023; Annual calls ≥ 5 &lt; 10 credited 80%; Annual calls ≥ 10 credited 100%</td>
<td>Seasonal accreditation based on call limits. Thermal BTMG accredited based on seasonal EFORd</td>
<td></td>
</tr>
</tbody>
</table>

* LMR accreditation enhancements with implementation starting with PY22/23

LMR = Load Modifying Resource
ELCC = Effective Load Carrying Capability
BTMG = Behind The Meter Generation
EFORd = Equivalent Forced Outage Rate Demand
MISO proposes a three-level exemption process and considers timely submissions and the Maintenance Margin to support reliability.

<table>
<thead>
<tr>
<th>Maintenance Margin</th>
<th>Tier Exemption</th>
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<tbody>
<tr>
<td>Maintenance Margin &gt;=0 for duration of outage</td>
<td>Tier 1 &amp; 2 (Full)</td>
</tr>
<tr>
<td>Maintenance Margin &lt;0 for any day in the duration of outage</td>
<td>Tier 1 Only (Partial)</td>
</tr>
</tbody>
</table>

- **>120 days, no outage in previous 120 days**
  - Exempt Tier 1 & 2
  - Exempt Tier 1 Only

- **>120 days, outage in previous 120 days, or between 30-119 days**
  - Exempt Tier 1 Only
  - No Exemption

- **14-30 days and no harm***
  - Exempt Tier 1 Only
  - No Exemption

- **Outage moved per MISO request**
  - Fully Exempt*
  - Rescheduled to a better margin
  - N/A

*Weather, forced, conditions in BPM-008 section 4.3