



Demand Response and Emergency Resource Reforms White Paper Version 3

January 2025

Highlights

- Load Modifying Resources (LMR) are one of the key components for maintaining reliability during Emergency conditions. With evolving system risk, market rules need to ensure the availability, visibility and operational effectiveness of LMRs during Emergency conditions.
- MISO's proposed LMR Reforms are focused on improving the availability, accreditation and operational effectiveness of demand and Emergency-only generation resources by setting rules and operating conditions that maximize the value of these end-of-the-stack resources.



Revision History

Version	Date	Note
1.0	10/9/2024	Initial draft
2.0	11/6/2024	Second draft – Accreditation changes and clarifications
3.0	01/23/2025	Third draft • Added a flow chart and table summarizing participation options and changes • Revised design elements and market rules: ◦ LMR – Type I resources now deployed during Max Gen Warning ◦ EDRs are no longer eliminated ◦ Reduced the number of hours used to calculate Seasonal Capability from 18 Hours on weekdays to 15 hours • Clarification of M&V of a resource that deploys • Clarification of the Capacity Availability requirements • Clarification on Self-Scheduling and how it relates to performance obligations • Added a category of Demand Resources that do not use a Firm Service Level are handled • Accreditation for a new Statistical M&V Demand Resource and how deficient Hours are handled has been updated • When a BTMG is considered to have partially and completely failed to perform has been adjusted • Partial failure to perform ACP penalties for a BTMG adjusted • The organization of the white paper has changed



Purpose Statement

This paper provides a primer for the Demand Response and Emergency Resource reforms (previously referred to as LMR reforms) design discussed with stakeholders at the MISO Resource Adequacy Subcommittee (RASC). This work began as a consideration of LMR reforms in May 2022 as a part of non-thermal accreditation discussion at the RASC, with the revival of discussions on LMR accreditation mainly focused on accreditation and tool updates in August 2023. Throughout the course of the evaluation and design process, MISO identified other challenges to accreditation, availability and operational effectiveness, necessitating the expansion of the Demand Response and Emergency Resource reforms effort. The first white paper draft was posted on October 6, 2024. MISO invited stakeholder feedback, which was incorporated into the November 6 draft, and further discussion led to this January 23 draft. MISO will continue to work with stakeholders to refine and clarify the design to ensure that ratepayers are paying for the demand reduction that actually happens.



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Executive Summary

The transformation of the electricity sector — driven by a shifting resource mix, more frequent extreme weather events, and increased electrification — creates new demands and challenges in ensuring adequate resources during high-risk periods. The “Reliability Imperative” represents the shared responsibility of MISO, its members, and states to address the urgent and complex challenges to electric system reliability. MISO’s response to the Reliability Imperative prioritizes a host of interconnected initiatives that aim to address the region’s challenges. The Reliability Imperative is organized into four primary pillars: Market Redefinition, Operations of the Future, Transmission Evolution, and System Enhancements. Reforms of Demand Response and Emergency Resources are a core component of the Market Redefinition pillar.

Demand Response and Emergency Resource Reforms

Demand Response and Emergency Resource reforms focus on improving real-time visibility and the efficient procurement and operation of Load Modifying Resources (LMR), Demand Response Resources (DRR), and other emergency-only Resources as part of MISO’s broader Resource Availability and Need (RAN) initiative. The Demand Response and Emergency Resource reforms effort has identified eight areas that require improvement to ensure that these resources are procured and used efficiently to improve reliability.

Historically, the LMR participation model adapted various programs used by utilities under state retail rate regulation, which integrated resources that would become categorized as LMRs into resource plans. To meet the least-cost objectives established by the Relevant Electric Retail Regulatory Authority (RERRA), Demand Serving Entities (LSEs) would match the expected load duration curve with the commensurate resource mix. LMR-type resources were used by LSEs to meet “super-peaking” needs, high levels of generation outages, or those few hours (< 50 hours per year) when demand was much higher than the expected forecast. When MISO developed its Resource Adequacy construct, LSEs and RERRAs requested the continued use of LMRs, which are currently deployable during MISO Emergencies, to meet their Resource Adequacy objectives.

Since the creation of the LMR program at MISO, participation from third-party Market Participants, intermittent behind the meter generation, small and large commercial and industrial customers, and aggregations of residential and commercial programs have begun. The expansion of resources participating as an LMR necessitates improvements to the LMR program to verify these resources can provide the demand reduction they are being compensated for and changes in the participation models to account for the wide diversity of participation models.

Increasing Reliability Risks

The MISO Region is increasingly vulnerable to reliability risks due to its changing regional resource mix, growing demand, more frequent extreme weather, and reduced capacity margins. Operating at or near minimum operating margin requirements exposes the region to heightened risks, particularly when these factors coincide.

Developed with stakeholder input, MISO submitted an LMR proposal to the Federal Energy Regulatory Commission (FERC), in May 2020, which reduced the LMR maximum notification time from 12 hours to 6 hours and extended deployment across Seasons.¹ Since FERC’s approval, MISO has adapted a Seasonal Resource Adequacy construct,² is implementing Reliability Based Demand Curves (RBDC),³ and received FERC acceptance of a Direct Loss of

¹ *Midcontinent Independent System Operator, Inc.*, 172 FERC ¶61,138 (2020).

² *Midcontinent Independent System Operator, Inc.*, 182 FERC ¶61,096 (2023).

³ *Midcontinent Independent System Operator, Inc.*, 187 FERC ¶61,202 (2024).



Demand (DLOL) based accreditation methodology for internal, non-Emergency resources.⁴ The DLOL based accreditation methodology will be implemented in the 2028/2029 Planning Year, with indicative DLOL-based accreditation values provided beginning with the 2025/26 Planning Year.

MISO is re-evaluating the accreditation of demand side resources and other emergency-only resources to improve availability and visibility. This expanded scope includes enrollment, testing, and enhanced measurement and verification methods to ensure these resources are dependable during emergencies.

MISO initially began these efforts by reducing the total response time of LMRs to 30-minutes. In response to stakeholder concerns regarding this short notification time while balancing MISO's operational needs, MISO created a new type of LMR, deployable earlier in the Emergency procedures.

Resource Accreditation and Visibility

MISO's proposed accreditation changes apply to resources based on their type, regardless of participation option, to accurately reflect each resource type's unique capabilities and allow for resources to switch their participation option easily without significant changes in accreditation methodology. This proposal creates a specific option for Intermittent Behind the Meter Generation (IBTMG) resources currently participating as an LMR. The reforms also apply to Capacity Resources and DRRs using the Available Maximum Emergency Resource (AME Resource) commitment status to better reflect their unique operating characteristics.

To improve real-time visibility, MISO's proposal ties a resource's availability to its accreditation. Under the current design, there is a Tariff requirement to maintain accurate availability information. MISO has reviewed the availability information submitted by Market Participants and found that between 1/3 and 1/2 of resources never update their information in even one hour of a Season, even when there are EEA2 emergencies declared.⁵ MISO's proposal will incentivize resources to keep their information up to date by tying the Capability value to the submitted Capacity Availability during Capacity At Risk Hours.

Enrollment and Testing Process Improvements

MISO's proposed design will standardize enrollment and simplify participation requirements. Currently, demand side resources may enroll as any combination of DRR, LMR, and Emergency Demand Resource (EDR) creating additional burden to verify resources are meeting their obligations. Revised enrollment procedures will be discussed as part of the *Demand Response Participation Rules* work occurring at the Market Subcommittee.

Testing protocols are also evolving. MISO's Independent Market Monitor, Dr. David Patton, recommended moving from mock tests to real performance tests for enrolled Demand Resources, with MISO testing all Demand Resources registered in the Planning Resource Auction. This is to ensure that resources can perform to their registered parameters and ensuring that rate payers are paying for resources that can truly reduce their demand within the required response time.

Incentives and Penalties

MISO's proposed design also clarifies and enhances penalties for non-performance to include penalties tied to capacity payments. These changes are needed to ensure that penalties are not viewed as a minor cost of business expense and are necessary due to the typically infrequent and short duration nature of emergencies. Additionally,

⁴ *Midcontinent Independent System Operator, Inc.*, 189 FERC ¶61,065 (2024).

⁵ See Section 4.1.1 for more information.



the Measurement and Verification of LMRs needs to be improved as well to ensure that these resources provide an amount of demand reduction commensurate with what they are being paid.

The proposed reforms offer a comprehensive response to the challenges of demand-side and emergency only resource participation in MISO's Planning Resource Auction (PRA). MISO also recognizes the importance of setting appropriate Planning Reserve Margin Requirements (PRMR) and ensuring resource accreditation aligns with load obligations. As presented at the October RASC, MISO has begun a separate effort to address the LSE PRMR obligation.⁶ Concerns expressed by stakeholders as part of the Demand Response and Emergency Resources reforms will be considered during work on the *PRMR Allocation* project. By separately addressing allocation, MISO is ensuring that proper care and attention is paid to the efforts of both projects. With an implementation date for all of these efforts being in the 2028/29 Planning Year, there is time to address each effort separately to ensure due diligence is paid in the design efforts.

These efforts will ensure that all qualified resources will continue to have the opportunity to participate in the PRA as well as in the Energy and Ancillary services markets. By better aligning resources' capabilities with market compensation, these reforms ensure the continued reliable operation of the MISO Region and ensure that rate payers are not paying for resources that cannot provide meaningful demand relief during the times when these resources are needed.

⁶ See item 9, [PRMR Allocation](#).



1 Introduction

MISO's August 2020 whitepaper, [*Aligning Resource Capacity Availability and Need, Changing Reliability Requirements for an Evolving Fleet*](#) highlighted the significant resource portfolio transformation underway in the MISO Region and provided an analysis that showed changes to planning, markets and operations will be needed to manage these developments. In 2020, MISO filed with FERC two significant changes to MISO's LMR construct:

- **Increased number of deployments:** MISO increased the number of deployments to receive 100% accreditation from five (5) deployments to ten (10) deployments. MISO further adjusted the number of deployments in the November 2021 filing on Seasonal accreditation⁷ to include five (5) deployments in the Summer and Winter Seasons, and three (3) in the Fall and Spring Seasons.
- **Decreased notification time:** A decrease in the maximum allowed notification time from 12 hours to six (6) hours. This was based on the observation that long-lead time resources have a reduced contribution towards reliability based on the expected notification time going into an (EEA2) which is when LMRs are deployed.

These changes were accepted by the FERC on August 14, 2020,⁸ and were implemented as part of MISO's 2022/2023 PRA. Since the above filings, MISO has revisited the accreditation of all internal non-Emergency Resources as part of the broader Reliability Imperative effort.

As the resource portfolio rapidly evolves toward more Intermittent Resources, and the reliability risk continues to shift, it is critical that MISO and its stakeholders find additional ways to improve Resource Adequacy practices overall and resource accreditation specifically. This white paper details the continuation of these accreditation reform efforts by focusing on Demand Response and Emergency Resources.

When this effort is completed, MISO will have transitioned to an accreditation methodology that accredits all internal resources based on when they are needed the most to meet increasing system risk.

1.1 Resource Adequacy Objectives

Resource Adequacy (RA) refers to the ability of the Bulk Electric System to serve electricity Demand while providing enough excess supply to achieve a threshold level of grid reliability of an industry-accepted target for Loss-of-

MISO Market Design Guiding Principles

- Support an economically-efficient wholesale market system that minimizes cost to distribute and deliver electricity
 - Facilitate non-discriminatory market participation regardless of resource type, business model, sector or location
 - Develop transparent market prices reflective of marginal system cost and cost allocation reflective of cost-causation and service beneficiaries
 - Support Market Participants in making efficient operational and investment decisions
 - Maximize alignment of market requirements with system reliability requirements
-

⁷ Midcontinent Independent System Operator, Inc., 182 FERC ¶61,096 (2023).

⁸ Midcontinent Independent System Operator, Inc., 172 FERC ¶61,138 (2020).



Demand Expectation (LOLE) of one-day Loss of Demand (LOL) every ten years. In the MISO Region, the responsibility for achieving Resource Adequacy rests with Demand Serving Entities (LSE) overseen by retail regulatory authorities as applicable by jurisdiction. MISO facilitates these efforts by administering Tariff-defined RA Requirements and Planning Resource Auction (PRA), which LSEs use to demonstrate their ability to serve peak Demand and provide a sufficient margin of excess supply.

Resource accreditation is the process of accurately measuring and assigning a capacity value to a resource based on its contribution to system reliability during *periods of highest risk*. MISO's role is to measure current resource accreditation values and forecast future values to inform investment and retirement decisions. If the accreditation methodology is inaccurate, Market Participants are sent incorrect signals on which types of resources to procure to maximize system reliability.

[MISO's Market Design Guiding Principles](#) are an important guide to evaluating and developing market enhancements and will continue to be used as a foundation for accreditation reform. With these principles as a guide, the fundamental goals of resource accreditation are:

- 1) Ensure that Seasonal reserve requirements are met;
- 2) Inform long-term resource investment and retirement decisions by accurately representing the capacity value of a resource in the prompt year; and
- 3) Provide an incentive for resources to develop operating practices and attributes that serve the greatest system need.

MISO and stakeholders debated the problem statement related to the accreditation of LMR resources. After incorporating stakeholder feedback and refinement, MISO developed the following problem statement:

Problem Statement: With the increased penetration of Intermittent Resources, changing weather patterns, and growing electrification, higher uncertainty and complexity is expected in the future. This evolving situation requires MISO and LSEs to fully understand the capabilities and responsibilities of all Demand Resources clearing the Planning Resource Auction (PRA). Rules and procedures need to be developed for effective market participation of such resources while helping MISO maintain reliability during Capacity Emergency situations.

- Resource accreditation should reflect the availability of resources when they are most needed. MISO's existing accreditation methods for Load Modifying Resources (LMRs) and Demand Response Resources require further evaluation to ensure that the accredited capacity value appropriately reflects each resource's contribution to Resource Adequacy.
- Real-Time availability data for LMRs indicates far less capacity than the PRA-cleared quantity.
- Allowed response times for LMRs require evaluation to better address capacity Emergencies (EEA2 or higher).

To align with MISO's DLOL accreditation methodology, MISO has proceeded with the following key considerations to ensure a robust accreditation methodology:

- Reliability contribution during periods of highest reliability risk;
- Consideration of all high-risk periods throughout the year;
- Comparability is ensured across resource types;
- Ability to change availability as needed; and



- Volatility of reliability contribution over time.

1.2 Scope

The scope of the Demand Response and Emergency Resource reforms has evolved and expanded considerably since initial MISO presentations to stakeholders on May 25 and November 30, 2022.⁹ The initial scope identified short-term and long-term solutions. In the short term, MISO proposed improvements to the Demand-Side Resource Interface (DSRI) tool and locational information collected at the time of market registration. Long-term changes to the LMR construct included non-Emergency availability and 30-minute or less response time for Emergency LMRs.

This scope has expanded as MISO identified necessary improvements and considered stakeholder feedback regarding non-Emergency availability and resources with response time longer than 30 minutes. MISO's design has sought to balance the operational realities faced due to the changing system conditions as well as the participation preferences of stakeholders. The final design aligns LMR reform efforts within MISO's broader accreditation reform context, maintaining comparability and accountability for all resources participating in the PRA while treating all supply-side and demand-side capacity in a comparable, non-discriminatory fashion.

The current design of the demand response space encompasses a wide variety of resource types. Captured within the DRR, LMR, and EDR programs are intermittent behind the meter generation, small and large commercial and industrial customers, aggregations of residential and commercial programs, behind the meter generation used during a very limited number of hours, behind the meter generation that operates nearly continuously, and practically any type of demand program one can contemplate. Additionally, Market Participants extend beyond traditional LSEs and into third-party aggregators. With the upcoming introduction of Distributed Energy Resources (DERs), the list of potential Market Participants expands even further. This complexity requires a balanced design that provides as much simplicity as possible while recognizing the diverse array of operating characteristics.

The Demand Response and Emergency Resources reform effort attempts to balance the complexity of the participation options, operational needs, and simplicity of design. To achieve this, MISO has developed a two-stage design for demand response participation. In this design, the first piece looks at what kind of resource a Market Participant is enrolling. Accreditation and testing is based on the type of resource being registered in the PRA. Each resource may participate in one of 5 participation options: Demand Response Resource – Type I, Demand Response Resource – Type II, Load Modifying Resource – Type I, Load Modifying Resource – Type II, and Emergency Demand Resource. Each of these participation options has its own obligations and compensation mechanisms that do not depend on the type of resource. By developing this design space, MISO is ensuring non-discriminatory participation for all resources that wish to participate, and these resources are accredited in a way reflective of their operational characteristics.

When evaluating how the rules are changing for a resource, the Market Participant should first identify the type of resource it wishes to enroll, be it a Demand Resource or Behind the Meter Generation, and then decide what kind of Demand Resource or Behind the Meter Generation it is. Once the Market Participant has identified what resource type it is, the Market Participant should then evaluate the different participation options based on what kind of services it wishes to provide, requirements of each participation option and compensation offered for each participation option.

⁹ See <https://cdn.misoenergy.org/20220525%20RASC%20Item%2006b%20Non-Thermal%20Accreditation624769.pdf> and [https://cdn.misoenergy.org/20221130%20RASC%20Item%2007b%20Non-Thermal%20Accreditation%20Presentation%20\(RASC-2020-4%202019-2\)627100.pdf](https://cdn.misoenergy.org/20221130%20RASC%20Item%2007b%20Non-Thermal%20Accreditation%20Presentation%20(RASC-2020-4%202019-2)627100.pdf)



2 Overview of Demand Response

This section provides a high-level description of the role demand response plays in the MISO Capacity market.

“Demand response” refers to the ability of a Market Participant to reduce its electric consumption in response to an instruction received from MISO. Market Participants can provide such demand response either with discretely interruptible, continuously controllable loads or with behind-the-meter generation. Three types of entities who have been certified by MISO as Market Participants may provide demand response in MISO:

1. Demand Serving Entities (LSEs),
2. Aggregators of Retail Customers (ARCs), and
3. End-use customers that have Market Participant status.¹⁰

This paper focuses on participation of demand response as a Planning Resource in MISO’s Capacity Market.¹¹ MISO is not proposing changes in the participation of demand response in the Energy or Operating Reserves Markets. Emergency Demand Response is also not being addressed in this effort.¹²

Demand response as a Planning Resource is currently accomplished through two categories, Demand Response Resources (DRRs) and LMRs. Demand Resources and Behind the Meter Generation resources may participate as either a Demand Response Resource or a Load Modifying Resource. Registering as an LMR and clearing the Planning Resource Auction (or being included in a Fixed Resource Adequacy Plan (FRAP) or an RBDC Opt out) obligates the Market Participant in advance to using the resource to reduce the gross load on the system when instructed to do so by MISO during an Emergency event.

Demand Resources and Behind the Meter Generation are two very broad categorizations of the types of resources participating as demand response in the MISO Planning Resource Auction (PRA); i.e., MISO’s Capacity Market. The Module A definition of a Demand Resource is “Interruptible Demand or Direct Demand Management and other resources that can reduce Demand during Emergencies.” MISO currently has a wide variety of Demand Resources participating in the PRA, ranging from large industrial customers with high load factors to small facilities aggregated together and resources with rapid response times and resources that require longer response times.

The types of Behind the Meter Generation resources participating in the MISO Markets are just as expansive as those participating as a Demand Resource. MISO allows Behind the Meter Generation to participate in the PRA as these resources are either serving Demand in a manner similar to that of a Generation Resource or are capable of reducing Demand during Emergencies.

DRRs and LMRs have monetary value because they can be offered by an LSE into the MISO PRA to meet its assigned Planning Reserve Margin Requirement (PRMR). Each MW of Demand participating in the PRA displaces a MW of Generation capability, therefore it is essential that their accredited value accurately reflects their capability to reduce Demand during Emergencies.

¹⁰ An end-use customer taking service directly from the wholesale market is effectively an LSE serving one retail customer (itself), or an end-use customer providing demand response is effectively an ARC.

¹¹ From Module A, A Planning Resource is a Capacity Resource, Energy Efficiency Resource, or Load Modifying Resource that can be used to satisfy the PRMR.

¹² MISO is proposing changes that impact the Energy and Operating Reserve Markets through the *Demand Response Participation Rules* effort and to prohibit Emergency Demand Response to dual-register as a DRR or LMR. These efforts are ongoing discussions at the Market Subcommittee.



Table 1 Participation Options Overview

	Generation Resource	DRR I/II	LMR – Type I	LMR – Type II	AME Resource	Intermittent BTMG
Resource Type	Generation Resource	DR ¹ BTMG ²	DR ¹ BTMG ²	DR ¹ BTMG ²	Generation and DRR	Intermittent BTMG
RT Deployment Period	Economic	Economic	Max Gen Warning	EEA 2	Max Gen Warning	N/A
RT Deployment Order	Economic	Economic	Lead Time Location	Location	Economic	N/A
Max Response	24 hours - Tier 2 Hours	6 Hours	6 Hours	30 Minutes	6 Hours	N/A
Paid Energy	Yes	Yes	No	No	Yes	No
Paid Capacity	Yes	Yes	Yes	Yes	Yes	Yes
Ancillary Services	Yes	Yes ³	No	No	Yes	No
Must Offer	Day Ahead	Emergency	Emergency	Emergency	Day Ahead	N/A
Accreditation Method	Schedule 53A	By Resource	By Resource	By Resource	Schedule 53B	Schedule 53B
Hours Used	All Hours	Capacity At Risk Hours & T2 Hours ⁴	Capacity At Risk Hours & T2 Hours ⁴	Capacity At Risk Hours & T2 Hours ⁴	Capacity At Risk Hours & T2 Hours ⁴	All Hours
Weights	80% T2 ⁴ 20% T1 ⁴	No	No	No	No	80% T2 ⁴ 20% T1 ⁴
Lookback	3 Years	1 Year	1 Year	1 Year	3 Years	3 Years
Outage Exemption	Yes	No	No	No	No	No
Testing	GVTC	By Resource	By Resource	1x/year ⁵	Generation or DRR	GVTC

1 Demand Resource

2 Non-Thermal BTMG

3 DRR – Type I may provide Spin, Sup, and STR; DRR – Type II may provide Reg if telemetry information is provided

4 Tier 1 Hours and Resource Adequacy Hours

5 LMR – Type II resources may opt out and be tested 1x/3 years if qualified

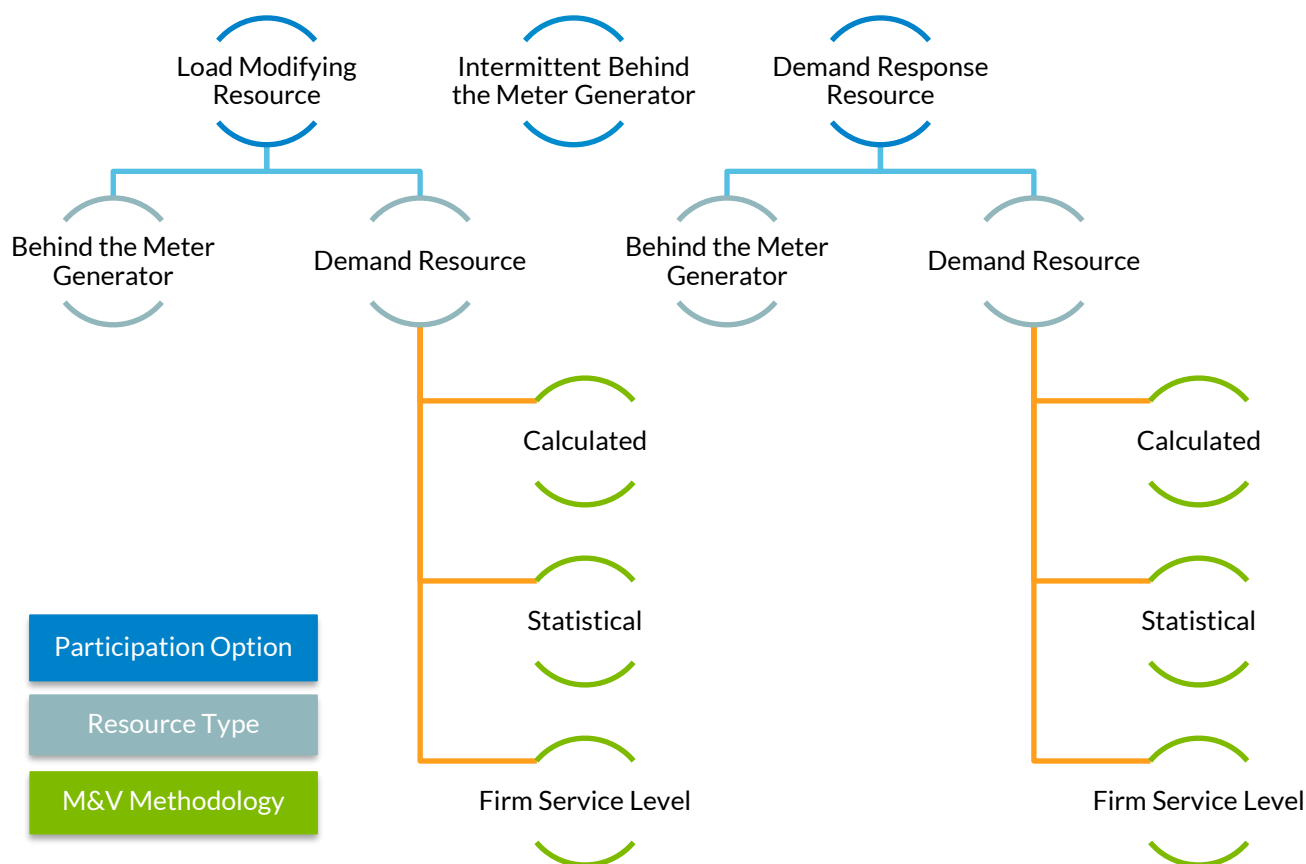


Table 2 Resource Type Overview					
	Statistical DR	FSL DR	Calculated DR	BTMG	Intermittent BTMG
Attachment TT M&V	Direct Load Control or Statistical M&V	Firm Service Level	Calculated Baseline	BTMG	N/A
Capacity Availability	As Participation Option ¹	As Participation Option ¹	As Participation Option	As Participation Option ¹	N/A
Seasonal Capacity ²	No	Yes	No	N/A	N/A
Hourly Capability	Demand Curve	Metered Demand	Metered Demand	Capacity Availability or Meter Data	Meter Data
Resource Class	No	No	No	Yes	Yes
Line Loss	Yes	Yes	Yes	Yes	Yes
PRMR Gross Up	Yes	Yes	Yes	No	No
Firm Service Level	N/A	Registered	N/A	N/A	N/A
Test Frequency	1x/year	1x/3 years	1x/3 years	GVTC	GVTC
¹ DRR submit Offers, LMR submit Availability ² Seasonal Capacity is calculated for each Hour of the day and is the average of the top 15 hours for each Hour in a Season on weekdays and 6 hours on weekends					



MISO's proposed reforms aim to fill a gap in the accreditation of Demand side resources that has been identified as part of the Resource Availability and Need (RAN) initiative. Additionally, the North American Electric Reliability Corporation (NERC) has characterized the changing resource mix combined with extreme weather and shifting load profiles as having created a "hyper-complex risk environment".¹³ MISO is already seeing evidence of this shifting risk as demonstrated by the increase and changing times of occurrence of Resource Adequacy Hours, shown in Figure 1.¹⁴

System Load	# of RA Hours Occurring	
	2018 - 2020	2021 - 2023
> 120 GW	2	13
115 GW - 120 GW	18	52
110 GW - 115 GW	38	52
105 GW - 100 GW	5	38
< 105 GW	0	10

Time of Day	# of RA Hours Occurring	
	2018 - 2020	2021 - 2023
HE 13	1	4
He 14	7	13
HE 15	11	24
HE 16	17	30
HE 17	15	33
HE 18	9	32
HE 19	3	22
HE 20	0	6
HE 21	0	1

Figure 1. Number of Resource Adequacy Hours occurring during the Summer Season. This highlights the shifting of risk from Summer afternoons to hours later in the day and with lower load levels.

To address these gaps, MISO is making three significant changes to the accreditation and participation options for demand-side resources:

1. Accreditation based on expected performance during the highest risk hours.
2. A new participation option that deploys earlier in the Emergency Operating Procedures (EOP).
3. Restricting LMRs that are deployed during Energy Emergency Alert Stage 2 events to be those resources capable of rapid response.

MISO is also proposing other changes to address several recent instances of market manipulation by Market Participants enrolling Demand side resources in the PRA. These changes are designed to ensure that ratepayers are paying for resources that can actually reduce demand and to improve visibility into demand side resources. These reforms will also need changes to internal MISO systems to enable easier deployment of these resources, penalty provisions for resources that underperform, and testing changes to ensure that all resources are positively verified as being capable of providing the services they are being compensated for.

Taken together, these changes represent a comprehensive overhaul for demand resources participating in the PRA. Through these reforms, MISO aims to provide better incentives for performance, better compensation to those resources that can provide Capacity to MISO, and improved participation options to ensure these resources effectively be used to improve reliability to the system.

¹³ NERC, Challenges to Reliability and Resilience (December 2023), at p. 5, available at <https://cdn.misoenergy.org/20231207%20Board%20of%20Directors%20Item%2007a%20NERC%20CEO%20Update631092.pdf>

¹⁴ Resource Adequacy Hours are a Schedule 53A defined term and represent the Hours during which the system is either in an Emergency or is experiencing an operating margin of less than 25%.



3 Participation Options

The previous section detailed specific resource types and the specific rules pertaining to each resource type which apply regardless of the participation option selected by the resource. In this section, the specific participation options are detailed along with their qualification requirements, obligations, benefits, and deployment information.

The most significant change under this proposal is the portioning of Load Modifying Resources into two categories, Load Modifying Resource – Type I and Load Modifying Resource – Type II. Table 1 provides an overview of these participation options, with detailed explanations provided in Subsections 3.3 and 3.4 respectively. The primary distinguishing features of these resources are deployment order and total allowed response time.

One change that is required in this effort is aligning accreditation of the DRR and LMR participation option. One cause of dual enrollment is the difference in accreditation for a resource if it participates as a DRR or as an LMR. Additionally, this difference creates a potential barrier for a resource to find its optimal participation option. Therefore, MISO is eliminating these differences and accrediting demand side resources based upon their resource type rather than their participation option. Another difference is that a DRR is a Capacity Resource, which has a Day-Ahead must-offer obligation, while LMRs are a Planning Resource, which do not have this obligation. MISO is eliminating this difference as well such that all DRR and LMR will be Planning Resources, rather than Capacity Resources, removing the Day-Ahead must-offer requirement from the DRR participation option.

One set of characteristics these resources share is the obligation of performance. Currently, a resource participating as a DRR or as an LMR has an obligation to be available for all Emergency events.¹⁵ After discussing the issue with stakeholders, MISO is proposing to eliminate this requirement and replace it with an obligation to be available for all Emergencies until the resource has responded to at least one Scheduling Instruction within a Season. For a DRR or an LMR – Type I resource, MISO will require a resource to be available in all Emergencies until it has received a Scheduling Instruction. These resources may make themselves unavailable to receive additional Scheduling Instructions at the cost of reduced accreditation. An LMR – Type II resource will have an obligation to be available in all Emergencies, thus removing the limitation on the number of deployments within a single Season. This change reflects operational concerns regarding having to decide if an Emergency warrants deployment or if it is better to wait to deploy these resources for future Emergencies. Additionally, the 24-hour separation rule between deployments will no longer apply.

This section will also discuss Generation Resources and Demand Response Resources that use a Commitment Status of Emergency. These resources are referred as Available during Maximum Generation Emergency (AME) resources. These resources' accreditation is being brought in-line with demand side resources as the performance obligations are similar.

MISO has also evaluated the deployment order of these resources to better use these resources in Emergencies. This work is on-going, and MISO will make presentations at the Reliability Subcommittee when the finalized ordering is complete. While the specific ordering is not planned to be finalized prior to making this filing, the following information regarding deployment is finalized and will be included in the Module A Tariff definitions of the Load Modifying Resource – Type I and Load Modifying Resource – Type II:

¹⁵ While not an explicit requirement of a DRR, it is an implicit requirement due to the Day-Ahead must offer obligation.



1. Demand Response Resources
 - a. Economic deployment based on least-cost dispatch
2. The following resources will be deployed during, or in anticipation of, Maximum Generation Warnings¹⁶
 - a. Load Modifying Resource – Type I
 - i. Deployed based on location and response time such that long-lead time resources will be deployed before short-lead time resources when notification times permit
 - b. AME Resources
 - i. Deployed based on least-cost dispatch
3. Load Modifying Resource – Type II
 - a. May be deployed in anticipation of, or beginning with, Energy Emergency Alert Stage 2 events
 - b. Based on location

3.1.1 Current Demand Response Participation

Figure 2 provides an overview of how these resources currently participate in the MISO markets.

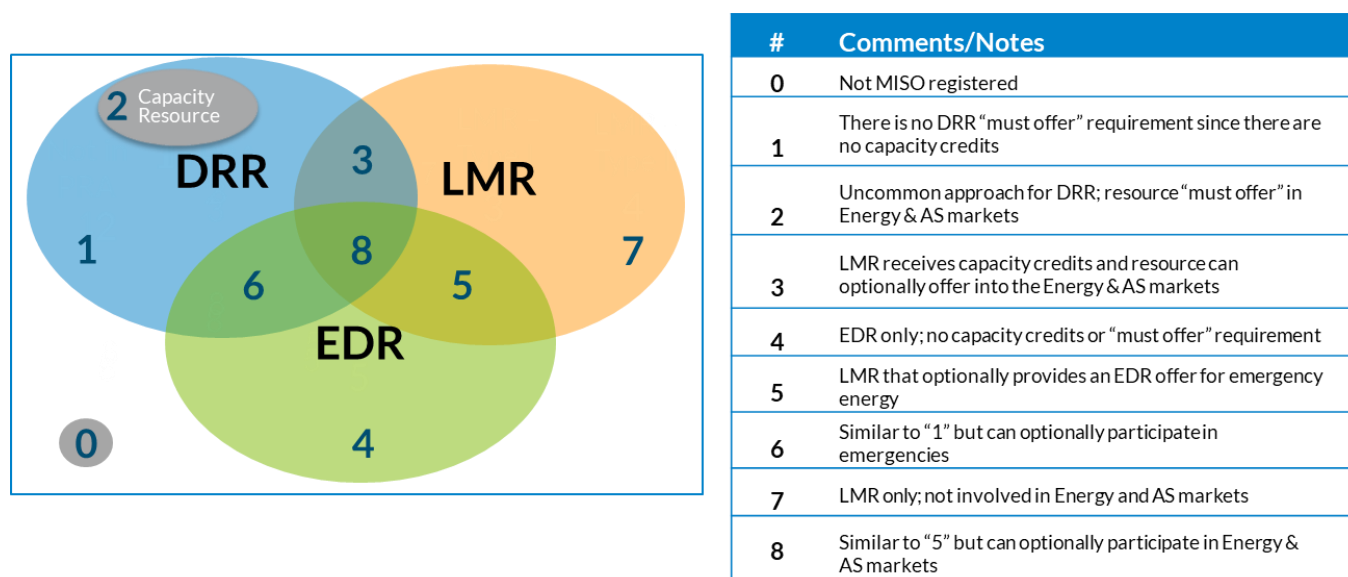


Figure 2. Current participation framework for demand side resources in the MISO markets.

The proposed participation options have the following characteristics:

1. The **DRR** participation option will continue to allow a resource to participate in the Energy and Operating Reserve Market and receive Zonal Resource Credits (ZRCs) when registered in the PRA. Qualified DRR may provide ancillary services. When a DRR's ZRCs clear in the PRA, it will be a Planning Resource and the DRR no longer has a must-offer obligation in the Day-Ahead Market. There continues to be no obligation to participate in the PRA while participating as a DRR.
2. The **LMR** participation option participates in the PRA only. Resources selecting this participation option will participate as either an LMR – Type I resource or an LMR – Type II resource. These resources will continue to receive the ACP for cleared ZRCs and will continue to not be compensated for Energy through

¹⁶ Changes to MISO's Emergency Operating Procedures (EOP) and specific ordering of deployment during Capacity Emergency events will be discussed and finalized at MISO's Reliability Sub Committee in 2025.



Locational Marginal Pricing (LMP). As Planning Resources, LMRs do not have an obligation or the ability to Offer into the Day-Ahead Energy and Operating Reserve Market. A resource participating as an LMR – Type I resource may be deployed in anticipation of or beginning with a Maximum Generation Warning. A resource participating as an LMR – Type II may be deployed in anticipation of or beginning with an EEA2 event. Additional requirements for this participation options are described in detail below.

3. Intermittent Behind the Meter Generation will continue to be permitted to participate in the PRA and will be provided their own participation option in recognition of their unique operating characteristics.
4. The **EDR** will continue to be a voluntary, Emergency Energy participation option and will not qualify to participate in the PRA. These resources may submit an EDR Offer when they desire and will be deployed after LMR – Type II resources have been deployed.

Additionally, resources may currently dual-register in any combination of three participation options: Demand Response Resource (DRR), Load Modifying Resource (LMR), and Emergency Demand Response (EDR). That is, a single resource may be enrolled as a DRR, an LMR, an EDR, a DRR and LMR, a DRR and EDR, an LMR and EDR, or a DRR and LMR and EDR.

3.1.2 Proposed Demand Response Participation

Figure 3 provides an overview of how these resources will participate in the MISO markets under MISO’s proposal.

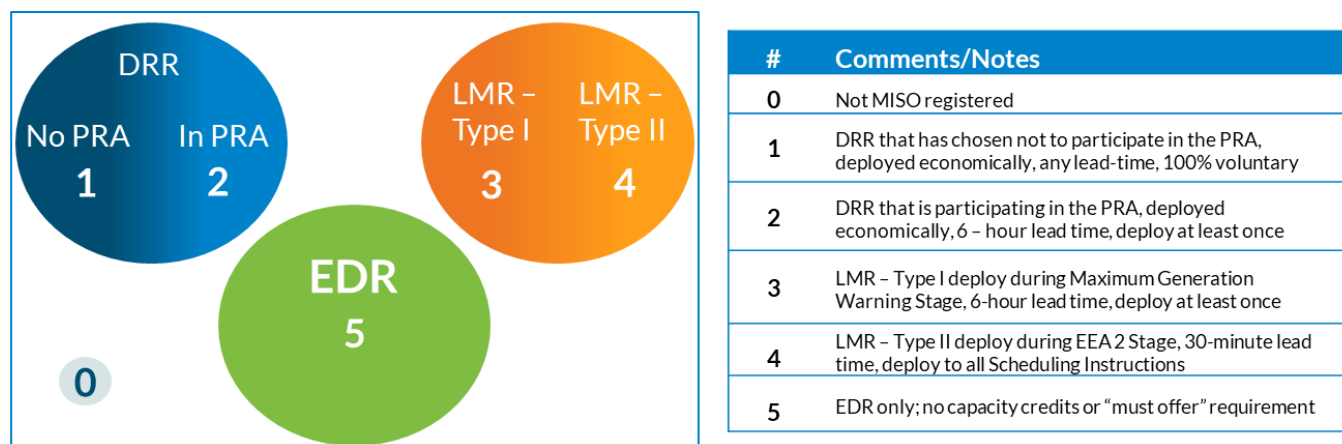


Figure 3. Proposed participation framework for demand side resources in the MISO markets.

In his Summer 2024 Quarterly Report to the MISO Board of Directors, MISO’s Independent Market Monitor, Dr. David Patton, made a recommendation to “Eliminate EDR resources as a class of demand response.”¹⁷ This recommendation is based on the IMM’s evaluation of demand response in MISO. The IMM notes that EDRs are called very late in MISO’s Emergency Operating Procedures, which provides an effective strategy to receive capacity payments with virtually no chance of having to perform.¹⁸ After proposing to eliminate EDRs, stakeholders provided feedback on why these resources should be retained. MISO has discussed the issue further with the IMM

¹⁷ IMM Quarterly Report: Summer 2024: [20240917 Markets Committee of the BOD Item 06 IMM Quarterly Report](#) (Slide 11), September 17, 2024.

¹⁸ See id. at slide 10.



and after considering stakeholder feedback, will discuss eliminating the ability for EDRs to dual-register.¹⁹ MISO will extend the elimination of dual-registration with proposal to encompass DRR and LMR dual-registration.

3.1.3 Deployment Ordering of Resources

As will be discussed in the relevant participation option subsections, MISO has re-evaluated when to deploy these Emergency and Demand Resources, as shown in Figure 4.

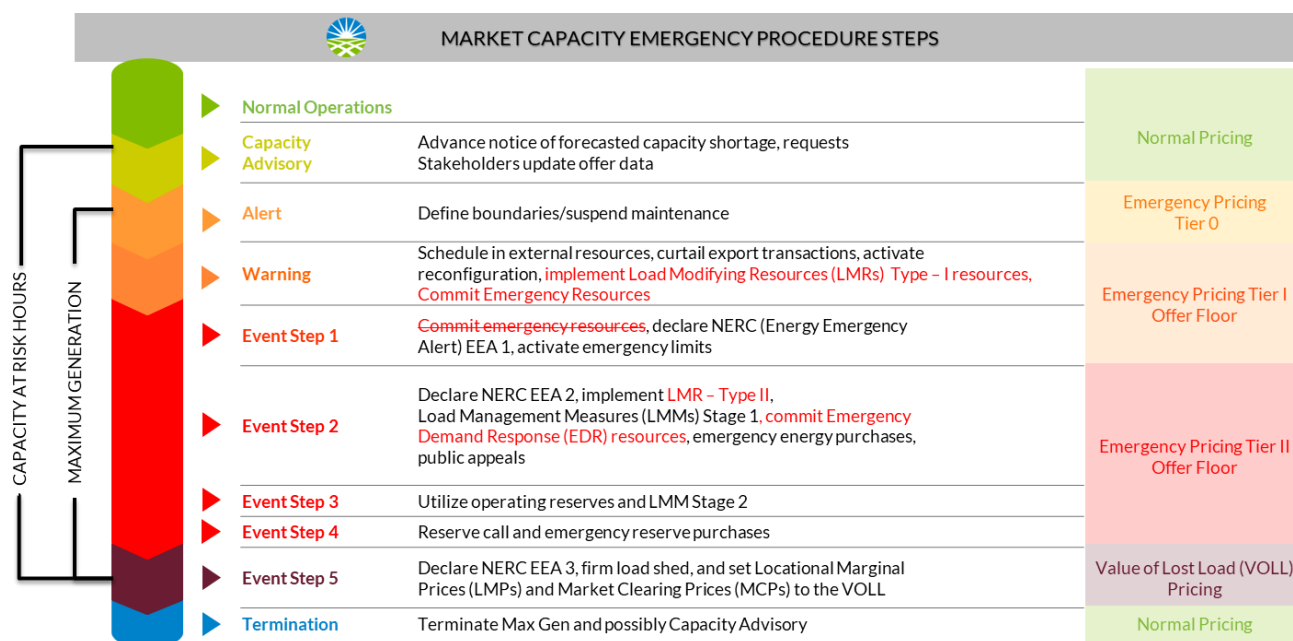


Figure 4. Emergency Operating Procedure overview with proposed placement of each participation option in red.

3.2 Demand Response Resource – Type I & Type II

A Demand Response Resource is a Resource that participates in the Energy and Operating Reserves Markets through the so-called demand as supply model. These resources may Offer to curtail Demand in exchange for Energy payments in the form of Locational Marginal Pricing (LMP). Additionally, these Resources may currently participate in the PRA either directly, as a Capacity Resource, or through the Load Modifying Resource participation option.

MISO is aligning the Demand Response Resource participation options' accreditation determination and PRA participation requirements with LMR – Type I resources. This requires reclassifying Demand Response Resources to be Planning Resources, thereby removing the Day-Ahead must offer obligation and replacing it with a must offer requirement during all Capacity At Risk Hours. A Demand Response Resource will qualify for the PRA if it has a maximum response time (Start-Up/Shut-Down Time + Start-Up/Shut-Down Notification Time) of less than six (6) hours and will accredit these Resources based upon the underlying resource type enrolled as the Demand Response Resource. See Section 4 for more information regarding accreditation of a Demand Response Resource.

There are two types of Demand Response Resources, the DRR - Type I and the DRR - Type II. A DRR – Type I resource has only two output states (either “on” or “off”) whereas a DRR – Type II resource can deliver output over a

¹⁹ MISO discussed elimination of EDRs at the November 7, 2024 Market Subcommittee meeting and elimination of dual registration for EDRs at the January 16, 2025 Market Subcommittee meeting.



continuous range of values. Another difference is in how these resources are modeled. A DRR – Type I resource is modeled in the Commercial Model with a DRR1CPNODE, which is like a Demand Zone CPNode. These resources are not modeled in the MISO Network Model.²⁰ A DRR – Type II is functionally a Generation Resource, with identical Offer parameters, reliability requirements, and is modeled as a Generator, meaning that there is a one-to-one mapping of EPNode to CPNode.²¹ Both a DRR – Type I and DRR – Type II are eligible to provide most types of reserve products, however only a DRR – Type II resource that provides telemetry is eligible to provide Regulating Reserves. Because of these differences, most demand side resources will not qualify to participate as a DRR – Type II resource.

When participating as a Demand Response Resource, a Resource may be committed Economically based on least-cost dispatch. This means that Demand Response Resources will be committed before deploying Load Modifying Resources. In effect, a Market Participant selecting this option has elected to deploy more frequently in exchange for receiving LMP and having the ability to provide ancillary services.²²

Other provisions regarding DRR will remain unchanged, and Market Participants should consult [Module C](#) of the Tariff and [BPM 26 – Demand Response](#) for more information regarding the DRR participation options.

3.2.1 Flexibility of Response

As part of the proposed changes, MISO is eliminating the limitation on the number of deployments for all demand side resources. Stakeholders have expressed concern regarding how many times they are required to deploy and the uncertainty of such a requirement. In response, MISO has provided flexibility in response for resources participating as a DRR or LMR – Type I resource. See Subsection 3.3.2 for more details. Until a DRR has been deployed economically at the same time as an LMR – Type I resource was issued a Scheduling Instruction within the same LBA, the DRR has not met its obligations for performance as a Planning Resource. A DRR that has met its obligations for performance as a Planning Resource may make itself unavailable for further deployment in exchange for reduced accreditation, as described in Subsection 5.5.

3.3 Load Modifying Resource – Type I

The Load Modifying Resource – Type I participation option is a new Capacity only participation option developed for demand side resources wishing to participate in the PRA and who do not wish to participate in the Energy and Operating Reserves markets and require up to six (6) hours to respond. Both Demand Resources and Behind the Meter Generation that is non-Intermittent may participate as a Load Modifying Resource – Type I.

²⁰ See the Business Practices Manual for Network and Commercial Models, Section 4.2.3 and 4.2.4 for more information regarding the modeling of DRRs.

²¹ An aggregation may qualify to participate as a DRR – Type II if the entire aggregation is behind a single EPNode. If the aggregation is spread across multiple EPNodes, it may only participate as a DRR – Type I resource or the future DEAR participation option.

²² In a parallel effort being discussed with Stakeholders at the Market Subcommittee, the IMM and MISO have identified concerns regarding Demand Response Resources. As part of this effort, MISO is removing the ability for a DRR to be compensated LMP for a Self Scheduled deployment. A DRR will receive appropriate Capability credit when Self Scheduling but will never be compensated LMP. See *Demand Response Participation Rules* being presented at the Market Subcommittee and the *IMM Quarterly Report: Summer 2024* for more information.



These resources have an obligation to respond to at least one Scheduling Instruction issued per Season and may make themselves unavailable for deployment in exchange for lower accreditation after responding to a Scheduling Instruction. As these resources have been provided a longer response time, they are also being moved up in the deployment order during Emergencies and may be used during the Maximum Generation Warning stage. Accreditation and testing will be performed in accordance with the resource type underlying the LMR – Type I resource. See Section 4 for more details.

3.3.1 Deployment Order and Response Time

The Load Modifying Resource – Type I participation option was developed in response to several issues. The first is that outside of long-duration winter events, EEA2 events typically have a very short notification time, shown in Table 3.²³

Date/Time of Initial Declaration (Cons Ops, Alert, or Step 1a)	Date/Time of Event Declaration (Step 2a/2b or 2c/2d)	Time From Initial Declaration to Event Start	Event Level	LMRs Deployed	LMR Deploy Time	Time from Start to Deployment
4/4/2017 2:51 PM	4/4/2021 3:00 PM	0.15	EEA 2A	Yes	1600	1.15
1/17/2018 4:05 AM	1/17/2018 6:10 AM	2.08	EEA 2A	Yes	800	3.91
1/17/2018 4:05 AM	1/17/2018 6:10 AM	2.08	EEA 2A	Yes	2000	15.91
1/17/2018 4:57 PM	1/18/2018 6:00 AM	13.05	EEA 2A	Yes	700	14.05
9/15/2018 2:47 PM	9/15/2018 3:00 PM	0.22	EEA 2B	Yes	1600	1.22
1/30/2019 6:19 AM	1/30/2019 8:00 AM	1.68	EEA 2A	Yes	900	2.68
5/16/2019 2:09 PM	5/16/2019 2:00 PM	-0.15	EEA 2A	Yes	1500	0.85
2/15/2021 4:00 PM	2/15/2021 6:00 PM	2.00	EEA 2A	Yes	1900	3
2/16/2021 5:57 AM	2/16/2021 8:00 AM	2.05	EEA 2A	Yes	900	3.05
2/17/2021 3:52 PM	2/17/2021 6:00 PM	2.13	EEA 2A	Yes	1900	3.13
6/10/2021 12:05 PM	6/10/2021 2:00 PM	1.92	EEA 2A	Yes	1500	4.92
12/23/2022 5:40 PM	12/23/2022 6:00 PM	0.33	EEA 2A	Yes	1900	1.33
8/24/2023 8:15 AM	8/24/2023 12:00 PM	3.75	EEA 2A			
Average excluding multi-day events		1.47				2.52

Table 3. Time from the initial declaration of an Emergency event to the declaration of an EEA2 event to the time of LMR deployments, for all EEA2 events that have occurred since 2017.

Long-duration winter storms have occurred twice between 2017 and 2024. During these events, MISO was in a near-continuous state of EEA2 Emergency level for 2 or 3 days. Both events saw repeated LMR deployments within a several-day span, with the January 2018 event seeing 2 deployments of LMRs on the 17th followed by a third deployment on the morning of the 18th. In general, MISO deploys LMRs approximately one hour after declaring an EEA2 event. During Capacity Emergencies, MISO's goal is to manage reliable grid operations by utilizing all resources that are available to it without needing to escalate the condition to EEA2 declarations. The August 24, 2023 event saw significant Self Scheduling of resources which negated the need for LMR deployment instructions to be issued. There have also been instances with EEA2 declarations made retroactively, that is after the EEA2 event had begun. This instance resulted in LMRs being deployed with less than one hour of notification time.

²³ This data differs slightly from what has been presented previously. The difference is the unit of measure. In previous presentations and versions of the white paper, the time between notification and the start of a declaration was shown. This table uses the unit of measure present in the 2020 LMR Filing. The "Time From Initial Declaration to Event Start" is the time from when the EEA 2 was declared to when it began. The "Time From Start to Deployment" is the time between when the EEA 2 event began and when LMRs were deployed. Other differences arise from the way escalations are accounted for. This data is presented from data posted to stakeholders at the December 15, 2024 RASC.



Stakeholders have indicated that the LMR – Type II resource should provide 2 hours of notification given that is the average notification time leading into EEA2 events in the past. MISO understands that the historical data can be interpreted in several different ways. In reviewing this data, 10 LMR deployments that have occurred outside of the severe long-duration Winter event of January 17th have occurred. Of these 10, 4 required LMRs that could respond within 1.5 hours to effectively deploy in response to the start of the event. MISO's position is that reliability planning requires a conservative posture with regards to the ability for resources to effectively respond during different stages of the Emergency Operating Procedures. If planning to the average, the system is left without the ability to deploy many of its LMRs in a timely fashion. By planning for the shorter-lead time LMR deployment events that have occurred in the past, MISO is positioning itself to maximize the reliability contribution of these resources.

When MISO first initiated the LMR Reforms effort, now known as the Demand Response and Emergency Resource Reforms, MISO proposed allowing LMRs with lead times of only 30 minutes to participate with no Capacity only participation option for a resource requiring more 30 minutes of lead time. Stakeholders expressed concern at this proposal. MISO's response was to create the Load Modifying Resource – Type I participation option, which allows for longer lead time resources to have a Capacity only participation option.

MISO initially positioned the LMR - Type I resource at the Maximum Generation Alert stage, to guarantee these resources could respond within the six (6) hours of response time they were afforded. MISO stakeholders expressed an understanding of the need for longer lead resources to deploy earlier in the Emergency Operating Procedures, but requested these resources be deployed during the EEA1 declaration stage. After discussion with stakeholders and investigations into the notification times of the various stages of Emergencies MISO has moved the deployment of LMR - Type I resources to the Maximum Generation Warning stage.²⁴ After consulting with NERC Emergency declaration guidelines and internal discussion, MISO has also moved AME Resources from just prior to declaring an EEA1 Emergency to the Maximum Generation Warning stage – the same stage when LMR Type I resources will be eligible for deployment.

MISO will review specific changes to the Emergency Operating Procedures at the Reliability subcommittee in the coming Months. These changes do not need to be completed prior to filing this proposal with the FERC and MISO will commit in the filing that the Maximum Generation Warning stage is where these resources will be deployed.

These resources will be committed based on the location they are in and from long lead time resources to short lead time resources, when the notification times make this possible for MISO. MISO is also investigating whether to allow these resources to submit price offers to signal to MISO their willingness to deploy. If this mechanism is put into place, Market Participants would have the ability to distinguish within a lead-time their preferred ordering of deployment. These signals would not result in LMP payments.

3.3.2 Flexibility of Response

As was discussed in Subsection 3.2.1, stakeholders have expressed concern at the removal of the cap on the number of deployments. MISO would not like to put operators in a situation wherein they are hesitant to deploy LMRs because of uncertainty on whether they will be truly needed or not and risk not having these resources available for deployment at a future event in the Season. Therefore, additional out of market decisions are made that impact the markets and reliability of the system. This is exacerbated by the reduction in lead time into an event. More specifically, operators can deploy an LMR under the current rules in anticipation of an EEA2 event. However, if an EEA2 event is not declared, then any LMR that began to deploy in response to the Scheduling Instruction is credited

²⁴ A Maximum Generation Warning is declared when MISO projects a shortfall of the ability to serve Demand.



with a deployment and may stop responding to the issued Instruction. Premature LMR deployments may also increase the likelihood of an Emergency occurring because an ex-ante price drop occurs when LMRs are deployed due to the decrease in Demand. This sometimes creates cyclical price volatility.²⁵

To remove these extra decisions, MISO is removing the limitation on how often a resource may be deployed. Removal of these limitations also presents MISO with an opportunity to more efficiently operate the system. Resources can have the flexibility to make themselves available or unavailable, in exchange for accreditation. In this way, the uncertainty of response is reduced for stakeholders as they can make real time decisions regarding whether it is efficient for them to respond or not. Additionally, resources with a higher willingness to respond are provided with more accreditation than resources that are not willing to respond. The removal of the limitation on the number of responses extends to multiple deployments in a single day. Under the current rules, if there are two deployments within a 24-hour span, the second response may be ignored. Under the proposed rules, this response would result in reduced accreditation incentivizing resources to perform while not requiring them to do so. By shifting from a requirement to an incentive-based system, more efficient outcomes are achieved, Market Participants have flexibility to decide whether to make their resource available to MISO during certain Emergency events, and MISO operations has improved visibility in real time on which resources are available and which are not.

The rules for flexibility in response are as follows:

1. A DRR has an obligation to be available for all Scheduling Instructions until it has deployed in response to a Setpoint Instruction at the same time an LMR – Type I resource located within the same LBA has responded to a Scheduling Instruction.
2. An LMR – Type I resource has an obligation to be available for all Scheduling Instructions until it has deployed in response to a Scheduling Instruction.
3. The obligation to be available means one of the following:
 - I. Submitting non-zero Capacity Availability information to MISO or;
 - II. Self Scheduling to or below the Firm Service Level or;
 - III. Injecting Energy.
4. After responding to a Setpoint Instruction or Scheduling Instruction under 1. and 2., a resource has met its obligations for performance as a resource participating in the PRA and may make itself unavailable to MISO for future Scheduling Instructions
5. A resource that has not satisfied its obligations under 1. and 2. has failed to perform and will be subject to the complete failure to perform penalties described in Section 7.2.

3.4 Load Modifying Resource – Type II

The Load Modifying Resource – Type II participation option is the second Capacity only participation option available to demand side resources. Either Demand Resources or non-Intermittent Behind the Meter Generation resources may use this participation option. Resources participating under this option will be accredited identically to resources participating as a DRR or LMR – Type I resource. Because of its unique operating requirements, it differs substantially from the other participation options with regards to testing requirements, deployment ordering, response time, and flexibility in response. These are described in detail below.

²⁵ The pricing impacts of deploying LMRs in real-time have also been identified as needing to be addressed, however this effort is being addressed separately at a future date.



3.4.1 Deployment Order and Response Time

The LMR – Type II resource is a Capacity only participation option that will deploy during EEA2 events. As was described in Subsection 3.3.1, the notification time leading into EEA2 events is short. To effectively use the LMR – Type II participation option during all EEA2 events a much shorter response time is necessary for this participation option than for resources participating as a DRR or LMR – Type I resource. Therefore, a resource may only participate as an LMR – Type II resource if its total response time (Notification Time plus Shut-Down/Start-Up time) is less than or equal to 30-minutes. This rapid response time ensures that these resources can be used when EEA2 events occur.

The ordering of deployment of these resources is done in the same manner as is performed today, that is locationally based deployment during the EEA2 event step.

3.4.2 Flexibility of Response

To ensure that the reserve margin remains intact, MISO depends on resources to be able to deploy to their fullest capabilities. For an LMR – Type II resource, this requirement is even more important as these resources represent the last deployable assets under MISO control. After LMR – Type II resources are deployed, the only assets available for MISO to commit are under no obligation to respond to a MISO instruction even if an Offer has been made. Therefore, these resources must be available to respond to all Scheduling Instructions. If a resource is already operating at or below its Firm Service Level or is injecting Energy, it is considered available and is meeting its obligations to perform. These resources cannot make themselves unavailable to MISO.

3.4.3 Testing Requirements

Because LMR Type II resources are required to be highly available, highly reliable resources and because these resources are deployed after all other resources, MISO needs to test these resources more frequently than DRR or LMR – Type I resources. Specifically, any Demand Resource participating as an LMR – Type II will have an obligation to respond to a MISO initiated test once per Planning Year.

A Demand Resource that is not using a statistical Measurement and Verification methodology as defined in Attachment TT may opt out of this requirement if it can demonstrate perfect performance to all Scheduling Instructions over the previous three Planning Years, including MISO-initiated tests. If a resource has selected this opt-out, it will be tested once per three years. Deployments in response to MISO Scheduling Instructions satisfy the requirements for a test. Demand Resources using a Statistical Measurement and Verification methodology are never eligible to opt out of this testing requirement.

A resource choosing to opt out will be subject to increased penalties for failure to perform. These reflect the likely impact that the resources failure to deploy has on the system and will replace the ACP penalty with the Pricing VOLL.²⁶ This reflects the expected pricing impacts that LMR – Type II resources failing to perform have on the system as the system is at an increased risk of going into an involuntary Demand shed event where all LMP is set to the Pricing VOLL. Specific details on what a MISO initiated test looks like is discussed in Section 6.

²⁶ Pricing VOLL is a newly defined term submitted as part of the Scarcity Pricing FERC filing in late 2024. If this filing is approved, Pricing VOLL will be equal to \$10,000.



3.4.4 Metering Requirements

Any resource using the LMR – Type II participation option will be required to submit hourly meter data for all hour of the Planning Year. If a resource is deployed, it will be required to submit 5-minute meter data from the hour prior to the deployment instruction until an hour after the resource has responded.

3.5 Intermittent Behind the Meter Generation

Intermittent Behind the Meter Generation is the other new Capacity only participation instrument being introduced as part of these reform efforts. These resources participate in the PRA today under the LMR umbrella; however, they are not treated like a regular LMR. They have no performance obligation in Emergencies, do not submit availability information to MISO, and exist entirely outside of MISO's control.

To better reflect these operating characteristics, MISO is creating a specific participation option available only to these types of resources. These resources will continue to exist outside of MISO's control and so are not obligated to make themselves available or submit availability information. These resources will be required to submit meter data for all hours of the Planning Year in order to calculate their accreditation. Further details of this participation option are found in Subsection 5.3.

3.6 Metering Requirements

Resources participating as a DRR or LMR will be required to submit hourly meter data for all hours of the Planning Year regardless if they are participating in the PRA or not. If these resources select a response time under one hour, they will be obligated to provide 5-minute meter data from the Hour prior to the beginning of the Scheduling Instruction through the first Hour after the Scheduling Instruction was issued. The need for 5-minute meter data is to ensure these resources are responding in the timeframe they enrolled under. As a practical matter, a resource's response will almost always be measured as one extra interval of meter data than its actual response. This is because of the timing of the meter submissions. For example, a resource claiming a response of 1 hour could receive a Scheduling Instruction at xx:02. Hence, this resource is expected to perform as per the instruction starting at xx+1:02. It will not be until xx + 2 that the response of this resource will be verifiable. This logic extends to all intervals, such that as a practical matter, a 30-minute response time will not be measured until forty-five minutes have passed. For resources with a response time of at least one hour, this is acceptable. But for resources enrolled with a response under 1 hour, it is necessary to ensure that they are responding in a more granular way. Therefore, 5-minute meter data will need to be submitted ensuring that these resources are measured in a manner that accurately captures this rapid response. Only resources enrolling with less than one hour of total response time will be held to this obligation. If a resource enrolls as a one hour or longer resource, this requirement does not apply.

Additional meter data requirements may be imposed based on the type of ancillary services the DRR wishes to provide. The requirements described in this white paper do not change the requirements stated for these types of services.

4 Accreditation Overview

Accreditation for resources participating as an AME Resource will be done in a manner like that of regular Schedule 53A Resources. The portions of accreditation that change for AME Resources are detailed in Subsection 5.4 and include a change in hours used, detailed below, removal of the Tier 2 Planned Outage Exemptions provisions, and exclusion from Resource Class calculations. For Demand Resources, Behind the Meter Generation, and Intermittent



Behind the Meter Generation, accreditation will be detailed below. This overview section describes new terminology, rules, and calculations that apply to all resource types.

In general, accreditation answers the question: How many megawatts could a resource have provided if it had been deployed? Broadly speaking, this is equal to the Offer submitted by the AME Resource or the Demand Response Resource, or the availability submitted by the LMR. The unique operating characteristics and incentives of a Demand Resource require several special case rules, but in all instances, the fundamental question being addressed in accrediting these resources is the same.

4.1.1 Capacity Availability

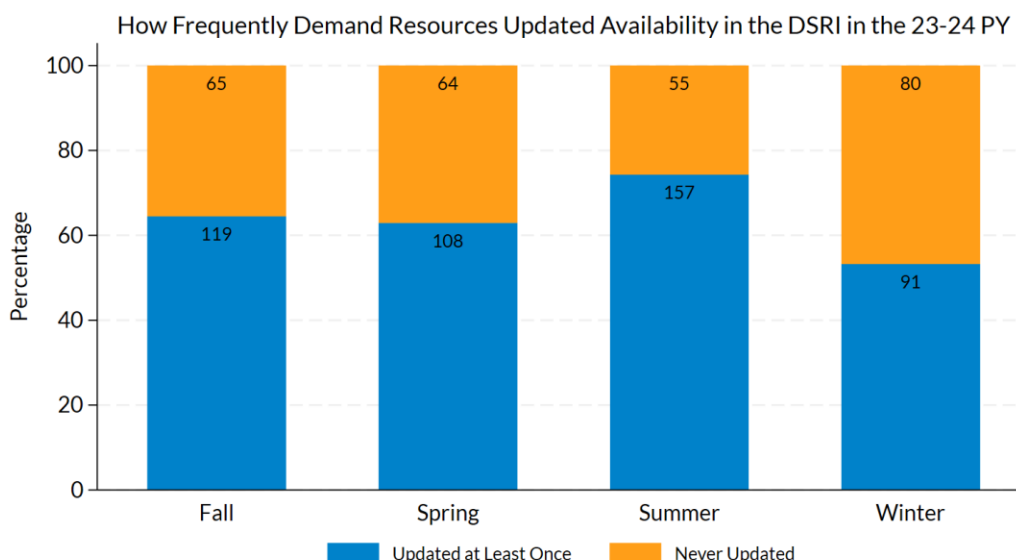
Capacity Availability: The amount of Energy a DRR or LMR makes available for deployment to MISO.

Capacity Availability refers to the amount of energy submitted in real time by DRRs and LMRs. This value should reflect the forecasted amount of energy the resource can provide within the total enrolled response time. Currently, MISO requires accurate real-time availability for all LMRs. From Module E-1 69A.3.3.1: “The Market Participant shall, at all times, notify the Transmission Provider or Local Balancing Authority when the status or availability of an LMR changes, except for de minimis changes that do not need to be reported, according to procedures specified in the BPM for Resource Adequacy and Emergency Operating Procedure.”

BPM 011 – Resource Adequacy states: “It is critical that LMR availability always be current as the Scheduling Instructions (dispatch directives) and ultimately performance and availability review will utilize the information in the DSRI at the time the Scheduling Instruction is issued and how the Market Participant responds to the Scheduling Instruction. If the LMR is on any type of derate, outage or otherwise not available, the LMR availability should be adjusted by decrementing the availability in the DSRI by reducing the ‘MWs available for MISO’ for the affected LMR.”²⁷

MISO has investigated the frequency with which LMRs are updating their availability information in the DSRI. Figure 5 presents Demand Resources that are solely registered as LMRs, that is LMRs that are not also participating as a DRR or EDR. Those LMRs that changed either their availability or Self Scheduled amount in at least one hour in a Season are shown in blue. Those LMRs which never changed their availability or Self Scheduled amount in even one hour in a Season are shown in orange. Approximately 33% to 50% of Demand Resources that are not dual-enrolled have never updated information provided to MISO in at least one hour in a Season. A similar comparison to Behind the Meter Generation enrolled as an LMR demonstrates 40% to 50% of these types of LMRs have never updated the information provided in the DSRI. In total, this represents between 150 and 200 out of the approximately 400 non-dual enrolled resources participating as an LMR in the 2023-24 Planning Year. The Summer of 2023 saw two Emergency declarations issued which should have resulted in LMRs updating their information, however about 150 unique LMRs did not change the information provided to the DSRI in any way.

²⁷ BPM 011 – Resource Adequacy 4.2.5 Load Modifying Resource Obligations and Penalties.



This data excludes any dual-registered resource. Numbers show unique number of Demand Resources.

Figure 5. This graph presents Demand Resources that are solely registered as LMRs, that are not participating as a DRR or EDR. Those LMRs that changed either their availability or Self Scheduled amount in at least one hour in a Season are shown in blue. Those LMRs which never changed their availability or Self Scheduled amount in even one hour in a Season are shown in orange.

To incentivize accurate Capacity Availability, MISO will tie the Capacity Availability information submitted by a Market Participant to the Capability calculation.²⁸ MISO recognizes that Market Participants may wish to make less than their full Capability amount available to MISO. That is, a resource with a Firm Service Level of 0 MW, consuming 100 MW of Demand, may only wish to provide MISO with 50 MW of reduction in a given Hour. MISO will respect this and calculate the Capability of the resource as 50 MW.²⁹ Similarly, for a BTMG that can normally provide 20 MW, if it only submits 10 MW as available, then MISO will provide a Capability of this resource of 10 MW for these hours.

A resource is obligated to provide accurate availability information for the hour by which its response should be complete. For example, if a resource has a total response time of 3 hours, then the Capacity Availability that is used to determine accuracy of the submitted Availability information corresponds to 3 hours from the time the value is imputed. That is, for information submitted for 1500, the Capacity Availability that is submitted by 1200 will be used for the 1500 determination of accuracy.

The reason for this requirement is that Scheduling Instructions provided by MISO are issued ahead of the Hour in which the resource is needed. MISO's commitment decision of both LMRs and other Emergency resources is contingent upon how many megawatts can be provided. The information used in the commitment decision reflects the expected reduction in Demand that will occur when the LMR is deployed, not based on the Demand reduction the LMR can provide instantaneously. Accurate availability information is paramount to the efficient and reliable operation of the system.

²⁸ Capability is a newly defined term that is described in detail below.

²⁹ There are further examples of Capability with and without accurate Capacity Availability offers below.



Market Participants have also expressed concerns regarding their ability to accurately forecast their Demand consumption. MISO recognizes that there may be slight forecast errors that prevent a Market Participant from perfectly predicting the amount of Demand to be consumed several hours into the future. To accommodate these errors while maintaining the incentive for DRR and LMR to submit accurate information, MISO will extend the current Tolerance Band in the following way, to be defined in Schedule 53B:

Firm Service Level: The amount of customer Demand, in MW, that is intended to always be consumed by the end use customer and that can be reduced to regardless of how much Demand is being consumed.

Firm Service Level represents the amount of Demand the Market Participant indicates to MISO is reserved and should always be considered to be consumed. Any reduction of Demand below the Firm Service Level will not be included in the determination of Capability. For the purposes of Market Participant enrollment testing any Demand reduction that occurs below the Firm Service Level will be excluded from the test performance.

Capacity Availability Tolerance Band: A resource submitting its Capacity Availability shall receive full Capability if such Capacity Availability is within the Capacity Availability Tolerance Band defined as follows:

- (i) The Excessive Capacity Availability Threshold shall be equal to one hundred and twelve percent (112%) of the amount of Demand that is Metered less the Firm Service Level such that:
 - a. The Excessive Capacity Availability Threshold shall never be less than 1 MW and never be larger than 30 MW.
- (ii) The Deficient Capacity Availability Threshold shall be equal to eighty-eight percent (88%) of the amount of Demand that is Metered less the Firm Service Level;
 - a. The Deficient Capacity Availability Threshold shall never be less than 1 MW and never be larger than 30 MW.

Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Metered Output	57.8	58.9	57.9	36.9	39.4	40.9	54.9	59.0	60.6	55.1	51.4	57.1	51.8	53.3	53.5
Firm Service Level	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Capacity Availability	50	50	50	25	30	30	45	50	50	60	40	55	40	45	45

Figure 6. Example of how Capacity Availability information should be submitted. In this example, Hour 17 has 60 MW of Capacity Availability but only 45.1 MW were available. If Hour 17 is a Capacity At Risk Hour or Resource Adequacy Hour, it will receive reduced Capability for this Hour.

Submission Time	Submitted Capacity Availability for 1700
0847	55
0952	50
1051	55
1157	55
1249	55
1358	60
1457	55
1555	50
1656	45

Figure 7. Example of a resource updating Capacity Availability over a span of Hours and how MISO will select which submission to use when determining the accuracy of Capacity Availability.

In Figure 6, a set of Hours with actual metered Demand and the associated Capacity Availability submitted by the Market Participant is shown. In Hour 1200, the resource had made available to MISO 30 MW. As the true Demand less Firm Service Level at 1200 was 29.4 MW, the Capacity Availability information is considered accurate, and the resource will receive the full Capability value for the Hour. In Hour 1700, the Market Participant indicated to MISO that 60 MW of reduction capability would be made available, however only 45.1 MW were available. Therefore, Hour 1700 would receive a reduced Capability value commensurate with the size of the error of this submission.

This resource submitted information for the 1700 Hour during Hours 9 through 17, shown in Figure 7. Because it



had a 3-hour response time, MISO locks in the Capacity Availability that was submitted at the 1400 Hour when determining the accuracy of the submitted Capacity Availability information. This lock in reflects the most accurate information that would be available to MISO operators when making the decision on whether to deploy this resource or not.

Had the resource only required one hour to respond, information would have been locked in at the 1600 Hour for determination of Capacity Availability. Since the value submitted at Hour 1600 is within the Capacity Availability Tolerance Band ($45.1 \text{ MW} \times 1.12 = 50.5 \text{ MW}$), the resource would not have been penalized if the resource registered with a three-hour response time. If the resource was a six-hour response resource, the time at 1100 would be used, which being 55 MW is also outside of the Capacity Availability Tolerance Band.

Hours that occur at the beginning of an event, whether a Capacity Advisory or another Emergency Event, will also need to have accurate availability information submitted. This means that a resource needing 5 hours to respond will need to have its Capacity Availability up -to date 5 hours prior to the official event start, even if the event does not have 5 hours of notice before beginning. Market Participants are reminded that the Tariff requirement is currently, and will remain, for availability to be kept up to date during all hours. This means if an Emergency occurs with little lead time, the Capacity Availability information submitted at the appropriate time may impact Capability during the first Hour of the Capacity At Risk period. That is, Capacity Availability that was not updated at Hour 1500 will be used when determining Capability at Hour 1700 even when an Emergency is declared for Hour 1700 after Hour 1500 has passed.

4.1.2 Hours Used For Accreditation Calculations

MISO will accredit DRR, LMR, and AME Resources using Hours that are either Capacity At Risk Hours or Resource Adequacy Hours. Intermittent BTMG will be accredited during Tier 1 Hours and Resource Adequacy Hours. AME Resources and Intermittent BTMG will use a three (3) year look-back period. DRR and LMR will use a one (1) year look-back period. The choice of hours and look-back period accounts for the unique operating characteristics of these resources and is described in more detail in Subsection 4.1.2.1 and Subsection 4.1.2.2. If there are fewer than 65 total hours in a Season, there will be a deficiency of hours. The way this deficiency is handled is described within each resource type.

Participation Option	Hours used for Accreditation	Lookback Period
AME Resource	Hours that are Capacity At Risk Hours or Resource Adequacy Hours	Three Years
DRR	Hours that are Capacity At Risk Hours or Resource Adequacy Hours	One Year
LMR	Hours that are Capacity At Risk Hours or Resource Adequacy Hours	One Year
Intermittent BTMG	All Hours	Three Years

Capacity Advisory Hour: Hour during which a Capacity Advisory declaration has been made in accordance with *MISO Market Capacity Emergency Procedures*.



Capacity Advisory Hours are declared when MISO forecasts that the Operating Margin is less than 5%.³⁰ MISO attempts to declare Capacity Advisories two (2) or three (3) days in advance, but a Capacity Advisory or higher declaration may be declared in any timeframe. During these times, MISO operators have identified an increased risk of the system experiencing a Capacity Emergency.

Capacity At Risk Hour: An Hour during which a Capacity Advisory, Maximum Generation Alert, Maximum Generation Warning, Energy Emergency Alert – Stage 1 (EEA1), EEA2, or EEA3 is declared.

Capability: The definition of Capability varies by resource type, but a general summary is that Capability represents the amount of Energy a resource is, or is capable of, providing to MISO. Schedule 53B has the full Capability definition and the specific definition for each resource type will be described in full below.

The following terms are already defined under the MISO Tariff and are used to accredit Capacity Resources under the Schedule 53A framework as well as AME Resources and Intermittent BTMG. These are the Resource Adequacy Hours, Seasonal RA Hours, and Seasonal Non-RA Hours and Resource Adequacy Hours, whose definitions are summarized below:

Resource Adequacy Hours: All operating hours during any declared Maximum Generation Emergency in a Season. If there are fewer than 65 hours identified for the Season after accounting for all Maximum Generation Emergency hours, then additional hours will be identified, up to a total of 65 hours, starting with those hours with the lowest Operating Margin that is below a threshold of 25 percent. These hours are used to calculate Tier 2 ISAC.

Seasonal RA Hours: All Resource Adequacy Hours that occur during a Season.

Seasonal Non-RA Hours: All Hours not identified as a Seasonal RA Hours.³¹

To be clear, the Resource Adequacy Hours discussed throughout this white paper are identical to the Resource Adequacy Hours that have been defined as part of the Schedule 53 and Schedule 53A methodologies.

Seasonal Emergency Hour Deficiency: A Season in which there are less than sixty-five (65) Capacity At Risk Hours plus Resource Adequacy Hours experiences a Seasonal Emergency Hour Deficiency. This value is equal to difference between sixty-five (65) and the sum of the number of Capacity At Risk Hours and number of Resource Adequacy Hours occurring outside of a Capacity At Risk Hour.

There will be no weights applied to the Hours used to accredit DRR, LMR, and AME Resources. If weights were applied, it would be possible for very few Tier 1 Hours to disproportionately impact accreditation; that is, it would be possible to have a Season occur where there is only one Tier 1 Hour in the entire set. A weighting scheme would accredit this individual Hour by far more than is appropriate. By leaving the Hours unweighted, this problem is avoided. Additionally, the distribution of Resource Adequacy Hours provides a natural weighing scheme to favor hours of the day with the greatest likelihood of deployment as shown in Figure 8. Therefore, because there is a natural weighting scheme based on when Resource Adequacy Hours occur and there is a risk of having only a small

³⁰ See *Market Capacity Emergency*, SOP-00-002, for specific details related to Total Reserve Margin and other details associated with MISO's operating procedures during a Capacity Emergency.

³¹ See Schedule 53A for a complete definition of Resource Adequacy Hours as applied to Schedule 53A Resources.



number of Tier 1 Hours disproportionately impact accreditation, there will be no weights applied for the hours used to accredit DRR, LMR, and AME Resources. The same weighting as is used for Schedule 53A resources will be applied to Intermittent Behind the Meter Generation resources.

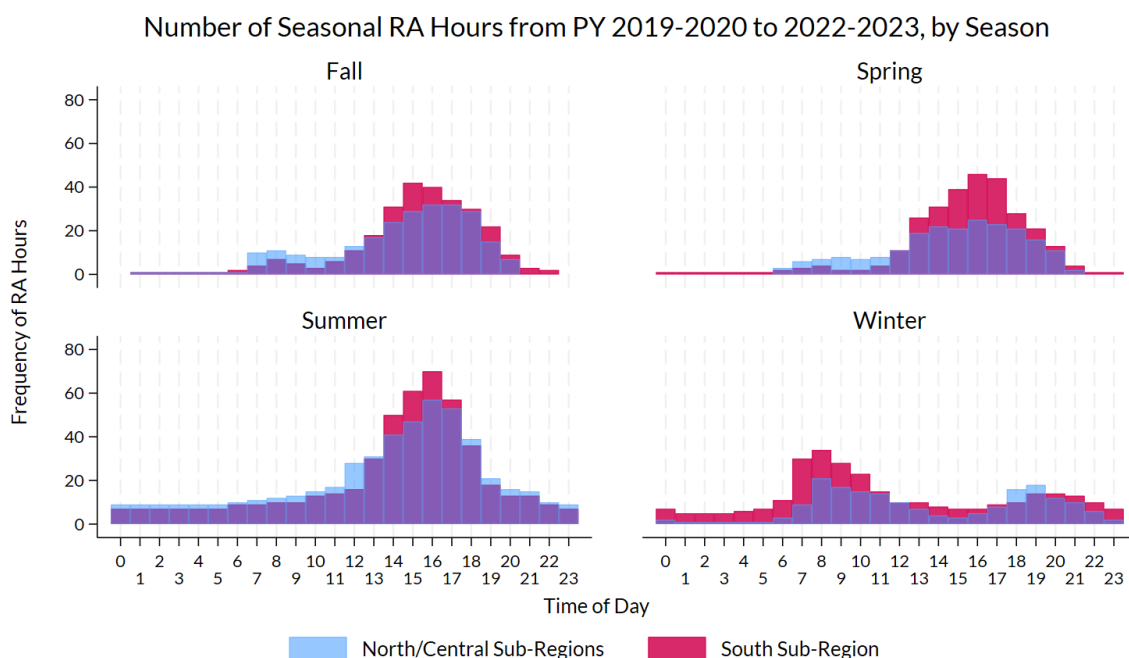


Figure 8. Number of Seasonal RA Hours by Season, indicating the relative frequency distribution of Hours that will be accredited for DRR, LMR, and AME Resources. Data is from Sept 2019 through Summer 2023, the last 4 Planning Years.

If a DRR, LMR, or AME Resource has received zero accreditation for all Capacity Advisory At Risk Hours during a Season, that resource shall be deemed to have been unavailable for the entire Season and will receive zero accreditation for all Hours within the Season and may be penalized as described in Subsection 5.4. Emergency Resources that are unavailable when needed for Emergencies and unavailable at all other times have no Capacity value if they cannot provide energy during at least one Emergency per Season. If no deployments of LMR – Type I occurs during a Season, then this provision will not apply.

4.1.2.1 Options for Hours to be Used for Accreditation of DRR, LMR, and AME Resources

MISO considered using only Resource Adequacy Hours to accredit DRR, LMR, and AME Resources. Under both options, real-time visibility is improved, and resources are accredited based on the times they are most likely to be used in a manner that naturally adjusts as the timing of risk to the system changes. Therefore, either option can satisfy the requirements of the design goals. After considering both options internally, taking into account previous stakeholder comments and feedback regarding updating availability information and concerns regarding the magnitude of the penalty when a resource is deployed twice in a single day, MISO selected Hours that are either Capacity At Risk Hours or Resource Adequacy Hours. Stakeholders were provided the opportunity to provide another round of feedback on the hours to use and this feedback will be considered before finalizing the choice of Hours to use, which will be presented at the February 2025 RASC.

One reason to use Hours that are either Capacity At Risk Hours or Resource Adequacy Hours is that Capacity At Risk Hours are known in real-time. Therefore, MISO can incentivize accurate real-time data by tying submitted Capacity Availability to the Capability calculation during these hours. If these hours are not used, MISO would need



to tie Capacity Availability to the only hours available, Resource Adequacy Hours. Because these hours are not known in real-time, this effectively means a resource must always keep its Capacity Availability information up-to-date to maximize accreditation, even when these resources have no possibility of being deployed. Stakeholders have indicated that maintaining accurate availability information in every hour of the day throughout a Season is burdensome. MISO selected Hours that are either Capacity At Risk Hours or Resource Adequacy Hours as this addresses these stakeholder concerns while satisfying the requirements that MISO have accurate real-time information to make deployment decisions at the time these resources would need to be used.

The following provides another reason why MISO has determined that Hours that are either Capacity At Risk Hours or Resource Adequacy Hours are the appropriate hours to use to accredit these resources. Consider the following two scenarios:

The first scenario, shown in Figure 9, occurs during the Summer Season and involves a resource that has already responded to a Setpoint or Scheduling Instruction issued during a Capacity At Risk Hour. A second heat-wave occurs, necessitating a Capacity Advisory declaration being made covering a period of 38 contiguous hours. Within these 38 contiguous hours, four Resource Adequacy Hours occur. There are also 61 Resource Adequacy Hours that occur during this Season outside of this event. The resource has made itself unavailable for deployment during this event.

In this scenario, when using only Resource Adequacy Hours and without an additional penalty for failing to be available to respond, the impact on final accreditation is very small. This case results in a resource having a weak signal incentivizing it to respond; receiving 93.8 MW of accreditation for this Season³² despite being unavailable while a resource that was available receives 100 MW of accreditation, a difference of only approximately 6%. Therefore, a penalty factor needs to be included so that a resource has an incentive to make itself available. The appropriate penalty factor is to take a ratio of the number of deployments a resource was available for and the number of deployments the resource was needed for. This has the impact of lowering accreditation from 93.8 MW to 46.9 MW (one deployment divided by two potential deployments), thereby significantly strengthening the signal sent to a resource to be available. Using Hours that are either Capacity At Risk Hours or Resource Adequacy Hours, there is no need for an additional penalty as the resource is given a strong signal to make itself available, receiving 61.6 MW of accreditation for being unavailable and 100 MW if available. Therefore, under this scenario, a penalty needs to be imposed when using only Resource Adequacy Hours, while a penalty does not need to be imposed if using Hours that are either Capacity At Risk Hours or Resource Adequacy Hours.

³² This value is grossed up by line losses and possibly the PRMR as appropriate.



Time	Scheduling Instruction																							
	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	0	1	2	3	4	5	6	7	8
Metered Output	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Capacity Availability	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Option 1 Capability	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Option 2 Capability	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

- The resource is unavailable during the Scheduling Instruction, which occurs during hours 15 – 18 and these are the only RA Hours that occur
- Under Option 1, the entire Capacity Advisory period receives 0 MW Capability
- Under Option 2, only the RA Hours receive 0 MW as the other hours are not included in the accreditation

Option 1: Capacity At Risk + RA Hours

$$\bullet \text{ ISAC} = \frac{61}{99} * 100 + \frac{38}{99} * 0 = \mathbf{61.6 \text{ MW}}$$

Option 2: RA Hours Only

- Without penalty

$$\text{ISAC} = \frac{61}{65} * 100 + \frac{4}{65} * 0 = \mathbf{93.8 \text{ MW}}$$
- With penalty

$$\text{ISAC} = \frac{1}{2} \left(\frac{61}{65} * 100 + \frac{4}{65} * 0 \right) = \mathbf{46.9 \text{ MW}}$$

Figure 9. Scenario 1: A comparison of the two options considered on which hours to use during a Summer type, long-duration Capacity Advisory declaration.

In the second scenario, shown in Figure 10, occurs during the Winter Season and involves an event similar to that which occurred on January 17, 2018 where Scheduling Instructions are issued twice within the same day. This event is comprised of only Resource Adequacy Hours and begins at 0600 and ends at 2300. Here the Resource has a two-hour response time and is able to fully meet its performance obligations. The resource deploys during the first set of Scheduling Instructions and makes itself unavailable for deployment during the second set of Scheduling Instructions. There are an additional 48 Resource Adequacy Hours that occur during this Season outside of this event, resulting a total of 65 Resource Adequacy Hours. No other Capacity At Risk Hours occur during this season with the exception of this scenario.

Firm Service Level = 10 MW	Resource Adequacy Hours (Capacity At Risk Hours)																
			SI Issued									SI Issued					
Time	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Metered Output	100	100	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100
Capacity Availability	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0	100	100
Option 1 Capability	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0
Option 2 Capability	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0

- The resource is available during the first Scheduling Instruction, and unavailable during the second
- Under both options, all hours after the end of the first Scheduling Instruction receive 0 Capability

Option 1: Capacity At Risk + RA Hours

$$\bullet \text{ ISAC} = \frac{53}{65} * 100 + \frac{12}{65} * 0 = \mathbf{81.5 \text{ MW}}$$

Option 2: RA Hours Only

- Without penalty

$$\text{ISAC} = \frac{53}{65} * 100 + \frac{12}{65} * 0 = \mathbf{81.5 \text{ MW}}$$
- With penalty

$$\text{ISAC} = \frac{1}{2} \left(\frac{53}{65} * 100 + \frac{12}{65} * 0 \right) = \mathbf{40.8 \text{ MW}}$$

Figure 10. Scenario 2: A comparison of the two options considered on which hours to use during a Winter type, multi-deployment within a single day event.

In Figure 10, a scenario with two deployments in a single day is presented. This is a scenario that has occurred during the Winter in the MISO footprint. In this scenario, a resource is issued Scheduling Instructions for the 0800-1000 hours, for which it is available, and for the 1700-1900 hours, for which it is unavailable. Under both options that



were considered, the resource receives 0 accreditation for hours from the end of the first Scheduling Instruction until the end of the event, resulting in 12 hours receiving 0 accreditation. This is the extent of the accreditation reduction the resource receives using Hours that are either Capacity At Risk Hours or Resource Adequacy Hours.

Using only Resource Adequacy Hours requires the addition of the penalty provision discussed in Figure 9, resulting in accreditation being lowered by $\frac{1}{2}$, 1 coming from a single successful deployment and 2 from there being two total potential deployments. This results in the resource receiving an accredited value of 81.5 MW when using Hours that are either Capacity At Risk Hours or Resource Adequacy Hours, while using only Resource Adequacy Hours, the resource would receive only 40.8 MW of accreditation. This penalty may be too severe for a resource that was available for deployment once in a day and made itself unavailable during the other Scheduling Instruction issued in that day. Using Hours that are either Capacity At Risk Hours or Resource Adequacy Hours allows for a resource to receive a strong signal to be available without overly penalizing the resource in these scenarios. Therefore, while the additional penalty can send a strong signal when using only Resource Adequacy Hours, this penalty may be too large in some instances.

4.1.2.2 The Need for a One Year Look Back

Accreditation of Capacity Resources and Intermittent Behind the Meter Generation occurs over a three-year interval. The reason for the choice of three years for these resources was because one year of performance may create undue volatility for these resources when experiencing a longer than usual outage or unfavorable weather conditions. A longer look back interval does not allow these resources to experience improvements in their accreditation as rapidly as they improve their operating procedures and make other capital improvements designed to make these resources more reliable. Therefore, MISO, in consultation with stakeholders, decided to use a three-year look back.

For Emergency and demand-side resources, these conditions do not apply. For these resources, performance is an obligation only during Emergency conditions. It is not required that these resources perform outside of Emergency conditions however, they are required to perform during Emergencies. Emergencies may occur for a variety of reasons, but overall, they are a rare phenomenon, as shown in Figure 11. MISO has deployed LMR resources twelve times since 2017, six of these deployments occurring in two multi-day events. Additionally, not all LMRs are deployed; therefore, these resources undergo long periods where they are compensated to be available without needing to be available.

The end result of this is that these resources may go years without being deployed. Therefore, when Emergencies do appear, it is imperative that these resources perform. MISO has provided these resources with flexibility in their response in exchange for accreditation. This flexibility, which was provided based on stakeholder feedback, means that resources need to be strongly incentivized to perform. These resources also have an obligation to successfully deploy when called upon. Therefore, very strong signals need to be sent to these resources to ensure performance during the infrequent times they are deployed.

Using a three-year look back results in an attenuation of the accreditation penalty imposed for not being available to deploy when needed. Rather than being a large penalty with possible third-party contract implications, the accreditation penalty for failing to be available beyond a single deployment instruction will be significantly reduced. In effect, the signal strength is reduced by a factor of three. A resource that knows its performance will be heavily impacted by being unavailable is more likely to take positive actions to be available than it would if it knew the impact of being unavailable would be spread over three years, or in put another way, would be three times less impactful.

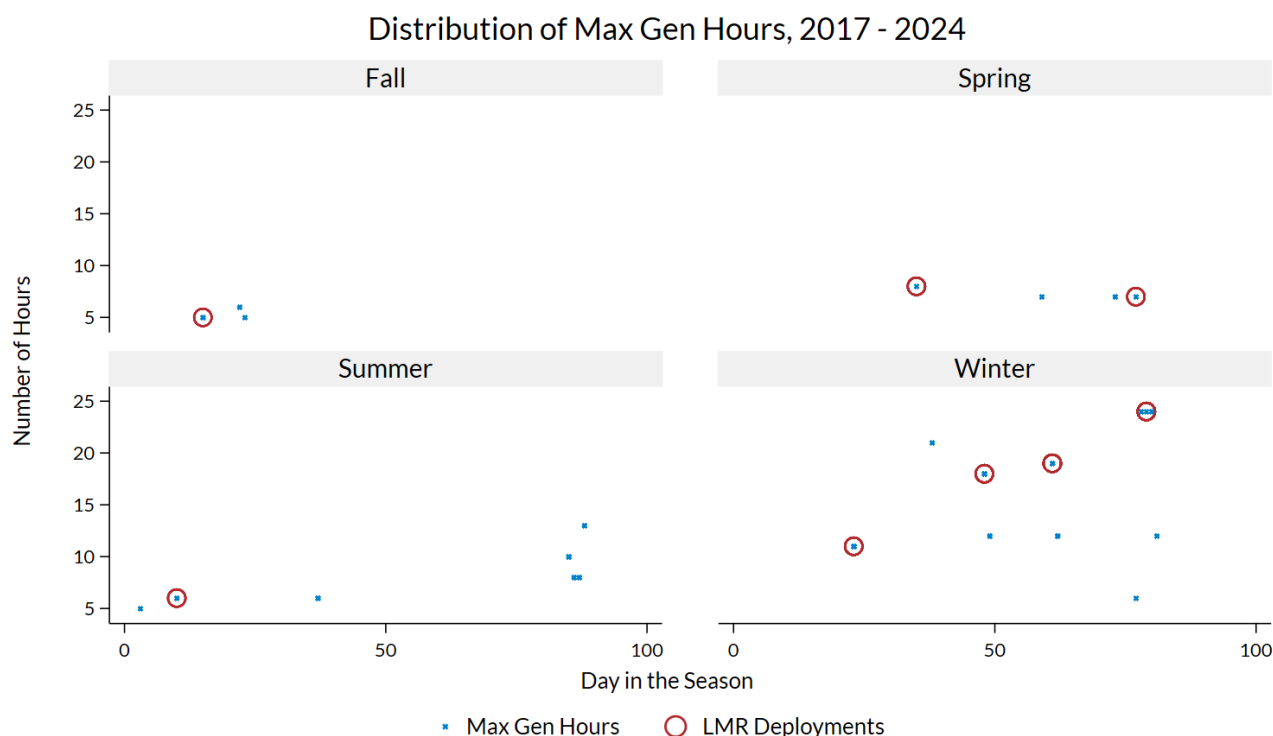


Figure 11. Count and duration of Emergency declarations since 2017. LMR deployments shown in the red circles.

Consider a reduction of 3 MWs in a resource's accreditation due to being unavailable for deployment. A one year look back will result in a reduction of the accredited value of this resource by 3 MW, while a three year look back will result in a reduction of the accredited value of this resource of only 1 MW, spread over three years. By spreading the penalty over three years, these resources are significantly less incentivized to be available for all deployments and reliability has been traded for stability of accreditation, a tradeoff that is not appropriate for resources that only expect to be utilized rarely.

5 Resource Types

This section provides an overview of the rules impacting different types of resources participating in the MISO markets. At the highest level, there are two types of demand side resources that may participate in the MISO markets, whose Module A definitions are also provided:

- **Demand Resource:** Interruptible Demand or Direct Control Demand Management and other resources that can reduce Demand during Emergencies.
 - These may be single, small and large industrials, aggregations of resources, or any other program that is, in aggregate, at least 0.1 MW in size and reduce Demand in response to a MISO instruction.
- **Behind the Meter Generation:** Generation resources used to serve wholesale or retail load located behind a CPNode that are not included in the Transmission Provider's Setpoint Instructions, and in some cases, can also be deliverable to Demand located within the Transmission Provider Region using either Network Integration, Point-To-Point Transmission Service or transmission service pursuant to a Grandfathered Agreement.
 - These may be thermal or intermittent BTMG that operate either continuously, infrequently, or only in response to MISO instructions.



Within each type of these two broad categories there are two sub-categories. For Demand Resources, these are distinguished by their choice of Measurement and Verification methodology: Calculated Baseline, Firm Service Level, and Statistical. For Behind the Meter Generation, the sub-categories are Intermittent Behind the Meter Generation and Non-Intermittent Behind the Meter Generation. As a reminder, Table 2 provides an overview of the portion of the design associated with specific resource types.

From the Resource Adequacy Business Practices Manual,

“[a] Demand Resource shall mean a resource [enrolled] with MISO defined as Interruptible Demand or Direct Demand Control Management and other resources that result in additional and verifiable reductions in end-use customer Demand during an Emergency.

Behind the Meter Generation is defined as a generation resource used to serve wholesale or retail load that is located behind a Demand Zone CPNode. BTMG is not included in MISO’s Setpoint Instructions. An LMR that exclusively relies only on a generator to accomplish the load reduction and remains synchronously connected to the grid, or injects onto the grid, must register as a BTMG. In scenarios where LMRs represent an interruptible program that disconnects the load from the grid and activates a local backup generator to provide power on an asynchronous island, independent from the grid, a DR registration may be used.”

Resource types determine the type of accreditation a resource receives and specific testing requirements.

5.1 Demand Resources

5.1.1 Demand Resources using a Calculated Baseline

Demand Resources using a Calculated Baseline Measurement and Verification methodology (Calculated DR) have a measurable amount of Demand being consumed from which the response capabilities of the resource can be directly measured. During registration for the PRA, these resources will provide MISO with their Capacity Rating. An aggregation comprised of multiple Calculated DR resources (sub-resources) has an obligation to submit meter data for each individual sub-resource comprising the aggregation. MISO will determine the Capability of the aggregation as the sum of the Capability for each sub-resource and all rules of Capability will be applied on an individual basis to determine the final Capability of the resource.

These resource types will be accredited using the most recent period spanning from September 1st through August 31st and determine their ZRCs using their average Capability across all Hours that are either Capacity At Risk Hours or Resource Adequacy Hours. This calculated average will continue to be grossed-up by the line losses and the PRMR percentage, as defined in Module E 69A.3.3.

A Calculated DR may participate as a DRR – Type I, DRR – Type II, LMR - Type I, or LMR – Type II resource. If participating as a DRR – Type I resource, the Calculated DR must be capable of providing a *specific quantity* of Energy, Contingency Reserve, Short Term Reserve and/or Capacity. If participating as a DRR – Type II resource, the Calculated DR must be capable of providing a *range* of Energy, Operating Reserve, Up Ramp Capability, Down Ramp



Capability, and/or Short-Term Reserves.³³ If participating as a LMR – Type I or LMR – Type II resource, the Calculated DR must be capable of providing a *specific quantity* of Capacity. In other words, as a DRR – Type I or LMR resource, a Calculated DR must be able to provide the amount of Energy the resource makes available to MISO. As a DRR – Type II, the Calculated DR must be able to provide a range of response up to the submitted Emergency Maximum Limit.

5.1.1.1 Capability for a Calculated Demand Resource

Capability for a Calculated Demand Resource is determined by the following procedure:

1. During a Resource Adequacy Hour that is not a Capacity At Risk Hour, if consuming Demand at or above the registered Capacity Rating, the Capability is the registered Capacity Rating.
2. During a Capacity At Risk Hour, the submitted Offer or Capacity Availability will be used to determine accreditation. This value will never be permitted to exceed either: (i) the registered Capacity Rating; or (ii) the Demand being Metered.
3. If consuming Demand below the registered Capacity Rating, the Capability will be 0.
4. When a resource has successfully deployed to its stated Offer or Capacity Availability, the Capability for each Hour during the deployed period, for each Hour while the resource responded, and for the Hour after the Offer or Scheduling Instruction is lifted will be given the Capacity Availability submitted at the time the Scheduling Instruction was issued at.
 - a. This means that if a resource has a three-hour response time, the three hours it is deploying, the hours it is deployed in, and the hour after it is deployed will all receive the Capacity Availability submitted at the time the Scheduling Instruction was issued.

In Figure 12, Hours 12 and 15 are Resource Adequacy Hours that do not occur during a Capacity At Risk Hour. These Hours receive a Capability value based on the Demand that is Metered. For Hour 12, the resource was consuming 9.8 MW of Demand and so receives a Capability equal to its registered Capacity Rating, which is 3 MW. For Hour 15, the resource is consuming 1.2 MW of Demand, which is less than the 3 MW it is registered to provide. Therefore, it receives 0 MW of Capability for this Hour.

					T2					T2	Capacity At Risk Hours				
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Registered Demand Reduction Capability	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Metered Output	6.0	6.6	9.7	6.2	9.8	5.8	2.2	1.2	2.1	1.6	10.3	10.3	9.5	6.4	2.4
Demand > Input							NO	NO	NO	NO					NO
Capacity Availability	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Capability	-	-	-	-	3.0	-	-	0.0	-	-	3.0	3.0	3.0	3.0	0.0

Figure 12. Example of Capability for a Demand Resource registered to provide 3 MW of Capacity Rating that is not issued a Setpoint Instruction or Scheduling Instruction. Only Resource Adequacy Hours (T2) and Capacity At Risk Hours are accredited.

³³ As Attachment D of BPM 002 Real-Time Energy and Operating Reserve Market Software Formulations and Business Logic states in Section 5.2.1.7 Maximum Limit Constraints demonstrates, a range must be a continuous range. A Calculated Demand Resource comprised of multiple, discrete, resources that could only qualify as a DRR – Type I if they were large enough to qualify as a DRR individually is not capable of providing the discrete Energy output required of a DRR – Type II resource.



Hours 8 through 11, 13, 14, 16, and 17 are neither Capacity At Risk Hours nor are they Resource Adequacy Hours, and so are not considered in the determination of Capacity Availability. Hours 18 through 22 are Capacity At Risk Hours and so do receive a Capability value. For these Hours, the Capacity Availability that is submitted is the amount of Capability that these resources are assigned, provided that the Demand is at least as great as the submitted Capacity Availability. In Hour 22, the Demand is below the registered Capacity Rating, therefore this Hour receives 0 Capability.

5. A Calculated DR may Self Schedule and receive Capability while Self Scheduled, provided each of the following conditions are met:
 - a. The Self Schedule occurred during a Capacity At Risk Hour and;
 - b. The Self Schedule can be verified using the Calculated Measurement and Verification methodology and;
 - c. The Self Schedule was not preceded by an artificial increase in Demand and;
 - i. MISO will use the submitted metered output of the resource to determine if an artificial increase is suspected, and if so, initiate an investigation. If it is determined that the resource artificially increased its load prior to the Self Schedule, the Self Schedule will not contribute to the Capability calculation for the entirety of the Self Scheduled period
 - d. The Self Schedule is maintained for at least four hours.
 - i. The Self Schedule must be maintained for four hours because this is the expected minimum runtime for these resources. By ensuring the Self Schedule lasts at least four hours, the resource is contributing to reliability in a manner consistent with had it been deployed.

A Calculated DR that has Self Scheduled must make itself unavailable to MISO. An aggregation comprised of Calculated DR must indicate each sub-resource that Self Schedules and this Self Schedule must be verifiable using the Calculated Baseline methodology.

5.1.2 Demand Resources using a Firm Service Level

Demand Resources using a Firm Service Level Measurement and Verification methodology (FSL DR) have a measurable amount of Demand being consumed from which the response capabilities of the resource can be directly measured. These resources have an obligation to reduce Demand to or below the Firm Service Level regardless of how much Demand is being consumed.

These types of resources will be accredited using the most recent period spanning from September 1st through August 31st and determine their ZRCs using their average Capability across all Hours that are either Capacity At Risk Hours and Resource Adequacy Hours in a Season. This calculated average will continue to be grossed-up by line losses and the PRMR percentage.

A Demand Resource using a Firm Service Level Measurement and Verification methodology may participate as a LMR – Type I or LMR – Type II resource only. A resource selecting this Measurement and Verification methodology is not eligible to participate as a DRR or EDR. If participating as a LMR – Type I or LMR – Type II resource, the FSL DR must be capable of providing a *specific quantity* of Capacity.

A Direct Demand Resource using a Firm Service Level Measurement and Verification methodology will be required to submit a Firm Service Level at initial enrollment. The resource's performance will always be judged relative to achieving this Firm Service Level. By selecting Firm Service Level Measurement and Verification methodology, the Market Participant is informing MISO that the resource should never be assumed to be capable of dropping its



Demand below the Firm Service Level and that it is always being capable of decreasing its Demand to the Firm Service Level when called upon by MISO regardless of how much Demand it is consuming.

5.1.2.1 Capability for a Demand Resource using a Firm Service Level

Capability for a Demand Resource using a Firm Service Level is defined as follows:

1. For a Demand Resource using a Firm Service Level that is operating above its Firm Service Level and has not received a Scheduling Instruction, Capability shall be the amount of Demand being consumed less the Firm Service Level.

Firm Service Level = 10 MW					T2			T2			Capacity At Risk Hours				
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Metered Output	57.8	58.9	57.9	56.9	59.4	50.9	54.9	59.0	60.6	55.1	51.4	57.1	51.8	53.3	53.5
Capacity Availability	40	40	40	40	50	40	40	50	40	40	40	45	40	45	45
Capability	-	-	-	-	49.4	-	-	49.0	-	-	41.4	47.1	41.8	43.3	43.5

Figure 13. Example of Capability calculation for a Demand Resource with 10 MW of Firm Service Level that is not deployed. Only Resource Adequacy Hours (T2) and Capacity At Risk Hours are accredited.

In Figure 13, during Hours 12 and 15, a Resource Adequacy Hour occurred; therefore, this hour contributes a Capability value to the determination of accreditation. Capacity Availability is not considered for this Hour because it is not a Capacity At Risk Hour. The metered Demand of this resource was 59.4 MW, it has a Firm Service Level of 10 MW; therefore, the Capability for Hour 12 is the metered output, 59.4, less the Firm Service Level, 10, for a Capability of 49.4 MW while the Capability for Hour 15 is 49.0 MW. Hours 8 through 11, 13, 14, 16, and 17 are neither Resource Adequacy Hours nor are they Capacity At Risk Hours; therefore, they do not receive a Capability value and do not contribute to the final accreditation of the resource. During the Capacity At Risk Hours, Capability is calculated in the same way as was done for Hours 12 and 15; however, Capacity Availability may result in a change in accreditation for this resource. The impact of Capacity Availability on accreditation is detailed in Section 5.6.

2. An FSL DR may Self Schedule and receive Capability while Self Scheduled, provided each of the following conditions are met:
 - a. The Self Schedule occurred during a Capacity At Risk Hour and;
 - b. The Self Schedule can be verified using the Firm Service Level M&V methodology and;
 - c. The Self Schedule was not preceded by an artificial increase in Demand and;
 - i. MISO will use the submitted metered output of the resource to determine if an artificial increase is suspected, and if so, initiate an investigation. If it is determined that the resource artificially increased its load prior to the Self Schedule, the Self Schedule will not contribute to the Capability calculation for the entirety of the Self Scheduled period
 - d. The Self Schedule is maintained for at least four hours.
 - i. The Self Schedule must be maintained for four hours because this is the expected minimum runtime for these resources. By ensuring the Self Schedule lasts at least four hours, the resource is contributing to reliability in a manner consistent with had it been deployed.

Accuracy of Capacity Availability may impact this calculation, if the Capacity Availability is non-zero. If the Capacity Availability is zero, then this rule will not apply and rule 3 will apply.



Firm Service Level = 10 MW												Self Schedule Begins				
												Capacity At Risk Hours				
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Metered Output	57.8	58.9	57.9	56.9	59.4	50.9	54.9	59.0	60.6	55.1	51.4	27.1	26.4	21.3	27.0	
Self Scheduled	-	-	-	-	-	-	-	-	-	-	-	20.0	20.0	20.0	20.0	
Capacity Availability	40	40	40	40	50	40	40	50	40	40	40	15	15	10	15	
Capability	-	-	-	-	49.4	-	-	49.0	-	-	41.4	37.1	31.4	26.3	37.0	

Figure 14. A resource that has Self Scheduled 20 MW during a Capacity At Risk Hour, maintains the Self Schedule for at least four hours, and maintains availability of the remainder of the MWs.

In , the resource has Self Scheduled 20 MW beginning at Hour 19. In , the resource has Self Scheduled 20 MW beginning at Hour 19. This is within the Capacity At Risk Hours period, Demand did not increase prior to the Self Schedule in an unusual way, the Self Schedule can be measured using the LMR M&V methodology, and the resource maintains its Self Scheduled amount of at least 20 MW for at least four (4) consecutive hours; therefore, this is a valid Self Schedule. Furthermore, the resource maintains its remaining Demand as available to receive a Scheduling Instruction, therefore the additional megawatts are included in the Capability calculation. Specifically, at Hour 16, it indicated that it would Self Schedule 20 MW beginning in Hour 19 and make available 15 MW. Its Demand was 27.1 MW, the Capacity Availability offer is accurate; therefore, the resource receives accreditation equal to the Self Scheduled amount, 20, plus the Capacity Availability amount, 17.1 (because 15 is within the Capacity Availability Tolerance Band of 17.1), resulting in a total Capability for Hour 19 of 37.1 MW.

By allowing a resource to Self Schedule while receiving Capability credit, MISO is incentivizing resources to reduce their consumption in times of high need.

3. A FSL DR that is Self Scheduled and does not make itself available to reduce additional Demand to or below the Firm Service Level in response to Scheduling Instructions, will receive a Capability value equal to the amount Self Scheduled, provided each of the following conditions are met:
 - a. The Self Schedule occurred during a Capacity At Risk Hour and;
 - b. The Self Schedule can be verified using the appropriate M&V methodology and;
 - c. The Self Schedule was not preceded by an artificial increase in Demand and;
 - d. The Self Schedule is maintained for at least four (4) hours.

Firm Service Level = 10 MW												Self Schedule Begins				
												Capacity At Risk Hours				
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Metered Output	57.8	58.9	57.9	56.9	59.4	50.9	54.9	59.0	60.6	55.1	51.4	27.1	26.4	21.3	27.0	
Self Scheduled	-	-	-	-	-	-	-	-	-	-	-	20.0	20.0	20.0	20.0	
Capacity Availability	40	40	40	40	50	40	40	50	40	40	40	-	-	-	-	
Capability	-	-	-	-	49.4	-	-	49.0	-	-	41.4	20.0	20.0	20.0	20.0	

Figure 15. A resource that has Self Scheduled 20 MW during a Capacity At Risk Hour, maintains the Self Schedule for at least four hours and does not make any other MWs available to MISO for deployment.

In Figure 15, the resource has Self Scheduled 20 MW beginning at Hour 19. This is within the Capacity At Risk Hours period, Demand did not increase prior to the Self Schedule in an unusual way, the Self Schedule can be measured using the LMR M&V methodology, and the resource maintains its Self Scheduled amount of at least 20 MW for at least 4 consecutive hours; therefore, this is a valid Self Schedule. The resource does not make any other MWs available for deployment by MISO, and so only the Self Scheduled amount will be included in the Capability calculation.



4. An FSL DR that is operating at or below its Firm Service Level will receive a Capability value equal to the Seasonal Capability for that Hour. If a resource has fully responded within its registered response time, the Seasonal Capability will replace all hours during which the resource was responding, all hours during which it was operating at or below its Firm Service level, and an additional hour after the resource is released. A resource that deploys for four hours and ceases to perform without being released by MISO will not receive the Seasonal Capability value for the Hour after deployment but has met its performance obligations and will receive Seasonal Capability for the hours while it was responding and the hours during which it met its Scheduling Instruction obligations. A resource that experiences a partial or complete failure to perform will only receive Seasonal Capability during the Hours it is operating at or below its Firm Service Level.

Firm Service Level = 10 MW; 3 hour response time					Capacity At Risk Hours											
					SI issued for 1600 to 1800											
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Metered Output	57.8	58.9	57.9	56.9	59.4	50.9	42.9	28.7	10.0	10.0	10.0	57.1	51.8	53.3	53.5	
Capacity Availability	40	40	40	40	50	40	40	40	40	40	40	45	40	45	45	
Seasonal Capability	73.2	73.9	73.9	72.6	74.8	66.3	69.9	74.2	75.7	70.3	66.5	72.3	67.7	69.1	69.4	
Final Capability	-	-	-	-	49.4	66.3	69.9	74.2	75.7	70.3	66.5	72.3	41.8	43.3	43.5	

Figure 16. Example of a resource that has successfully deployed and receives Seasonal Capability during the hours it deployed, hours it was responding during, and the hour after the Scheduling Instruction ends.

5.1.2.2 Seasonal Capability

Seasonal Capability: The Seasonal Capability of an FSL DR will be calculated for each hour of the day with weekends and weekdays receiving separate values by averaging the top 15 hours for each hour of the day in a Season during weekdays, and six hours for each hour of the day in a Season during weekends.

Seasonal Capability is used to address the following problems:

1. A resource that deploys should not be penalized in its accreditation for responding to a MISO instruction.
2. Because Capability is measured from the Demand being consumed, a perverse incentive exists whereby a resource has the incentive to increase its Demand during the hours of smallest operating margin.
 - a. Specifically, if a resource receives notification that high-risk hours are expected and its Load is currently low, the incentive should be for this resource to remain low, not come online and potentially add 100s of MWs of additional Demand onto a system that is already experiencing low operating margins.
 - b. The incentive to come online exists whether the Market Participant is actively trying to increase their accreditation or is simply following their normal operating practices. Seasonal Capability provides an incentive for the resource to alter its normal operating practices and remain curtailed without MISO instruction, providing a valuable reliability contribution.

To address these issues, the Seasonal Capability is calculated. Conceptually, this can be thought of as replacing an hour of the day where a resource is operating at or below its Firm Service Level with the hour with the greatest Demand during the Season. To prevent a scenario like other gaming that MISO has experienced, enough hours need to be selected to make it too expensive to artificially increase Demand, but not so many hours as to remove the incentive to curtail Demand. Therefore, MISO selected the top 25% of Hours within a Season to use, which rounds to approximately 15 hours.

Every resource is required to submit hourly meter data for all hours in a Season. Each hour of the day will have a Seasonal Capability calculated for it. Figure 17 provides the Demand profile corresponding to Demand occurring during HE 18 (5pm to 6pm) within the Summer Season. From these 66 points (66 weekdays occurred in the Summer



of 2023), the top 15 are selected. The average of these values, less the Firm Service Level, is the Seasonal Capability for HE 18 in the Summer. Each hour of the day will have a separate profile calculated for it, and separate profiles will be calculated for weekdays and weekends and for each Season.

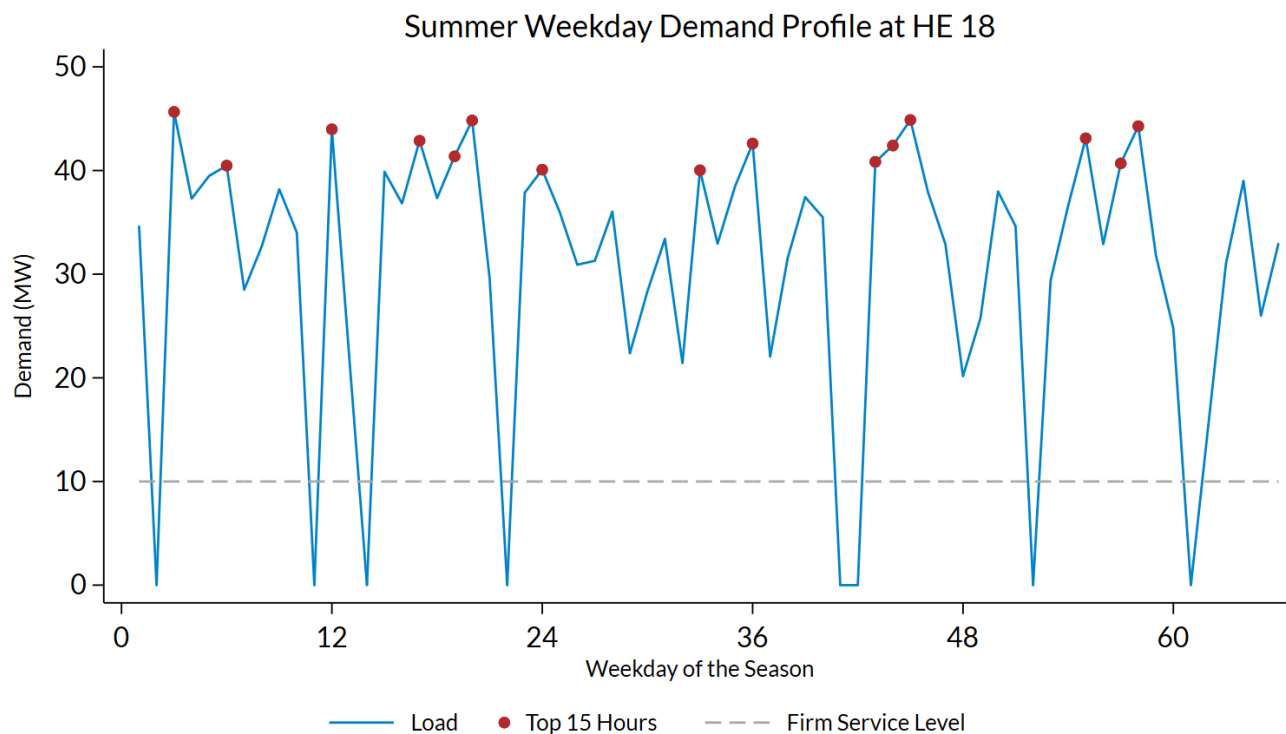


Figure 17. Example Demand profile of a resource. There were 66 weekdays during this Season, each value of the x-axis corresponds to HE 18 (5pm to 6pm) on that day of the Season. The points indicated in red are the 15 days with the highest Demand. The average of these red points, less the Firm Service Level, is the Seasonal Capability of the resource.

5.1.3 Demand Resource using a Statistical Methodology

Measuring the Demand consumed by a Demand Resource using a Statistical Measurement and Verification methodology as defined in Attachment TT (Statistical DR) in each interval is not a good measure of the performance capabilities of these resources nor is it a feasible methodology; therefore, another method for accreditation is necessary. To be clear, an aggregation does not automatically qualify as a Statistical Demand Resource; a resource must be using an Attachment TT defined statistical Measurement and Verification methodology to be considered a Statistical Demand Resource.

A Statistical Demand Resource may participate as a DRR – Type I, DRR – Type II, LMR – Type I, or LMR – Type II resource. If participating as a DRR – Type I resource, the Statistical Measurement and Verification Demand Resource must be capable of providing a *specific quantity* of Energy, Contingency Reserve, Short Term Reserve and/or Capacity. If participating as a DRR – Type II resource, the Statistical Measurement and Verification Demand Resource must be capable of providing a *range* of Energy, Operating Reserve, Up Ramp Capability, Down Ramp Capability, and/or Short-Term Reserves. If participating as a LMR – Type I or LMR – Type II resource, the Statistical Demand Resource must be capable of providing a *specific quantity* of Capacity. In other words, as a DRR – Type I or LMR resource, a Statistical Demand Resource must be able to provide the amount of Energy the resource makes



available to MISO. As a DRR – Type II, the Statistical Measurement and Verification Demand Resource must be able to provide a range of response up to the submitted Emergency Maximum Limit. There are also limitations on the extent of an aggregation for a DRR - Type II resource. Few, if any, Statistical Demand Resources will be qualified to participate as a DRR - Type II.

These types of resources will be accredited using the most recent period spanning from September 1st through August 31st and averaging the Capability for all Hours that are either Capacity At Risk Hours and Resource Adequacy Hours in a Season. This calculated average will continue to be grossed-up by line losses and the PRMR percentage as is done currently. If an LSE opts out of the RBDC, the RBDC Opt Out Adder will not be applied to Demand Resources.

Each Statistical Demand Resource will be required to submit an expected Demand profile at initial enrollment. This profile may vary by Season and reflects the expected capability of the resource based on some measurable characteristic, such as temperature or time of day. Market Participants submitting an expected Demand profile will be required to submit an analysis of the expected capabilities of the resource, the methodologies used to determine the expected capabilities, a detailed description of how the program works, how the Market Participant has handled expected underperformance of some sub-resources within the aggregation, and expected withdrawals among other information.

A Statistical Demand Resource methodology based on temperature or other geographic information will be required to submit to MISO a reference location from which to base the response of the resource and determine the Capability calculation. Each resource will be allowed to submit only one reference location, regardless of the geographic extent of the underlying resource. This location will be used to provide the underlying reference data to MISO to calculate the expected Demand reduction capabilities of the resource for the purposes of calculating Capability. To verify a resource's performance, MISO will use this location and the appropriate M&V methodology. For the purposes of Capacity Availability, a resource should submit the appropriate value from the Demand curve based on the underlying performance variable.

5.1.3.1 Capability of a Demand Resource using a Statistical Methodology

Capability for a Statistical Measurement and Verification Demand Resource will be calculated based on the relationship between the measurable quantity submitted by the Market Participant and its associated value during Hours that are either Capacity At Risk Hours or Resource Adequacy Hours.

1. For a Statistical Demand Resource, Capability will be calculated based on the submitted Demand curve and associated values.
2. For a Statistical Demand Resource that is participating as a Demand Response Resource Type – II, the Capability shall always be equal to the Emergency Maximum Limit.
 - a. Few, if any, Statistical Demand Resources qualify to participate as a DRR – Type II resource because these resources are functionally Generators in their energy production capabilities and are held to the same Applicable Reliability Standards as Generators.

For example, consider a resource that has a temperature dependency. An example Demand curve and relationship for such a resource is provided in Figure 18. From this figure, at 93° F the resource can provide a response of 2.9 MWs. When an Hour that is either a Capacity At Risk Hour or Resource Adequacy Hour occurs, the Capability will be calculated using the Demand curve relationship and temperature from the required location, an example of which is shown in Figure 19. The equation governing the relationship of this example resource is:



$$Capability = 10 * \left(\frac{temp - 60}{110 - 60} \right)^3$$

From this equation, the Market Participant should input the expected temperature and submit the result as this resource's Offer or Capacity Availability. MISO will use the results of this equation to verify the actual performance of the resource matches the submitted Offer or Capacity Availability information. Actual performance is always based on the appropriate Attachment TT M&V baseline. If a resource's performance exceeds what its Capacity Availability was, this will be considered accurate performance and will not be penalized. If the resources performance experiences a shortfall of the submitted Capacity Availability, as determined by the appropriate Attachment TT methodology, the resources will be subject to the Partial Failure or Complete Failure provisions described in Section 7. The Capability is always based on the submitted Demand curve when the meets its performance expectation, even if the performance exceeds the Demand curve.

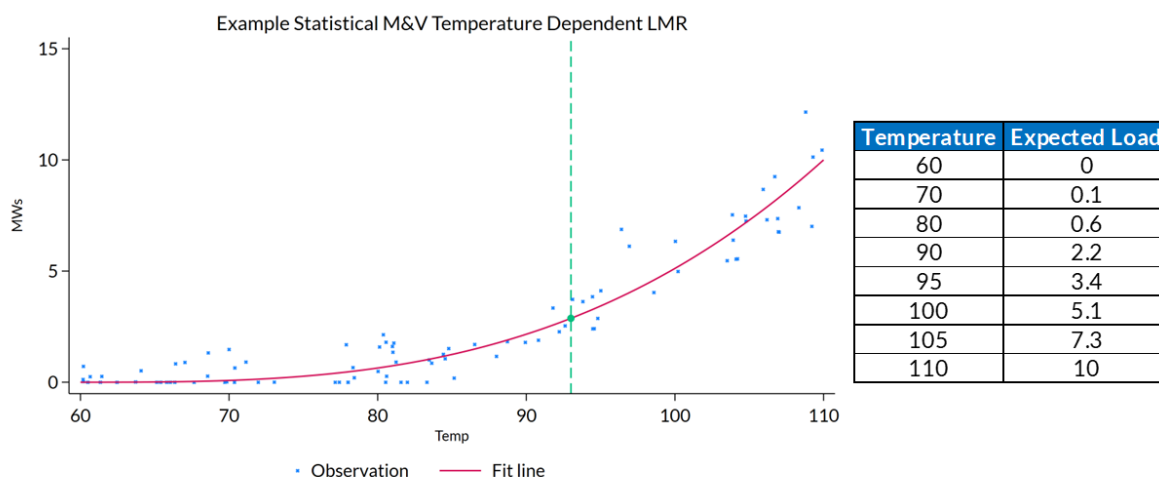


Figure 18. Example Demand curve submitted by a Statistical Measurement and Verification Demand Resource that has temperature dependency.

					T2						Capacity At Risk Hours				
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Temperature	-	-	-	-	84	-	-	95	-	-	98	94	89	85	83
Expected Load	-	-	-	-	1.1	-	-	3.4	-	-	4.4	3.1	2.0	1.3	1.0
Capability	-	-	-	-	1.1	-	-	3.4	-	-	4.4	3.1	2.0	1.3	1.0

Figure 19. Capability calculation of a Statistical M&V Demand Resource. Only Resource Adequacy Hours (T2) and Capacity At Risk Hours are accredited.

5.1.4 Capability for New Demand Resources

Market Participants registering a new Demand Resource using either the Calculated or Firm Service Level Measurement and Verification methodologies may choose one of the following options when determining initial accreditation:

1. A new resource may provide the full meter data for the Season(s) that it is registering for the PRA. When this information is provided to MISO, Capability will be calculated as a normal Demand Resource of the appropriate type.
2. A new resource may elect not to provide this meter data. In this case, the resource will be accredited using the appropriate methodology defined below:
 - a. For a Calculated Demand Resource, the submitted Capacity Rating will be used



- b. For a Firm Service Level Demand Resource, the registered Load Factor will be multiplied by the Capacity Rating.

Load Factor: The amount of daily Demand that is Metered divided by the product of twenty-four (24) and the Capacity Rating of a Demand Resource, averaged over a Season.

Capacity Rating: The maximum amount of Demand response a Demand Resource can provide.

The accreditation of a new resource enrolling as a Demand Resource using a Statistical Measurement and Verification methodology as defined in Attachment TT will be done in a manner identical to existing Statistical Demand Resources.

5.1.5 Deficient Hours

Seasonal Emergency Hour Deficiency: In a Season in which there are less than sixty-five (65) Hours in total, comprised of any combination of Capacity At Risk Hours or Seasonal RA Hours, a Seasonal Emergency Hour Deficiency exists.

The following rules are applied when a Seasonal Emergency Hour Deficiency exists for the number of Hours in which a Seasonal Emergency Hour Deficiency exists:

1. A Calculated Demand Resource will receive Capability equal to the Capacity Rating.
2. An FSL Demand Resource will receive Capability equal to the Load Factor * Capacity Rating.
3. A Statistical Demand Resource will receive Capability equal to the average Capability calculated using the appropriate previous Planning Year's Season.

For example, if the Spring of the 2030-2031 Planning Year has 40 total Resource Adequacy or Capacity At Risk Hours a Seasonal Emergency Hour Deficiency exists. Each Demand Resource will receive $65 - 40 = 25$ hours of Capability calculated using the above rules.

1. A Calculated DR with a Capacity Rating of 3 MW, the resource would use $3 \text{ MW} * 25 \text{ Hours}$ in the ISAC calculation.
2. An FSL DR with a Load factor of 50% and a Capacity Rating of 100 MW will receive $50 \text{ MW} * 25 \text{ Hours}$ in the ISAC calculation.
3. A Statistical DR with a Capability in the Spring of the 2029-2030 Planning Year equal to 4.5 MW will receive $4.5 \text{ MW} * 25 \text{ Hours}$ in the ISAC calculation.

5.1.6 Accreditation of a Demand Resource

The Intermediate Seasonal Accreditation Capacity (ISAC) of a Demand Resource is calculated using the following equation:

$$ISAC_t = \frac{\sum_h Capability_{t,h} + \max(0, 65 - H) * \sum_{h, PY-1} Capability_{t,h}}{\max(65, H)},$$

where t is the Demand Resource type, H is the number of Capacity At Risk Hours plus the number of Seasonal RA Hours not included in Capacity At Risk Hours within a Season, and h is an indicator of when an Hour that is either a Capacity At Risk Hours or Seasonal RA Hours occur.



To calculate the final Seasonal Accredited Capacity, the ISAC value is multiplied by 1 + line losses and 1 + the final PRMR, shown in the following equation:

$$SAC = ISAC(1 + Line Losses)(1 + Final PRMR).$$

5.1.7 Testing of a Demand Resource

A Demand Resource will be subject to MISO-initiated testing as described in Section 6 under the following schedule:

1. A Calculated Demand Resource will be tested based on the participation option selected.
2. A FSL Demand Resource will be tested based on the participation option selected.
3. A Statistical Demand Resource will be tested each Planning Year, regardless of its selected participation option.

Additionally, all newly registered Demand Resources are subject to a MISO-initiated test.

These tests ensure that all Demand Resources participating in the PRA are capable of providing the Demand Reduction they are being compensated to provide. Section 6 provides more information on the need for tests and testing procedures.

5.2 Non-Intermittent Behind the Meter Generation

Non-Intermittent Behind the Meter Generation consists of all Behind the Meter Generation that is not an Intermittent Behind the Meter Generation resource. For the remainder of this section, these resources will be referred to as BTMG in line with Module A of the MISO Tariff.

A BTMG may participate as a DRR – Type I, DRR – Type II, LMR – Type I, Type I, or LMR – Type II resource. If participating as a DRR – Type I resource, the BTMG must be capable of providing a *specific quantity* of Energy, Contingency Reserve, Short Term Reserve and/or Capacity. If participating as a DRR – Type II resource, the BTMG must be capable of providing a *range* of Energy, Operating Reserve, Up Ramp Capability, Down Ramp Capability, and/or Short-Term Reserves. If participating as a LMR – Type I or LMR – Type II resource, the BTMG must be capable of providing a *specific quantity* of Capacity. In other words, as a DRR – Type I or LMR resource, a BTMG must be able to provide the amount of Energy the resource makes available to MISO. As a DRR – Type II, the BTMG must be able to provide a range of response up to the submitted Emergency Maximum Limit. When participating as a DRR – Type II resource, a BTMG is functionally an in front of the meter generation resource; however, it does not receive outage exemptions as defined in the Outage Operations Business Practices Manual (BPM 008).

5.2.1 Capability

The Intermediate Seasonal Accredited Capacity (ISAC) for a BTMG will be calculated for each Season by averaging its Capability during all Hours that are either Capacity At Risk Hours or Resource Adequacy Hours over the most recent period covering Sept 1 through August 31.

Capability for a BTMG is determined using the following procedure:

1. When not operating, the Capability for an Hour is equal to the real time availability information that is submitted to MISO
 - a. This is the Offer submitted if operating as a DRR – Type I



- b. This is the Emergency Maximum Offer if operating as a DRR – Type II
 - c. This is the Capacity Availability if operating as an LMR
2. When operating, the Capability for an Hour is equal to the amount of Energy metered from the BTMG plus any additional Energy the BTMG makes available.
 - a. A BTMG that is operating may change its offers as allowed by its participation option without regard to its response time. This allows a BTMG to change its availability in real-time when it is capable of altering its Energy output faster than its Cold Start Up Time would allow for.
3. When the BTMG is unavailable due to outage or for any other reason excluding Force Majeure, the Capability for the Hour will be zero.

					T2				T2		Capacity At Risk Hours				
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Metered Output	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	9.4	9.3	9.8
Capacity Availability	10	10	10	10	10	10	10	10	10	10	10	0.9	0.6	0.7	0.2
Capability	-	-	-	-	10.0	-	-	10.0	-	-	10.0	10.0	10.0	10.0	10.0

Figure 20. Example of Capability calculation for a non-DRR - Type II BTMG. Only Resource Adequacy Hours (T2) and Capacity At Risk Hours are accredited.

5.2.2 No Outage Exemption

BTMG are not permitted an outage exemption and unavailability for reasons of maintenance are no longer permitted. To understand why, it is important to recall Figure 11 which shows how rare emergencies and LMR deployments are. Allowing a BTMG to have the ability to avoid performing due to maintenance would reduce the value of the resource by a significant amount. Therefore, MISO will disqualify a BTMG resource that fails to perform due to being on outage for the remainder of the Planning Year BTMG.

MISO also recognizes the argument stakeholders have presented regarding stability of accreditation. MISO recognizes the importance of stability. When determining the accreditation of a resource, all Hours that are either Capacity At Risk Hours or Resource Adequacy Hours will be used. There are Seasons that occur without a single Capacity At Risk Hour occurring. Every Season has a set of Resource Adequacy Hours whose distribution from Sept 1, 2019 through Sept 1, 2024 is shown in Figure 21.

A resource will be accredited during all Resource Adequacy Hours, even if it is disqualified. This ensures that the resource's accreditation for the next Planning Year is an accurate reflection of its performance without unduly penalizing it. The only impact of a disqualification on a resource's accreditation for the next Planning Year will be in receiving 0 Capability for the Hours of the event it was disqualified during.

The distribution of Resource Adequacy Hours in a Season, combined with the infrequent nature of LMR deployments, justifies a one-year lookback that does not allow for outage exemptions. A three-year lookback, or the allowance of outage exemptions, would significantly distort the signals sent to these resources to perform.

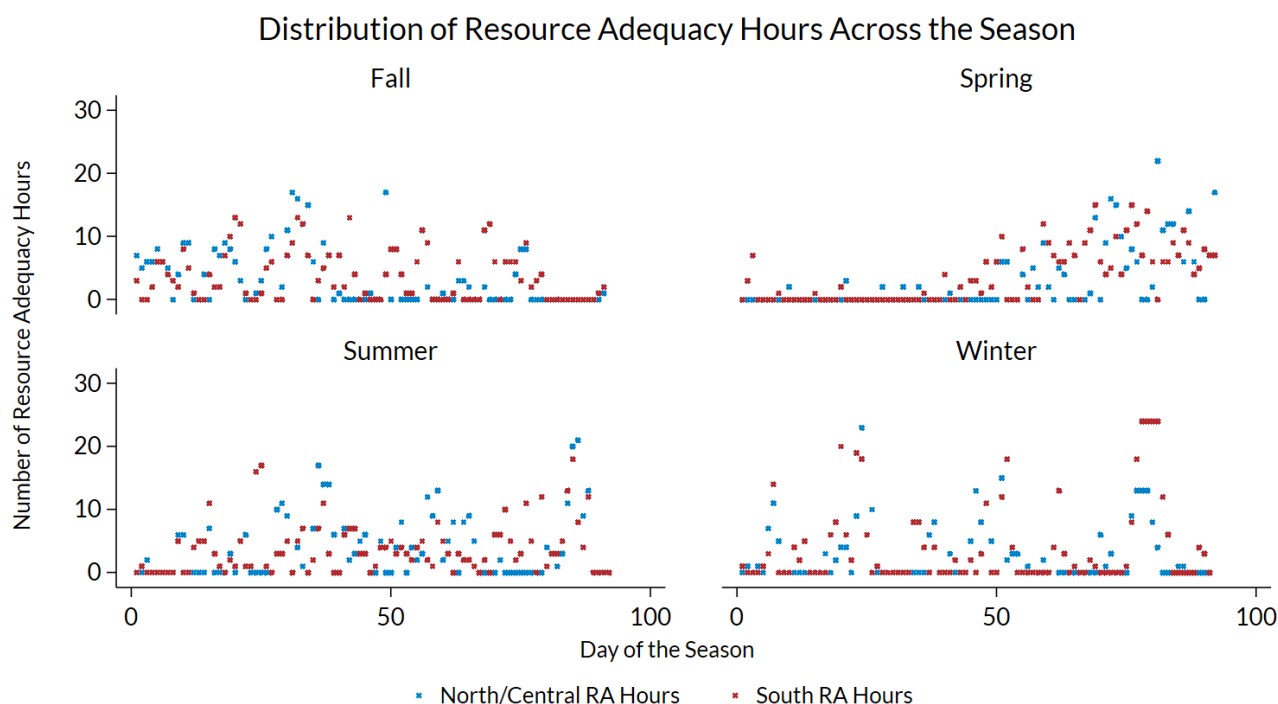


Figure 21. Distribution of Resource Adequacy Hours in a Season from 2019 through 2024.

5.2.3 Capability for Deficient Hours

Each BTMG, whether participating as a DRR or an LMR, will be assigned to a Resource Class.³⁴ For a Season that has a deficient number of Hours in a Season; i.e., when a Seasonal Emergency Hour Deficiency exists, the resource shall have the Resource Class-level UCAP as a percentage of the corresponding Resource Class-level ICAP multiplied by its BTMG ICAP multiplied by the total number of deficient Hours included in its ISAC calculation. As with newly registered resources, this is the same procedure used for Generation Resources.

In no case shall the BTMG be included in the Resource Class-level calculations; rather, BTMG takes these values as given based on the appropriate Resource Class. This is to prevent a BTMG from artificially reducing the Resource Class level values as these resources will not receive outage exemptions.

5.2.4 Accreditation for Non-Intermittent Behind the Meter Generation

The Intermediate Seasonal Accreditation Capacity of a BTMG is calculated using the following equation:

$$ISAC = \frac{\sum_h Capability_h + \max(0, 65 - H) * \frac{Resource\ Class\ Level\ UCAP}{Resource\ Class\ Level\ ICAP} * Resource\ ICAP}{\max(65, H)},$$

where H is the number of Hours that are Capacity At Risk Hours plus the number Hours that are Resource Adequacy Hours that are not included in Capacity At Risk Hours within a Season, and h is an indicator for when Capacity At Risk Hours or Seasonal RA Hours occur.

³⁴ Resource Classes are defined in Schedule 53A of the MISO Tariff and the procedure for disputing a Resource Class are described in that Schedule.



To calculate the final Seasonal Accredited Capacity, the ISAC value is multiplied by the Resource Class – Level UCAP and divided by the Resource Class – Level ISAC value, shown in the following equation:

$$SAC = \text{Resource Class-Level UCAP} * \frac{\text{Resource ISAC}}{\text{Resource Class-Level ISAC}} * (1 + \text{Line Losses}).$$

The SAC of a Behind the Meter Generation will be grossed-up by the amount of avoided transmission losses in accordance with Module E-1 Section 68A.8.b.

For a BTMG that is enrolling for the first time, a resource shall receive a SAC based on its respective seasonal Resource Class-level UCAP as a percentage of the corresponding Resource Class-level ICAP multiplied by its BTMG ICAP. This is the same procedure used to accredit new Generation Resources.

5.2.5 Testing of Non-Intermittent Behind the Meter Generation

BTMG are excluded from the MISO-initiated test requirement that Demand Resources experience as these resources must perform an annual GVTC test.

5.3 Intermittent Behind the Meter Generation

Intermittent Behind the Meter Generation (Intermittent BTMG): An intermittent resource registered as a Behind the Meter Generator.

Currently, Intermittent BTMG participate as Load Modifying Resource's. This creates confusion about what the participation options, obligations, and accreditation are for these resources. To bring clarity to these resources, MISO is creating the Intermittent Behind the Meter Generation participation option. These resources are both a resource and a participation type.

These resources operate continuously, as they are able, behind the meter. They do not have an obligation to respond during Emergencies currently or under the proposed design. Accreditation of these resources is currently consistent with that of other Intermittent Resources and will continue in this manner. These resources will be accredited using a slightly modified version of the Tier 1 ISAC and Tier 2 ISAC framework of Schedule 53A Resources. Specifically, these resources will be accredited during all hours of the year, with hours split into Tier 1 ISAC and Tier 2 ISAC, each weighted in the same way as Schedule 53A Resources are weighted using a lookback period spanning the most recent 3 periods spanning September 1st through August 31st.

These resources will also be assigned to the relevant Resource Class, as is done with BTMG and AME Resources. They will not impact the Resource Class values because they are not eligible to receive outage exemptions for the reasons described in Subsection 5.2. Finally, they will receive the gross up for Line Losses when eligible, as is done for all Behind the Meter Generation.

Capability for an Intermittent Behind the Meter Generation resource shall be determined based upon the Energy that is Metered.



					T2					T2					T2				
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				
Metered Output	0.0	0.4	1.1	2.3	2.4	2.4	2.3	2.4	2.2	1.6	1.1	0.4	0.0	0.0	0.0				
Capability	0.0	0.4	1.1	2.3	2.4	2.4	2.3	2.4	2.2	1.6	1.1	0.4	0.0	0.0	0.0				
Weight	0.2	0.2	0.2	0.2	0.8	0.2	0.2	0.8	0.2	0.2	0.8	0.8	0.2	0.2	0.2				

Figure 22. Example Capability calculation for an Intermittent Behind the Meter Generation resource. T2 indicates Resource Adequacy Hours outside of a Capacity At Risk Hour interval.

5.3.1 Deficient Hours

Intermittent BTMG will be assigned to a Resource Class.³⁵ As part of the registration process for an Intermittent BTMG, a Market Participant will be required to select a Resource Class and, once approved by MISO, this Resource Class will be used in the Resource Class portion of accreditation of Intermittent BTMG.

For Intermittent BTMG that is registering for the first time, a resource shall receive a Capability based on its respective seasonal Resource Class-level UCAP as a percentage of the corresponding Resource Class-level ICAP, multiplied by its Intermittent BTMG ICAP.

For a Season that has a deficient number of Hours in a Season, i.e. when a Seasonal Emergency Hour Deficiency exists, the resource shall have the Resource Class-level UCAP as a percentage of the corresponding Resource Class-level ICAP multiplied by its Intermittent BTMG ICAP multiplied by the total number of deficient Hours included in its ISAC calculation.

In no case shall Intermittent BTMG be included in the Resource Class-level calculations; rather, Intermittent BTMG takes these values as given based on the appropriate Resource Class.

5.3.2 Accreditation for Non-Intermittent Behind the Meter Generation

The Intermediate Seasonal Accreditation Capacity of an Intermittent BTMG is calculated using the following equation:

$$ISAC = ISAC_{Tier\ 1\ Value} * ISAC_{Tier\ 1\ Weighting} + ISAC_{Tier\ 2\ Value} * ISAC_{Tier\ 2\ Weighting}$$

where the weights applied are identical to Schedule 53A resources, which are 20% for Tier 1 Weighting and 80% for Tier 2 Weighting.

To calculate the final Seasonal Accredited Capacity, the ISAC value is multiplied by 1 + line losses, shown in the following equation:

$$SAC = Resource\ Class\text{-}Level\ UCAP * \frac{Resource\ ISAC}{Resource\ Class\text{-}Level\ ISAC} * (1 + Line\ Losses).$$

All Intermittent Behind the Meter Generation will be grossed-up by the amount of avoided transmission losses in accordance with Module E-1 Section 68A.8.b.

³⁵ Resource Classes are defined in Schedule 53A of the MISO Tariff.



5.3.3 Testing of Non-Intermittent Behind the Meter Generation

Intermittent BTMG are excluded from the MISO-initiated test requirement that Demand Resources experience as these resources must perform an annual GVTC test.

5.4 AME Resources

AME Resources are Generation Resources and Demand Response Resources that have taken a Commitment Status of Emergency. For the purposes of this document, Demand Response Resources are not included in the following discussion as they maintain the obligations, accreditation, and testing requirements of the underlying resource enrolled as a DRR. The only change for a DRR that takes a Commitment Status of “Emergency” will be deployed along with other AME Resources.

A Generation Resource or Demand Response Resource may qualify to participate as an AME Resource provided it can meet at least one of the following four Tariff defined criteria:

1. AME Resource has an operating limit established by law and/or regulation where the resource can only be accessed during an Emergency to preserve its reliability value.
2. The Offer is based on a demonstrated severe energy limit, including but not limited to a fuel shortage affecting the resource’s capability to respond to three days of Emergency conditions.
3. The operating configuration of the resource is inconsistent with “good utility practice” due to potential damage to equipment that is significant and difficult to quantify.
4. The AME Resource has received approval from the IMM for any reason.

A Generation Resource may be either a Schedule 53A Resource or a Schedule 53B Resource. A Resource will qualify as a Schedule 53B Resource once it has satisfied one of the two following criteria:

1. The Resource has Offered using an Emergency Commitment Status at least 110 Hours in a Season in the Day-Ahead Energy and Operating Reserves Market; or
2. The Resource has Offered using an Emergency Commitment Status at least 110 Hours in a Season in the Real-Time Energy and Operating Reserves Market.

A Resource may clear one Season as an AME Resource, a newly defined resource type under Schedule 53B, and another Season as a Schedule 53A Resource.

Resources participating in the PRA as an AME Resource will use a different set of Hours to calculate their ISAC than Schedule 53A Resources. AME Resources will not be eligible to receive a Tier 2 Planned Outage exemption and have a maximum allowable total response time (Notification Time + Start-Up Time) of six hours.

An AME Resource will not use a weighted average of Tier 1 ISAC and Tier 2 ISAC when determining accreditation. Instead, Resources using this accreditation methodology will use the unweighted average of Hours that are either Capacity At Risk Hours or Resource Adequacy Hours, which are defined in Subsection 4.1.2.1. AME Resources will use a lookback period spanning the most recent 3 periods spanning September 1st through August 31st and will not qualify for the Tier 2 Outage Exemption.

The reason these Resources are excluded from the Tier 2 Outage Exemption provision is that these Resources have elected to participate as Emergency only Resources. Therefore, they need to be available for all Emergencies. These Resources will still be eligible to submit an Outage Exemption as they may be Schedule 53A Resources; however,



these Outage Exemptions will not count in the Seasons during which these Resources participate as a Schedule 53B Resource. A Resource that receives a Tier 2 Outage Exemption and only is required to participate during Emergencies opens the potential for these Resources to plan their Outages for the periods with the highest risk of Emergencies occurring and thus collect Capacity payments while minimizing the probability of being deployed. To remove this incentive, the Tier 2 Outage Exemption must be removed.

Because these Resources do not receive a Tier 2 Outage Exemption, including them in the Resource-Class level calculations could result in a distortion of the Resource-Class values. To prevent this distortion, a Resource that qualifies as an AME Resource will not contribute to Resource-Class values but will continue to receive Resource-Class values when appropriate.

Intermediate Seasonal Accredited Capacity (ISAC) for each non-DRR AME Resource will be calculated separately for each Season and Planning Year, using the following formula:

$$ISAC_i = \frac{\sum_h Offer_h + \max(0, 65 - H) * (Resource\ ICAP * \frac{Resource-Class\ Level\ UCAP}{Resource-Class\ Level\ ICAP})}{\max(65, H)}$$

where “h” are the appropriate Hours that are either Capacity At Risk Hours or Resource Adequacy Hours occurring in the interval from September 1 until August 31 and “H” is the total number of Hours occurring.

The single valued, final Seasonal Accredited Capacity for a non-DRR AME Resource is calculated as:

$$SAC_i = \frac{Resource\ ISAC_i}{Resource\ Class-Level\ ICAP} * Resource\ Class-Level\ DLOL$$

For new Resources, or if a Seasonal Emergency Deficiency Hour exists, the same procedure used in Schedule 53A will be used to determine the final accreditation of a non-DRR AME Resource.

5.5 Additional Rules

5.5.1 Unavailability and Capability

- 1) A resource participating as a DRR and LMR – Type I may submit a Capacity Availability of zero MW in an Hour while having a non-zero amount of energy to provide. In other words, a resource may choose to make itself unavailable for any reason. No penalty for failure to perform will be applied to a resource that has made itself unavailable.
 - i) In the case when no LMR – Type I resources located within the same LBA deploy, the Capability value for the Hour will be zero.

Firm Service Level = 10 MW				Capacity At Risk Hours											
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Metered Output	57.8	58.9	57.9	56.9	59.4	50.9	54.9	59.0	60.6	55.1	51.4	57.1	51.8	53.3	53.5
Capacity Availability	50	50	50	45	50	40	0	0	0	0	40	45	40	45	45
Capability	-	-	-	46.9	49.4	40.9	0.0	0.0	0.0	0.0	41.4	47.1	41.8	43.3	43.5

Figure 23. Example of a resource that is unavailable and no LMR - Type I resource is deployed within the same LBA.



- ii) In the case when an LMR – Type I resource within the same LBA as the resource with Capacity Availability equal to zero is deployed, then the resource will receive zero Capability for the entire set of Capacity At Risk Hours that are contiguous with the Hour of zero availability.
 - a) These resources are receiving Capacity payments to be deployable for a very small number of hours each Season. Therefore, it is imperative that these resources are available to be deployed during periods when they are needed – specifically when other LMR -Type I resource(s) within the same LBA are deployed to manage Emergency conditions.

This rule applies to resources participating as a DRR as well and only applies when an LMR – Type I resource deploys within the same LBA because DRR may be committed outside of Capacity At Risk periods for economic reasons. A deployment of a DRR for economic reasons does not impact the performance obligation of any resource during Emergencies and no resource will be penalized when only DRR are committed, even if these commitments occur during a Capacity At Risk period.

Firm Service Level = 10 MW				Capacity At Risk Hours											
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Metered Output	57.8	58.9	57.9	56.9	59.4	50.9	54.9	59.0	60.6	55.1	51.4	57.1	51.8	53.3	53.5
Capacity Availability	50	50	50	45	50	40	0	0	0	0	40	45	40	45	45
Capability	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure 24. Example Capability of a resource that is unavailable during a Capacity At Risk Hour and during which an LMR - Type I resource is deployed within the same LBA.

- 2) In the event of multiple Scheduling Instructions being issued to an LMR – Type I resource located within the same LBA during a contiguous set of Capacity At Risk Hours, then the resource shall receive zero Capability for every Hour in the set of contiguous Capacity At Risk Hours bounded by the most recent of the following:
 - a) the start of the Capacity At Risk event or;
 - b) the end of the last Scheduling Instruction for which the resource was available, and;
 - c) the end of the Capacity At Risk event; or
 - d) the first Hour for which the resource is available after the end of the Scheduling Instruction for which it was unavailable, if the resource is available for deployment during a subsequent Scheduling Instruction issued to an LMR – Type I resource within the same LBA during the contiguous Capacity at Risk Hours.

This scenario covers three possible cases:

- i) The resource was available during the first set of Scheduling Instructions and doesn't wish to participate during the second set of issued Scheduling Instructions.
 - a) In this case, the resource will receive non-zero Capability from the start of the Capacity At Risk Hours until the end of the Scheduling Instructions. It will then receive 0 Capability for each Hour for the remainder of the Capacity At Risk Hours period. This case is shown in Figure 25.
- ii) The resource was not available to deploy during the first Scheduling Instruction issued but was available during the second Scheduling Instruction issued.
 - a) In this case, the resource will receive zero Capability from the start of the Capacity At Risk Hours until the end of the Scheduling Instructions. It will then receive 0 Capability for each Hour during which its Capacity Availability was non-zero, until the end of the Capacity At Risk Hour event. This case is shown in Figure 26.



- iii) The resource was available to deploy during the first Scheduling Instruction issued, was unavailable for the second Scheduling Instruction, and was available for the third Scheduling Instruction.³⁶
 - a) In this case, the resource will receive non-zero Capability from the start of the event until the end of the first Scheduling Instruction. It will receive 0 Capability from the end of the first Scheduling Instruction until the end of the second Scheduling Instruction. And will receive non-zero Capability from the end of the second Scheduling Instruction until the end of the Capacity At Risk Hour event.

Firm Service Level = 10 MW	Capacity At Risk Hours															
				SI Issued								SI Issued				
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Metered Output	57.8	48.9	27.9	10.0	10.0	10.0	54.9	59.0	60.6	55.1	51.4	57.1	51.8	53.3	53.5	
Capacity Availability	50	50	50	45	50	40	0	0	0	0	40	45	40	45	45	
Capability	70.5	68.7	67.6	65.7	65.5	66.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Figure 25. Example of a resource that is available for the first Scheduling Instruction, has a four-hour response time, is issued Scheduling Instructions at hour 8, but is unavailable for the second set of Scheduling Instructions during which a LMR - Type I resource is deployed within the same LBA. In this scenario, the resource achieved its Firm Service Level and so received its Seasonal Capability in place of the Capability.

Firm Service Level = 10 MW	Capacity At Risk Hours														
				SI Issued								SI Issued			
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Metered Output	57.8	58.9	57.9	56.9	59.4	50.9	54.9	59.0	60.6	55.1	51.4	57.1	51.8	53.3	53.5
Capacity Availability	50	50	0	0	0	0	0	50	50	45	40	45	40	45	45
Capability	0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.0	75.7	70.3	66.5	72.3	71.8	69.8	70.0

Figure 26. Example of a resource that is not available for the first Scheduling Instruction, has a four-hour response time, is issued Scheduling Instructions at hour 16, deploys successfully and receives its Seasonal Capability for each Hour during which it was responding and during which it was deployed. Hour 14 could have been a non-zero Capability, but because the resource continued to keep itself unavailable, the resource receives 0 Capability for this Hour.

5.5.2 Response-time and Capability

A DRR, LMR – Type I, and AME Resource may have up to a six (6) hour response time. When there is at least six (6) hours of notification time leading into a Scheduling Instruction, these resources can provide the same capacity value to MISO as short lead-time resources. In these situations, these resources will not be penalized for having a longer lead time, even if MISO subsequently escalates the Emergency operating procedural step and deploys these resources.

When there is less than six (6) hours notification time prior to the Scheduling Instructions beginning, and the system was not in a declared Maximum Generation Warning less than six (6) hours prior to the Scheduling Instructions beginning, these resources do not provide the same value as a short lead-time resource. In these situations, a long lead-time resource will have its Capability set to zero for the difference between its response time and the lead time allowed, beginning with the first Hour for which the Scheduling Instruction is issued. A resource with one (1) hour or less response time will never receive a zero value in these situations. This mechanism provides an incentive for resources to deploy as quickly as possible to provide the greatest reliability value to MISO. It also provides a natural way to give partial accreditation to these resources without unduly lowering their accreditation. The Hour receiving

³⁶ While this case may appear extreme, it is the scenario that occurred during LMR deployments that occurred on January 17/18, 2018, where LMRs were deployed the morning of the 17th, evening of the 17th, and morning of the 18th during which MISO was in a constant state of declared Emergency.



the zero value will begin during the first Hour the Scheduling Instruction was issued for and continuing until all zeros have been applied.

Firm Service Level = 10 MW 6 Hour Resource	Maximum Generation Warning														
					SI Issued for HE 15										
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Metered Output	57.8	58.9	57.9	56.9	59.4	50.9	54.9	59.0	60.6	55.1	51.4	57.1	51.8	53.3	53.5
Capacity Availability	50.0	50.0	50.0	45.0	50.0	40.0	45.0	50.0	50.0	45.0	40.0	45.0	40.0	45.0	45.0
Capability	47.8	48.9	47.9	46.9	49.4	40.9	44.9	49.0	50.6	45.1	41.4	47.1	41.8	43.3	43.5

Figure 27. Example of a six-hour response time resource, during which a Maximum Generation Warning began more than six hours prior to the time the Scheduling Instruction was issued. Therefore, it gets its full Capability value when deploying/deployed.

Firm Service Level = 10 MW 6 Hour Resource	Maximum Generation Warning														
					SI Issued for HE 15										
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Metered Output	57.8	58.9	57.9	56.9	59.4	50.9	54.9	59.0	60.6	55.1	51.4	57.1	51.8	53.3	53.5
Capacity Availability	50.0	50.0	50.0	45.0	50.0	40.0	45.0	50.0	50.0	45.0	40.0	45.0	40.0	45.0	45.0
Capability	47.8	48.9	47.9	46.9	49.4	40.9	44.9	0.0	0.0	45.1	41.4	47.1	41.8	43.3	43.5

Figure 28. Example of a six-hour response time resource, during which a Maximum Generation Warning began four hours prior to the start of the Scheduling Instruction. This resource was not deployed as its lead time was too long. Because an LMR – Type I resource was deployed within the same LBA and the six-hour resource could not have been deployed in time even if needed, it receives zero Capability for the first two Hours during which the Scheduling Instruction is issued.

5.6 Capacity Availability Tolerance Band Impacts on Capability

Capacity Availability is considered equal to the initial Capability value if the submitted Capacity Availability is within the Tolerance Band as measured from the initial Capability. That is, if a 100 MW resource submitted as available 91 MW, then MISO would assign a Capability value of 100 MW for this Hour. The Tolerance Band ensures that resources need not be perfectly accurate in their forecasts while still retaining the ability to recover 100% of their Capability within an Hour.

When a resource submits a Capacity Availability below the lower bound of the Tolerance Band, MISO will consider this a true reflection of the resource's desired performance and accredit the resource accordingly. That is, if a resource could provide 100 MW of demand reduction, a Capacity Availability of 50 MW will be assumed to be the true reflection of the resource's desired contribution, and the resource will be assigned 50 MW of Capability for this Hour.

When a resource submits a Capacity Availability above the upper bound of the Tolerance Band, MISO will reduce the Capability of the resource by the difference between the submitted Capacity Availability and the upper bound of the Tolerance Band. That is, if a resource could provide 100 MW of demand reduction, a Capacity Availability of 120 MW would be outside of the Tolerance Band. MISO will reduce the accredited value of this resource by the difference between the amount submitted and the upper bound of the Tolerance Band. In this example, the Capacity Availability Tolerance Band is equal to $100 * 1.12 = 112 \text{ MW}$. Therefore, the Capability of this resource for the Hour it submitted 120 MW of Capacity Availability is reduced by $120 - 112 = 8 \text{ MW}$, resulting in a Capability of 92 MW for this Hour.



Firm Service Level = 10 MW					T2		T2		Capacity At Risk Hours						
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Metered Output	57.8	58.9	57.9	56.9	59.4	50.9	54.9	59.0	60.6	55.1	51.4	59.2	51.8	53.3	53.5
Capacity Availability	40	40	40	40	40	40	40	40	40	40	40	40	40	55	45
Capability	-	-	-	-	49.4	-	-	49.0	-	-	41.4	40.0	41.8	36.8	43.5

Figure 29. Example of a resource submitting a Capacity Availability below the Tolerance Band in Hours 12, 15, and 19. In this set of hours, only Hour 19 is within a Capacity At Risk Hour, and so Hour 19 has its Capacity set to 40 MW. Hours 12 and 15 are not impacted as they fall during a Resource Adequacy Hour that is not a Capacity At Risk Hour. In Hour 21, the Capacity Availability is above the initial Capacity and Hour 21 is a Capacity At Risk Hour. Therefore, its Capacity is reduced.

An example of how Capacity Availability impacts Capability is provided in Figure 29. During Hours 12, 15, and 19, the resource has made available less than its initial Capacity Availability Tolerance Band. However, Hours 12 and 15 are Resource Adequacy Hours that do not correspond to a Capacity At Risk Hour. Therefore, the submitted Capacity Availability during these times is not considered when determining this resource's Capability because MISO, while experiencing a low operating margin, was not near an Emergency.

In Hour 19, the system is in a declared event, whether a Capacity Advisory or a higher Emergency declaration. Therefore, Hour 19 is a Capacity At Risk Hour. As such, its Capacity Availability information is considered when determining the Capability of the resource. Because this value is below the initial Capacity Availability Tolerance Band, calculated from the initial Capability of $49.2 \text{ MWs} * 0.88 = 43.3 \text{ MWs}$, the resource receives its stated Capacity Availability of 40 MWs for Capability.

In Hour 21, the resource has submitted a Capacity Availability that is greater than the initial Capacity Availability Tolerance Band. The initial Capacity Availability tolerance band is calculated centered on the initial Capability of $43.3 \text{ MWs} * 1.12 = 48.5 \text{ MWs}$. The resource receives its stated Capacity Availability less the upper bound of the Capacity Availability Tolerance Band, $55 - 48.5 \text{ MW} = 6.5 \text{ MW}$, subtracted from the initial Capability. This results in a final Capability value of $43.3 \text{ MW} - 6.5 \text{ MW} = 36.8 \text{ MWs}$.

6 Testing

This section provides specifics of MISO-initiated testing for Demand Resources participating in the PRA. All newly registered resources will be required to submit to a MISO-initiated test during the first Planning Year they participate in the PRA. After this initial test, a resource will be tested on a frequency corresponding to the type of participation option it has selected, with all resources participating using the Statistical Measurement and Verification methodology being tested annually without the ability to opt-out of the test. Resources participating in the PRA prior to the 2028 – 2029 Planning Year will have performance during the preceding years count for the purposes of determining whether these resources require a test. That is, if a resource is issued a Scheduling Instruction over the next three Planning Years (2025-2026, 2026-2027, and 2027-2028), the successful response to this Scheduling Instruction may be used to satisfy the testing frequency requirements detailed below. Resources that have not been deployed in the next three Planning Year will be subject to MISO-initiated testing beginning with the 2027-2028 Planning Year.

	Direct M&V Demand Resource	Statistical M&V Demand Resource
DRR – Type I/II	1 time per 3 Planning Year	1 time per Planning Year
LMR – Type I	1 time per 3 Planning Years	1 time per Planning Year
LMR – Type II	1 time per Planning Year*	1 time per Planning Year

*A Direct M&V Demand Resource may opt out and be tested 1 time per 3 Planning Years



The purpose of the MISO-initiated tests is to verify that ratepayers are paying for Demand Resources that can actually reduce demand. By ensuring that all Demand Resources participating in the PRA are tested in their first year of participation and at least once every three Planning Years subsequently, ratepayers can have a greater degree of confidence that these resources can provide the response they state they can. In all cases, a successful response to Scheduling Instructions to or below the Firm Service Level will count towards the testing requirements. A MISO-initiated test may be used to provide the tested performance required during the yearly registration process.

The only testing opt-out provision is for Direct Demand Resources participating as an LMR – Type II resource. No other opt-out provisions will be provided. The opt-out provision for an LMR – Type II merely extends the testing frequency to be once every third Planning Year rather than once per Planning Year and the Market Participant faces increased penalties as described in Subsection 3.4.3. A resource will not be compensated for performing this MISO-initiated test, and the test does not satisfy the deployment requirements for a resource.

These tests are designed to test both the enrolled response time claimed by the Market Participant registering the Demand Resource, and its response capabilities. In no case shall a Market Participant be required to increase the Demand being consumed by the Demand Resource in response to a MISO-initiated test. With these tests, MISO is testing the performance of the Demand Resource as if a regular Scheduling Instruction was being issued. Market Participants will be required to provide the maximum capability they can; i.e., reduce Demand to or below the Firm Service Level in response to the test. A resource is not required to provide a response equal to its full registered Capability, but it does need to provide its full initial Capability to pass the test.

If a Market Participant is unable to perform the test because it is either operating at or below its Firm Service Level, or (ii) the means by which it achieves its Targeted Demand Reduction are offline, the test will be rescheduled, and it will not count towards the one rescheduled test allowed for Market Participants. Market Participants have also expressed concerns with regarding the tests themselves. MISO considers testing an integral component to ensure that Demand Resources registering in the PRA can provide the response ratepayers are compensating these resources to provide. Because LMR deployments are a relatively infrequent occurrence³⁷, a Demand Resource may clear the PRA for years without being required to deploy. MISO-initiated tests ensure that a resource clearing the PRA can perform in a manner consistent with what they are being compensated for.

6.1.1 Testing Procedure

The following testing procedures apply to all resources being tested, regardless of participation or resource type:

1. MISO will inform the Market Participant that a test will be conducted with no less than 24-hours' notice and will provide information regarding the potential times of the test, such as between 3pm and 7pm.
2. The Market Participant will then be able to inform MISO whether the test should proceed or not.
 - a. Market Participants are allowed to reschedule one test per Planning Year. Failure to acknowledge the test instruction will be considered a request to reschedule the test.
 - b. A rescheduled test will be performed within 30 days.
3. The Market Participant will be required to update the Capacity Availability of the resource to be tested in the appropriate tool (Market User Interface or Demand Side Resource Interface). Submitting zero Capacity Availability of the resource will result in a reschedule of the test provided the test can be rescheduled.
4. MISO may perform the test at any time during the testing period.

³⁷ MISO has deployed LMRs 12 times over 8 separate events since 2017 and MISO does not deploy all LMRs during each LMR deployment.



5. A test is considered successfully passed if the Market Participant has demonstrated a successful deployment of the stated Capacity Availability amount, within the enrolled response time, that achieves the Firm Service Level. Self Scheduling will not be permitted during a MISO-initiated test to ensure that an actual response within the enrolled time may occur.

Penalty provisions for failing a test, partially or completely, are described in Section 7.

7 Penalty Provisions for DRR and LMR

MISO has identified strengthening the penalty provisions for DRR and LMR as a necessary component of the Emergency and Demand Resource Reforms effort. Consider the following example, a resource clears 10 MW in the Summer month at a price of \$139.60/MW*day.³⁸ This results in a payment to the asset of \$128,432 for the Summer Season. Under the current design, if this resource was deployed for the full 10 MW, but only provided 2 MW of reduction, the Market Participant would be subject to potential penalties of Hourly Real-Time Ex Post LMP at the Demand CPNode, plus any Revenue Sufficiency Guarantee charges. If the resource was required for 4 hours, this would result in a penalty of $\$1000 * 8 \text{ MW} * 4 \text{ hours} = \$32,000$.³⁹ This means that the resource would still collect \$96,432, meaning that ratepayers paid over \$100,000 dollars more than they should have based on the response this resource provided. Additionally, this figure is likely a significant underestimate of the amount overpaid to this resource because this resource may go years between deployments, each year collecting hundreds of thousands or more of payments.

The testing changes described in Section 6 compliment the penalty provisions described in this section to ensure that resources participating in the PRA can provide the response for which they are being compensated and are incentivized to provide that response when it is required. To accomplish this, the following changes to penalties are being proposed:

1. Clearly defined delineation between a complete failure to perform and a partial failure to perform.
2. Addition of accreditation penalties in addition to the real-time performance penalties.
3. Tolerance Bands to ensure that Market Participants are not unduly penalized in the event they are close, but do not quite meet, the performance level requirements.

Firm Service Level Tolerance Band: A resource is considered to have achieved its Firm Service Level under the following scenarios:

- (i) A resource with a Firm Service Level of 0 MWs will be deemed to have achieved its Firm Service Level if the Demand that is Metered is equal to or below 0.1 MWs.
- (ii) A resource with a Firm Service Level above 0 MWs will be deemed to have achieved its Firm Service Level if the Demand that is Metered is within the lesser of 1 MW or 10% of the Firm Service Level.

Performance Tolerance Band: The Demand Response Resource – Type I Tolerance Band is defined in Module C, 40.3.4.a.iii. The Demand Response Resource – Type II Tolerance Band is defined in Module C, 40.3.4.a.i. MISO will

³⁸ This price comes from the indicative values under the new RBDC PRA clearing construct; the indicative results were shared with Market Participants during October 9, 2024, RASC.

³⁹ This penalty is calculated as the shortfall (8 MW), the Ex Post LMP floor when LMRs deploy (\$1000), and four hours to match the minimum run-time obligation of LMRs.



extend the Demand Response Resource – Type I Tolerance Band to LMR resources with the following change applied:

- (i) The Excessive Energy Threshold shall not apply to LMRs. An LMR that overperforms will not be penalized in any way.

Additionally, Module C will be changed in the following manner for LMRs only:

- (i) Minimum and Maximum Tolerance Band Threshold will be reduced from 6 MW to 1 MW. The 30 MW band will still apply.

The effect of this change is to reduce the Tolerance Band for resources under 50 MW in size. It will never be less than 1 MW. This change is necessary as the Tolerance Band currently defined allows significant deviation for small resources.

7.1 Full Performance

For a Demand Resource using a Consumption Baseline other than Firm Service Level, full performance not subject to penalties is defined using the appropriate consumption baseline methodology and meeting the Setpoint Instruction or Scheduling Instruction within the registered total response time (Shut-down time plus Shut-Down Notification Time). If a resource claims a Capacity Availability of 10 MW and a response time of 2 hours, then the appropriate Consumption Baseline must demonstrate a reduction of 10 MW within 2 hours, subject to the Performance Tolerance Band.

	13	14	15	16	17	18	19	20
Capacity Availability submitted at 1230	-	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Scheduling Instruction Issued at 13:15	-	-	-	13.0	13.0	13.0	13.0	-
Metered Output	20.0	19.0	16.0	7.0	7.0	7.0	7.0	13.0
Demand Reduction per Attachment TT	-	-	-	13.0	13.0	13.0	13.0	-
Capability	10.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Performance Shortfall	-	-	-	0.0	0.0	0.0	0.0	-
Penalties Applied	-	-	-	0.0	0.0	0.0	0.0	-

Figure 30. Full performance of a Demand Resource not using a Firm Service Level Measurement and Verification methodology that requires two-hours to respond. Capability is replaced with the Seasonal Capability in the Hours prior to the Scheduling Instruction reflecting the three-hour response time this resource requires. Additionally, because the resource is fully deployed, it receives the Seasonal Capability in the hour after the deployment.

An example of full performance of a Demand Resource not using a Firm Service Level Measurement and Verification methodology is provided in Figure 30. In this example, the resource stated it could provide a demand reduction of 13 MWs. Because it reduced its consumption by 13 MW as required within the registered response time, the resource is deemed to have fully performed. Because it fully performed, the Capability of the resource is replaced with the Seasonal Capability to reflect the resource has fully met its obligations while responding. Because this resource does not use a Firm Service Level Measurement and Verification methodology, the Seasonal Capability of this resource is equal to its enrolled Capacity Rating, which in this case is 13 MW.

For a Demand Resource using a Firm Service Level Measurement and Verification methodology, full performance is achieved when the resource achieves its Firm Service Level within the registered response time. Capacity



Availability is never considered when determining if a resource using a Firm Service Level Measurement and Verification methodology has fully met its performance obligations.

	13	14	15	16	17	18	19	20
Capacity Availability submitted at 1230	-	10.0	11.0	12.0	13.0	12.0	11.0	11.0
Scheduling Instruction Issued at 1315	-	-	-	12.0	13.0	12.0	11.0	-
Metered Output	20.0	19.0	16.0	10.0	10.0	10.0	10.0	13.0
Demand Reduction per Attachment TT	-	-	-	10.0	10.0	10.0	10.0	-
Capability	10.0	29.0	28.6	25.5	27.7	21.2	20.1	28.6
Performance Shortfall	-	-	-	0.0	0.0	0.0	0.0	-
Penalties Applied	-	-	-	0.0	0.0	0.0	0.0	-

Figure 31. Example of a Demand Resource with a Firm Service Level of 10 MW that requires two-hours to respond. This resource achieves its Firm Service Level within the required response time. Capability is replaced with the Seasonal Capability in the Hours prior to the Scheduling Instruction reflecting the three-hour response time this resource requires. Additionally, because the resource is fully deployed, it receives the Seasonal Capability in the hour after the deployment.

An example of full performance of a Demand Resource using a Firm Service Level Measurement and Verification methodology is provided in Figure 31. In this example, the resource stated it could provide a demand reduction of 11 to 13 MWs. Because it reduced its consumption to its Firm Service Level within the registered response time, the resource is deemed to have fully performed. Because it fully performed, the Capability of the resource is replaced with the Seasonal Capability to reflect the resource has fully met its obligations while responding. Because this resource uses a Firm Service Level Measurement and Verification methodology, the Seasonal Capability is calculated for each Hour as described in Subsection 5.1.2.2.

For a resource participating as a Behind the Meter Generation resource, full performance is defined as achieving the stated Setpoint Instruction or Scheduling Instruction within the registered Start-Up Time plus Start-Up Notification Time.

	13	14	15	16	17	18	19	20
Capacity Availability	-	10.0	10.0	2.0	3.0	2.0	6.0	10.0
Scheduling Instruction Issued at 1315	-	-	-	8.0	7.0	8.0	4.0	-
Metered Output	0.0	0.0	0.0	8.0	7.0	8.0	4.0	0.0
Demand Reduction per Attachment TT	-	-	-	8.0	7.0	8.0	4.0	-
Capability	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Performance Shortfall	-	-	-	0.0	0.0	0.0	0.0	-
Penalties Applied	-	-	-	0.0	0.0	0.0	0.0	-

Figure 32. Example of a Behind the Meter Generation resource that requires two-hours to respond. Here, the resource indicated it could provide 10 MW at 1230. The resource was committed for less than what was available, and the BTMG maintains availability of the remaining MWs. Therefore, its Capability is 10 MW for each Hour. Note that the Capacity Availability of a BTMG may be updated in each Hour when the BTMG is operating to reflect its ability to change its output.

An example of full performance BTMG is provided in Figure 32. Here, the BTMG has initially stated it could provide 10 MW of Energy. MISO committed the resource for less than 10 MW, so the BTMG performed in accordance with the Scheduling Instructions and maintained availability for the remainder of its full output. The Capability will reflect this so that it receives Capability of 10 MW for each Hour. Only BTMG may have their availability updated within an Hour to reflect their ability to change their output from one Hour to the next.



7.2 Complete Failure to Perform

Under the existing rules, MISO can initiate an investigation into a resource if it has failed to respond to an interruption request. There is no definition of what constitutes a complete failure to respond, therefore a resource that is enrolled as a 100 MW resource could conceivably claim partial performance for providing 1 MW of reduction. To address this, MISO is defining a complete failure to perform as follows:

1. For a Demand Resource participating as a DRR, a complete failure to perform is defined as achieving less than 50% of the submitted Offer.
2. For a Demand Resource participating as an LMR, a complete failure to perform is defined as achieving less than 50% of the required response.
 - a. For a Demand Resource using the Firm Service Level methodology, this means achieving at least 50% of the difference from the Demand when the Scheduling Instruction was issued and the Firm Service Level by the required response time.
 - b. For a Demand Resource not using the Firm Service Level methodology, this means achieving at least 50% of the submitted Capacity Availability.
 - c. For a Behind the Meter Generation resource participating as a DRR, a complete failure to perform is defined as achieving less than 50% of the total Energy, measured in MWh, issued by the Setpoint Instruction.
 - d. For a Behind the Meter Generation resource participating as an LMR, a complete failure to perform is defined as achieving less than 50% of the total Energy, measured in MWh, issued by the Scheduling Instruction.

The penalty for a complete failure to perform is equal to the following:

- 1) A resource experiencing a complete failure to perform is charged the Real-Time Ex Post LMP, in dollars per MW, times the amount of shortfall, in MW for each Hour of shortfall plus any Revenue Sufficiency Guarantee (RSG).
- 2) A resource experiencing a complete failure to perform will be disqualified for the remainder of the Planning Year
- 3) A Market Participant must replace the ZRCs of a disqualified resource with a similar resource; i.e., either a DRR or LMR for the remainder of the Season. Additional Seasons during which the original resource cleared ZRCs must have these ZRCs replaced as well, again with a like resource. The resource replacing these ZRCs do not need to be the same resource in each Season, but must be of the same type as the disqualified resource.
 - a) The replacement resource is subject to a MISO initiated test immediately to verify its performance abilities. If this resource fails the MISO-initiated test, the Market Participant will be charged the Non-Compliance Capacity Replacement Charge for the entire Season in which the disqualification occurred. This Charge applies to each Season during which the resource is unable to be replaced.

A resource that has been disqualified or that has partially cleared the PRA will have its Capability determined in the same manner as a resource that has fully cleared and that has not been disqualified. This extends to Hours of the Season that occur after the resource has been disqualified, ensuring that these resources receive a reduction in accreditation for non-performance, but not unduly impacting their accreditation for the next PRA.



	13	14	15	16	17	18	19	20
Capacity Availability submitted at 1230	-	10.0	11.0	12.0	13.0	12.0	11.0	11.0
Scheduling Instruction Issued at 1315	-	-	-	12.0	13.0	12.0	11.0	-
Metered Output	20.0	19.0	18.0	18.0	17.0	15.0	11.0	13.0
Demand Reduction per Attachment TT	-	-	-	2.0	3.0	5.0	10.0	-
Capability	-	-	-	-	-	-	-	-
Performance Shortfall	-	-	-	8.0	7.0	5.0	0.0	-
Penalties Applied	-	-	-	8000.0	7000.0	5000.0	0.0	-

Figure 33. Example of a Demand Resource with a two-hour response time that has experienced a complete failure to perform. The numbers shown correspond with a Demand Resource with a Firm Service Level of 10 MW.

Figure 33 provides an example of a Demand Resource that has experienced a complete failure to perform. This resource was issued a Setpoint or Scheduling Instruction at 1315 and should have responded by 1600. If it was a Firm Service Level resource with a 10 MW Firm Service Level, the reduction needed to have been at least 5 MW by Hour 16. If the Demand Resource was not using a Firm Service Level, it should have achieved a reduction of at least 6 MW by Hour 16. Therefore, this Demand Resource has had a complete failure to perform and is subject to penalties totaling \$20,000 plus RSG.⁴⁰

Additionally, by experiencing a complete failure to perform, the resource must replace its ZRCs. These replacement ZRCs must come from the same type of resource; i.e., a DRR must be replaced by a DRR or LMR, while an LMR must be replaced by a DRR or LMR. The replacement ZRCs will be immediately tested by MISO to verify that these replacement ZRCs can provide demand reduction. Failure to replace ZRCs, or if the replacement resource fails the MISO-initiated test, results in a Non-Compliance Capacity Replacement Charge being charged to the Market Participant. This charge applies for the entire Season. Additionally, because the resource was disqualified, the Market Participant is required to replace these ZRCs in the remaining Seasons for which this resource cleared the PRA. The requirement for these replacement ZRCs regarding qualification and testing remains the same in these additional Seasons.

For a BTMG, complete failure to perform is defined slightly differently. Rather than requiring the resource to be online at 50% of the stated availability by the required response time, MISO will measure complete failure by the total MWh provided by the BTMG. In this way, a BTMG that fails to start but is successful in deploying for at least part of the event is not overly penalized. For a BTMG, at least 50% of the total Energy, defined in MWh, must be provided to avoid the complete failure to perform provisions. Under the scenario presented in Figure 34, the BTMG was only able to provide 7.5 MWh of Energy while being required to provide 40 MWh. Therefore, this resource has experienced a complete failure to perform. The penalties are the same as described in the scenario for Figure 33, resulting in real-time penalties totaling \$32,500 plus RSG. Additionally, the resource is disqualified and is required to be replaced as described above.

⁴⁰ With \$1,000 being chosen as this represents the EEA 2 price floor. For an LMR – Type I resource deployed during a Maximum Generation Warning stage, the LMP floor is \$500.



	13	14	15	16	17	18	19	20
Capacity Availability submitted at 1230	-	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Scheduling Instruction Issued at 1315	-	-	-	10.0	10.0	10.0	10.0	-
Metered Output	0.0	0.0	0.0	0.0	0.0	2.5	5.0	10.0
Demand Reduction per Attachment TT	-	-	-	0.0	0.0	2.5	5.0	-
Capability	-	-	-	-	-	-	-	-
Performance Shortfall	-	-	-	10.0	10.0	7.5	5.0	-
Penalties Applied	-	-	-	10000.0	10000.0	7500.0	5000.0	-

Figure 34. Example of a Behind the Meter Generation resource with a two-hour response time that has experienced a complete failure to perform.

An important distinction needs to be made between being disqualified and the Capability calculations. When determining Capability, the resource's performance for the next Planning Year is determined. A Demand Resource or BTMG that experiences a complete failure to perform will still be eligible to receive accreditation for the next Planning Year. Once disqualified, Capacity Availability will no longer impact the Capability of the resource as this resource is by the nature of the disqualification unavailable. In this way, a disqualification significantly impacts the accreditation of the resource in the current Planning Year but only reduces accreditation in the next Planning Year based on the failure to perform.

7.3 Partial Failure to Perform

A partial failure to perform is defined as:

- 1) For a Demand Resource participating as a DRR, a partial failure to perform is defined as achieving at least 50% of the submitted Offer within the enrolled response time but less than the Deficient Energy Threshold, which is defined in Module C 40.3.4.⁴¹
- 2) For a Demand Resource participating as an LMR, a partial failure to perform is defined as achieving at least 50% of the required response within the enrolled response but less than the minimum Performance Tolerance Band.
- 3) For Behind the Meter Generation participating as a DRR, a partial failure to perform is defined as achieving at least 50% of the total Energy, measured in MWh, issued by the Setpoint Instruction but less than the Deficient Energy Threshold during any Hour covered by the Setpoint Instructions.
- 4) For Behind the Meter Generation participating as an LMR, partial failure to perform is defined as achieving at least 50% of the total Energy, measured in MWh, issued by the Scheduling Instruction but less than the Performance Tolerance Band during any Hour covered by the Setpoint Instruction.

The penalty for a partial failure to perform is equal to the following:

- 1) A resource experiencing a partial failure to perform is charged the Real-Time Ex Post LMP times the amount of shortfall plus any Revenue Sufficiency Guarantee.
- 2) A Demand Resource experiencing a partial failure to perform will be charged the ACP times the MW shortfall in the first Hour of the shortfall until either; (i) the end of the Season; (ii) the resource has successfully responded to a Setpoint Instruction or Scheduling Instruction; (iii) or successfully passed a MISO initiated test.
- 3) A BTMG experiencing a partial failure to perform will be charged the ACP times one minus the ratio of the total Energy shortfall until either; (i) the end of the Season; (ii) the resource has successfully

⁴¹ As was stated in Section 7, the Performance Tolerance Band is based on the Module C defined Tolerance Band.



responded to a Setpoint Instruction or Scheduling Instruction; (iii) or successfully passed a MISO initiated test.

By including an additional penalty of the ACP times the MW shortfall in the first Hour of the shortfall, a stronger disincentive signal is sent to a resource. A DRR that is subject to the provisions of 40.3.4 will not receive the ACP penalty unless the deployment occurs during a Capacity At Risk Hour. This alignment between the accreditation obligation and the accreditation penalties.

	13	14	15	16	17	18	19	20
Capacity Availability submitted at 1230	-	10.0	11.0	12.0	13.0	12.0	11.0	11.0
Scheduling Instruction Issued at 1315	-	-	-	12.0	13.0	12.0	11.0	-
Metered Output	20.0	19.0	18.0	13.0	11.0	10.0	10.0	13.0
Demand Reduction per Attachment TT	-	-	-	7.0	10.0	10.0	10.0	-
Capability	10.0	9.0	8.0	7.0	27.7	21.2	20.1	3.0
Performance Shortfall	-	-	-	3.0	0.0	0.0	0.0	-
Penalties Applied	-	-	-	3000.0	0.0	0.0	0.0	-

Figure 35. Example of a Demand Resource with a two-hour response time that has experienced a partial failure to perform. The numbers shown in this figure correspond to a Demand Resource with a 10 MW Firm Service Level.

An example of a Demand Resource experiencing a partial failure is provided in Figure 35. If this Demand Resource has a 10 MW Firm Service Level, its performance should have been 10 MW. However, it only achieved a reduction of 7 MW, resulting in a partial failure to perform. The penalty for this is equal to Ex Post LMP * 3 MW * 1 Hour, because for all other Hours the resource met its obligations. Additionally, the Market Participant representing the resource is charged the ACP times 3 MW until one of the three conditions specified above is met. Additionally, because the resource experienced a partial failure, it does not receive Seasonal Capability until it has achieved its Firm Service Level, and then only for the Hours during which it is operating at or below its Firm Service Level.

	13	14	15	16	17	18	19	20
Capacity Availability submitted at 1230	-	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Scheduling Instruction Issued at 1315	-	-	-	13.0	13.0	13.0	13.0	-
Metered Output	20.0	19.0	18.0	13.0	10.0	7.0	7.0	10.0
Demand Reduction per Attachment TT	-	-	-	7.0	10.0	10.0	10.0	-
Capability	13.0	13.0	13.0	7.0	10.0	13.0	13.0	-
Performance Shortfall	-	-	-	5.0	3.0	0.0	0.0	-
Penalties Applied	-	-	-	5000.0	3000.0	0.0	0.0	-

Figure 36. Example of a Demand Resource with a two-hour response time that has experienced a partial failure to perform. The numbers shown in this figure correspond to a Demand Resource that is not using the Firm Service Level M&V methodology.

A partial failure to perform example for a Demand Resource that does not use the Firm Service Level Measurement and Verification methodology is shown in Figure 36. The only difference between this scenario and the previous one is that the resource did not fully achieve its reduction until Hour 17. The real-time penalty applied to the Market Participant of this resource is \$8000 plus any RSG. The accreditation penalty is equal to ACP*5 MW. The shortfall of 3 MW is ignored for the purposes of this portion of the penalty.

An example of a BTMG experiencing a partial failure to perform is provided in Figure 37. In this example, the resource was not deployed by the start of the Scheduling Instruction but was producing Energy by Hour 17. Because it provided a total Energy of 30 MWh, it satisfies the requirements of providing at least 50% of the required Energy, however it had a shortfall in Hour 16 thereby resulting in the partial failure. The ACP penalty of this resource is



equal to the one minus the ratio of the Energy shortfall times the ACP, resulting in a penalty for this resource of $\left(1 - \frac{30}{40}\right) * 10 = 2.5 \text{ MW}$ until the conditions stated above are met. This is slightly different than a Demand Resource and reflects that partial failure for a BTMG is measured differently than it is for a Demand Resource.

	13	14	15	16	17	18	19	20
Capacity Availability submitted at 1230	-	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Scheduling Instruction Issued at 1315	-	-	-	13.0	13.0	13.0	13.0	-
Metered Output	0.0	0.0	0.0	0.0	10.0	10.0	10.0	
Demand Reduction per Attachment TT	-	-	-	7.0	10.0	10.0	10.0	-
Capability	10.0	10.0	10.0	0.0	10.0	10.0	10.0	-
Performance Shortfall	-	-	-	5.0	0.0	0.0	0.0	-
Penalties Applied	-	-	-	10000.0	0.0	0.0	0.0	-

Figure 37. Example of a BTMG experiencing a partial failure to perform.

These resources will continue to receive Capability without any scaling due to the ACP penalty. That is, the BTMG will continue to receive 10 MW of Capability for each Hour, other than the shortfall Hours, during the Season. This ensures that the resource's accreditation is accurately measured for the next Planning Year while still providing a strong incentive to perform in this Planning Year.

7.4 Testing Failures

A test is considered to have been partially passed if it satisfies the criteria established in Subsection 7.3. If the resource only is consuming 1 MW above its Firm Service Level during the test, then achieving its Firm Service Level ensures it passes the test. However, it cannot consume 4 MW and only provide a response of 1 MW.

Penalties for a partial failure are equal to the ACP times the cleared ZRCs for the remainder of the Season or until a resource successfully responds to a Scheduling Instruction or passes a MISO initiated test. These penalties will not be carried into the next Season, nor will these penalties be applied to days in the Season that occurred prior to the MISO-initiated test.

A resource that completely fails a test, as established in Subsection 7.2, is a resource that has failed to achieve at least a 50% reduction of its Demand relative to its Firm Service Level. The penalty for completely failing a test is equal to the ACP times the cleared ZRCs of the resource for the entirety of the Season in which a test is failed, including days prior to the test. This penalty will carry forward into the next Season until the resource successfully passes a MISO-initiated test or responds to a Scheduling Instruction.

If a resource completely fails two tests within a single Planning Year, the resource will be disqualified for the remainder of the Planning Year and the Market Participant shall be subject to the penalty provisions described in Section 7.2, excluding the real time penalty. If a Market Participant completely fails the first test and partially fails the second, disqualification will not occur and the partial failure test penalties will apply to this resource for the second, partially failed, test. Test failures will never result in applying real-time penalties, regardless of whether test was partially or completely failed. being applied whether the rest was partially or completely failed. A resource that responded to a Scheduling Instruction in the previous three years will not be tested because this counts as a MISO-initiated test.



MISO will test any resource in the next Planning Year that was disqualified during the previous Planning Year to verify its performance.

7.5 Repeated Complete Failures

Resources that experience a complete failure to perform in two out of three Planning Years, where two complete test failures in a single Planning Year count as one of the two complete failures, will be disqualified from participation in the PRA for three Planning Years. This provision is necessary to prevent resources that cannot perform from clearing the auction repeatedly and collecting payments until they are uncovered.