Manual No. 026

Business Practices Manual

Demand Response

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Revision History

Doc Number	Description	Revised by:	Effective Date
BPM-026-r9	Update for Seasonal Resource Adequacy	MISO Staff	OCT-01-2022
BPM-026-r8	Annual Review completed.	MISO Staff	JUL-01-2022
BPM-026-r7	Add Short-Term Reserve (STR) Ancillary Service	MISO Staff	DEC-07-2021
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BPM-026-r3	Annual Review completed. Updated references and made numerous clarifications. Included feedback from John Reinhart (GRE) and Matthew Prorok (GPI)	C. Hansen, M. Robinson, MISO Staff	JUL-10-2018
BPM-026-r2	Annual Review completed MISO naming change, meter data format information (4.8.3), event settlement timeline (5.6), clean up changes throughout, and changes to reflect the move to an annual planning auction. Updates for implementation of Demand Response Enhancements (DRE) to the DA & RT Energy Markets to comply with FERC Order 719. Updates related to new market constructs, such as ELMP, Emergency Pricing, and the Ramp Capability Product. Include Real-Time Offer Override Enhancement (RTOE) function.	C. Hansen, M. Robinson	JUL-01-2017
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BPM-026	Original document	M. Robinson	APR-01-2013

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1 INTRODUCTION

This introduction to the Midcontinent Independent System Operator, Inc. (MISO) *Business Practices Manual (BPM) for Demand Response* includes basic information about this BPM and the other MISO BPMs. The first section (Section 1.1) of this Introduction provides information about the MISO BPMs. The second section (Section 1.2) is an introduction to this BPM. The third section (Section 1.3) identifies other documents in addition to the BPMs, which can be used by the reader as references when reading this BPM.

1.1 Purpose of MISO Business Practices Manuals

The BPMs developed by MISO provide background information, guidelines, business rules, and processes established by MISO for the operation and administration of MISO markets, provisions of transmission reliability services, and compliance with MISO settlements, billing, and accounting requirements. A complete list of MISO BPMs is available for reference through MISO's website. All definitions in this document are as provided in the MISO Tariff, the NERC Glossary of Terms Used in Reliability Standards, or are as defined by this document.

1.2 Purpose of this Business Practices Manual

This BPM: (1) provides Market Participants (MPs) with the information needed to understand the purpose and application of demand response within the MISO Region; (2) covers the rules, design, and operational elements governing the implementation of the various types of demand response within MISO's Day-Ahead and Real-Time Energy and Operating Reserve Markets; and, (3) describes how demand response can be accredited with Zonal Resource Credits and can be dispatched to interrupt their loads during system emergencies. Demand response used as a Non-Transmission Alternative is discussed separately in BPM-020: Transmission Planning.

MISO employs Security Constrained Unit Commitment (SCUC) and Security Constrained Economic Dispatch (SCED) algorithms to dispatch supply including Demand Response Resources, which simultaneously co-optimizes the Energy and Operating Reserve Markets. The Attachments to the Energy and Operating Reserves BPM explain these functions in greater detail.

This BPM benefits readers who want answers to the following questions:

- What are the roles of MISO and MISO's Market Participants in facilitating the participation of demand response in MISO Planning Resource Auctions, and Energy and Operating Reserve Markets?

- What are the basic concepts that one needs to know to understand the benefits to be derived from demand response?
- What activities must a Market Participant perform in order for its Demand Response Resources to participate in the Planning Resource Auctions, and the Energy and Operating Reserve Markets?

1.3 References

Other reference materials related to this BPM include:

- BPM-001 Market Registration
- BPM-002 Energy and Operating Reserve Markets
- BPM-005 Market Settlements
- BPM-007 Physical Scheduling
- BPM-009 Market Monitoring and Mitigation
- BPM-010 Network and Commercial Model
- BPM-011 Resource Adequacy
- BPM-020 Transmission Planning
- MISO Tariff, including
    - Module C: Energy and Operating Reserve Markets
    - Module D: Market Monitoring and Mitigation Measures
    - Module E-1: Resource Adequacy
    - Schedule 29-A: ELMP for Energy and Operating Reserve Market
    - Schedule 30: Emergency Demand Response Initiative
    - Attachment L: Credit Policy
    - Attachment TT: Measurement and Verification (M&V) Criteria
- Demand Response Tool User Guide (version 3, 5/20/2010)
- Demand Side Resource Interface (DSRI) On-line User Guide

2 Overview of Demand Response

This section presents a high-level description of the role that demand response plays in MISO markets[1].

“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 or continuously controllable loads or with behind-the-meter generation. Market Participants are compensated by MISO for providing such load reductions, as described later in this BPM. MISO market structures provide the opportunity for MPs with demand response to participate either on the demand-side or the supply-side of its markets. For the demand-side, MPs can make consumption decisions based on the value of energy consumed compared to the market price, and this is discussed further in the BPM for Energy and Operating Reserve Markets. This BPM for Demand Response is devoted to the supply-side, where MPs can offer and monetize the flexibility of demand response to help MISO meet the power balance, meet its ancillary service needs and/or meet its capacity obligations. This BPM also discusses the participation of demand response in MISO Planning Resource Auctions.

2.1 Eligible Market Participants

Three types of entities who have been certified by MISO as Market Participants may provide demand response in MISO:

- Load Serving Entities (LSEs),
- Aggregators of Retail Customers (ARCs), and
- End-use customers that have Market Participant status.[2]

If your entity is not a certified Market Participant, you must register and be certified as a MISO Market Participant prior to participation in any MISO Market. For more details on the registration processes, see Section 3.

[1] *Unless otherwise indicated, all capitalized terms used herein have the definitions set forth in Module A of the Tariff*

[2] *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.*

2.2 Types of Demand Response Services

MISO employs demand response to:

- reduce load in the Energy market (i.e., *Economic Demand Response*)
- provide Regulating Service, Contingency Reserves (i.e., *Operating Reserves Demand Response*), Ramp Capability Product (OR&RCP) or Short-Term Reserve (STR)
- reduce demand during system Emergencies (i.e., *Emergency Demand Response*)
- substitute for generating capacity (i.e., *Planning Resources Demand Response*)
- substitute for transmission (i.e., Demand Response as a Non-Transmission Alternative)

Each of these services is further described below.

Economic Demand Response

A Demand Response Resource (DRR) is a demand resource, behind-the-meter generation ("btmg") resource or storage device that can respond to instructions from MISO.[3] DRRs are the only demand resources that can "inject" Energy on an economic basis, i.e. to replace higher-priced Energy offered by other resources. Currently, the minimum size for DRRs to participate in MISO's markets is one (1) MW.

There are two types of DRRs:

- A ***DRR – Type I*** can supply a fixed, pre-specified quantity of Energy, through physical load reduction, or behind-the-meter generation, to the Energy and Operating Reserve Market when instructed to do so by MISO
- A ***DRR – Type II*** can supply a range (continuum) of Energy through physical load reduction or behind-the-meter generation, to the Energy and Operating Reserve Market and is capable of complying with MISO's Setpoint Instructions.

Market Participants may submit DRR Energy offers into the Day-Ahead Market and/or the Real Time Market. DRR offers submitted to these two markets are independent, i.e., the price-quantity schedules offered into one market are not linked to the schedules offered into the other market.

[3] *As defined in the Tariff, a DRR-Type I resource is unable to follow dispatch instructions; it must only follow an instruction to turn on or off.*

Market Participants with DRR offers that clear the market and that subsequently follow MISO instructions, within acceptable tolerance, are paid the Locational Marginal Prices (LMPs) for the Energy they provided to the market through their load reductions. In addition, if necessary, they are made whole to their offers if committed by MISO as part of MISO's Security Constrained Unit Commitment (SCUC) process. These offers can include Energy Offers, Shut-Down Offers and Hourly Curtailment Offers, as described below.

Demand Response providing Operating Reserves, Ramp Capability Product (OR&RCP) and/or Short-Term Reserve

OR&RCP and Short-Term Reserve Services take on several forms:

- Regulating Reserve
- Spinning Reserve
- Supplemental Reserve
- Ramp Capability Product (RCP)
- Short-Term Reserve

Together, Spinning Reserve and Supplemental Reserve are also known as Contingency Reserve.

In addition to providing Energy, DRR-Type I and DRR-Type II resources that are technically qualified to do so may provide one or more forms of Operating Reserve Service. DRR-Type I Resources can provide either Energy or Contingency Reserve Service but cannot provide both simultaneously. DRR-Type II Resources may provide Energy and/or one or more Operating Reserve products (as well as the Ramp Capability Product and Short-Term Reserve) simultaneously, like other Generation Resources. MISO uses its SCUC and Security Constrained Economic Dispatch (SCED) algorithms to determine which product a resource will provide in any particular time interval. Currently, the minimum size of DRRs capable of offering these services is one (1) MW.

The technical capabilities required to qualify for each service (see BPM-002) are most stringent for Regulating Service and less stringent for Supplemental Reserve. A DRR that is qualified to provide a more stringent service is generally qualified to provide all the services with less stringent requirements. Due to its "on/off" nature, DRR-Type I is not allowed to provide Regulation Service or the Ramp Capability Product. DRR-Type I Resources can provide offline Short-Term Reserve. Due to the frequency responsive nature of Regulation Service, DRR-Type II resources without telemetry are not allowed to provide Regulation Service. In addition, DRRs cleared for Spinning

Reserve Service cannot exceed 40% (on a MW basis) of the market-wide total for cleared Spinning Reserve.

In addition to providing the information required for an Energy Offer, a DRR that is available to provide one or more Operating Reserve products must submit additional pricing information in its offer (e.g., a reserve availability offer). Using these data, MISO will determine whether to clear the DRR offer to provide Energy and/or one or more Operating Reserve services, RCP or Short-Term Reserve. A DRR Type II may submit a price curve (up to 3 MW-price pairs) for each Operating Reserve or other reserve product.[4] A DRR may also choose to submit a daily limit per resource for Regulation or Contingency Reserve that may be deployed during one Operating Day of the Real Time-Market.

Emergency Demand Response

Market Participants can also offer to reduce their gross loads specifically when MISO declares an Emergency event (e.g., NERC EEA2 or EEA3 events). MISO's Emergency Demand Response (EDR) Initiative allows, but does not require, EDR resources to indicate their willingness to provide demand response during such events (unless they are also claiming capacity credit as Planning Resources, in which case they *must* be available to reduce load during Emergency events, as discussed herein). A Market Participant's decision to offer as an EDR is in addition to the choice of creating a DRR and/or an LMR. Currently, the minimum size of these EDRs is one hundred (100) kWs.

Each day a Market Participant can decide how much of each of its EDR resources to make available to MISO for EDR service the following day, and at what cost. In addition to providing hourly curtailment costs in its daily EDR offer, the Market Participant can also specify a one-time shutdown cost and several operational constraints for each EDR resource. When an Emergency event occurs, MISO will use the information in the EDR offers to decide the order in which to curtail the associated EDR resources, using SCED protocols. EDR offers cannot vary across the hours of the Operating Day.

The EDR Initiative, set forth in Schedule 30 of the MISO Tariff, provides Market Participants with the flexibility to shape their EDR offers based on their near-term circumstances while also providing them with opportunities to increase their operating profits through load curtailments

[4] *See Exhibit 4-3 and 4-5 below.*

when energy prices are high. In addition, EDR resources may simultaneously qualify as Planning Resources as discussed below.

Demand Response as a Planning Resource

Planning Resources fall into two potential categories (see Exhibit 2-1): Capacity Resources and LMRs. DRR Type I or II can qualify for either category of Planning Resource. Load Modifying Resources (LMRs) qualify as such when the Market Participant registers, and MISO accepts, those assets as LMRs. LMRs are either Demand Resources or Behind-the-Meter Generation (BTMG)[5]. Registering as an LMR and clearing the Planning Resource Auction (or being included in a Fixed Resource Adequacy Plan (FRAP)) 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. Module E-1 of the MISO Tariff prescribes how LMRs are accredited as Planning Resources. Planning Resources have monetary value because they can be substituted for Generation Resources by an LSE in meeting its assigned Planning Reserve Margin Requirement (PRMR). Currently, the minimum size of these LMRs is one hundred (100) kWs

Exhibit 2-1: Planning Resource Categories

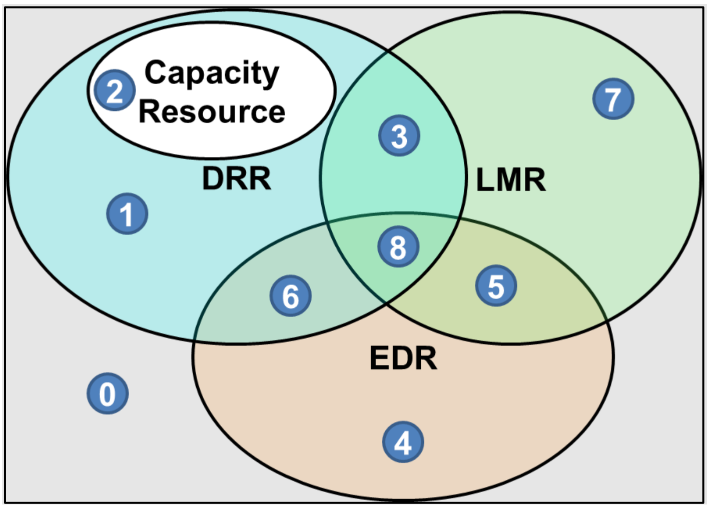
	Planning Resource			
	Capacity Resource		Load Modifying Resource	
	Generation and External Resources	Demand Response Resource (3)	BTMG	Demand Resource
Capacity Verification (1)	x	x	x	x
Must Offer (1)	x	x		
GADS Data Entry (2)	x		x	
DADS Data Entry		x		x
Must Respond to EOP	x (4)	x (4)	x	x

(1) Includes Intermittent Resources with Must Offer Requirements
(2) BTMG greater than 10 MW must supply GADS data
(3) Resources that could qualify as Demand Response Resources need not necessarily quality as Capacity Resources. Qualification depends, in part, upon the desired market(s) in which the resource will participate.
(4) Capacity Resource must respond, only if capable

[5] *If the MP registers behind-the-meter generation as an LMR, then its acronym is BTMG. If not registered as an LMR, but registered as another demand response instrument, then its acronym is btmg.*

As shown in Exhibit 2-2, there are many options available for demand response registration. Note that not all these configurations have been used by MISO Market Participants, but they are available. The finer distinctions between registering as a Capacity Resource, an LMR, a DRR, and/or an EDR should be evaluated by the Market Participant prior to registering under any of these categories.

Exhibit 2-2: Demand Response Registration Options



#	Comments/Notes
0	Not MISO Registered; cannot participate directly in MISO markets. End-use customers, or their agents, can use their demand-side assets at any time on their own volition to manage their energy consumption.
1	There is no DRR "must offer" requirement, since there are no capacity credits.
2	DRRs. "must offer" into the Energy & Ancillary Services markets.
3	Asset registers as an LMR and receives capacity credits, and also registers as a DRR with options to offer into the Energy & Ancillary Services markets.
4	EDR Only. No capacity credits or "must offer" requirement.
5	LMR that optionally provides an EDR offer for emergency energy.
6	Similar to "1", but optional participation in emergencies
7	LMR only. Not involved in Energy and Ancillary Services markets.
8	Similar to "5", but can optionally participate in Energy & Ancillary Services markets.

Note that in Options 1 – 8, the entity must be a Certified MISO Market Participant to participate.

Demand Response as a Non-Transmission Alternative

Consistent with Attachment FF of the Tariff, both transmission and Non-Transmission Alternatives (NTA) to resolve Transmission Issues will be considered on a comparable basis within the MISO transmission planning process. Non-transmission alternatives include contracted demand response, new or upgraded generators with executed interconnection agreements, and other non-transmission assets (e.g., energy storage not classified as a transmission asset, etc.). Additional details about this use for demand response are presented in Section 4.3.1.2 of *BPM-020: Transmission Planning*.

2.3 State and Other Retail Regulatory Requirements

In addition to MISO's own standards and requirements for demand response, the states or other retail regulatory entities within the MISO Region may also have various requirements and regulations that must be met regarding the use of demand response. MISO acknowledges the important role that state and other retail regulatory authorities play, in collaboration with FERC, and has developed its demand response initiatives to be supportive of these requirements.

For example, some state Relevant Electric Retail Regulatory Authorities (RERRA) currently do not allow ARCs to do business directly with retail customers subject to their jurisdiction. Such prohibitions may also be imposed by the RERRA having regulatory control over public power entities and cooperatives. Section 3.2 below expands on this.

For further details, Market Participants are encouraged to review demand response registration provisions contained in the BPM for Market Registration (BPM-001), and the BPM for Resource Adequacy (BPM-011). Credit requirements for Market Participants with demand response are found in Attachment L of the Tariff; and modeling requirements are specified in the BPM for Network and Commercial Models (BPM-010).

3 Registration Options for Demand Response

Registration of demand resources requires knowledge of two key issues: what are the operational characteristics of the resource ("what is it capable of doing") and how much responsibility for market participation is the Market Participant willing to accept? There are various levels of market interaction available to demand resources; some of these may be beyond the capabilities of the resource (e.g. regulation service), while some may involve more responsibilities than the Market Participant is willing to assume (e.g. does not wish to voluntarily interrupt during certain time periods). Answers to these two key questions will usually provide the Market Participant with a clearer picture of how the resource should be registered with MISO.

Finally, while this section of this BPM is intended to help Market Participants register demand resources, please consult the BPMs for Market Registration (BPM-001) and for Resource Adequacy (BPM-011) for further details, or contact Client Services & Readiness at help@misoenergy.org.

3.1 Registration as a Market Participant

To ensure fair, efficient, and competitive markets, MISO requires all entities desiring to participate in the Open Access Transmission, Energy and Operating Reserve Markets to undergo Market Registration and Qualification processes, also described in Section 38.2.2 of the MISO Tariff. Only valid legal entities, not otherwise prohibited from market participation by FERC or any appropriate regulatory authority, may register as a Market Participant.

Opportunities to join in the Open Access Transmission, Energy and Operating Reserve Markets for asset owning and non-asset owning MPs will be in accordance with Commercial Model or other applicable timelines,[6] which allows new Applicants to be adequately informed and have their facilities properly modeled before they participate as MPs. To become a Market Participant, an Applicant must complete the Market Participant Qualification Process with MISO by completing the online application, submitting all sections and required documents, completing the verification of assets by the quarterly Commercial Model deadline (as applicable), and completing the credit requirements as outlined in Section 3.4 of this BPM.

To register as a Market Participant, all Applicants will use MISO's Online Registration tool. Applicants will be prompted to complete application sections based on intended market activities.

[6] *See BPM-001 Market Registration, Section 3.3: Commercial Model Timeline*

The tool will direct Applicants to complete the applicable sections and accompanying legal documents. It is important to follow the directions carefully for each section as the Applicant's organizational structure and type of activities it wants to engage in will determine the Market Participant's rights and obligations under the MISO Tariff. All applicable forms and supporting documentation must be submitted in accordance with stated deadlines; failure to do so will delay processing of the application.

For full details on the process, please refer to the BPM for Market Registration (BPM-001).

Demand Response Resources (DRRs)

Market Participants who wish to employ a demand resource in the Energy and Operating Reserve market must register their resource as a DRR. Such registration enables the resource to offer energy services, as well as providing any of the OR, RCP, and Short-Term Reserve services for which the resource is qualified (capable).

The Market Participant may also decide to qualify the resource as a Capacity Resource; if so qualified, the MP accepts the "must offer" requirements associated with Capacity Resources and is also entitled to receive Zonal Resource Credits (ZRCs) commensurate with its ability to reduce load at MISO's peak. Note that a resource's maximum capability to reduce load may not be the same amount by which that resource is able to reduce load at MISO's peak. This distinction will be important to provide during registration. For example, an MP with a particular demand resource may be capable of reducing its load on the system by a maximum of 1.5 MW, but only capable of reducing its load by 1.0 MW at MISO's peak. The difference in these two values may be the result, for example, of the resource having its maximum operation at night or during the winter.

As an alternative to registering as a Capacity Resource, a DRR could be registered as an LMR (Planning Resource). An LMR receives ZRCs and is obligated to respond to a MISO Emergency any time they are available during the Planning Year, but no less than five times during the Planning Year, consistent with the availability indicated in the Demand Side Resource Interface (DSRI) and their Scheduling Instructions.

Failure to respond during these Emergencies when sent Scheduling Instructions may result in financial penalties and/or potential disqualification from participation in the Planning Resource Auction. The distinctions described in the earlier paragraph related to load reduction would still apply here. While a DRR may also be registered either as a Capacity Resource or as an LMR (or neither, if it so chooses), it may not be registered as both. Market Participants are urged to review the benefits, potential costs and requirements of various options in order to select the most appropriate to their circumstances and desired operation.

DRR Registration

If the DRR was not registered as a part of the initial Market Participant application, a Market Participant may register its DRR in accordance with stated Commercial Model deadlines posted on MISO's public website[7]. The Market Participant must submit all required documentation to add such resource including, but not limited to:

- Attachment B – Change of Information Form
- Commercial Model Master Template
- Section XIX: Certificate Representation Relationship between Applicant/Market Participant and Owners of Demand Response Resource(s)

All documentation must be received by stated Commercial Model deadlines for the resource to be adequately modeled. The Market Participant submitting the registration request will also be required to confirm the requested change to the Commercial Model during the Asset Confirmation period. A member of the Client Services & Readiness team will notify Market Participants when the confirmation period has opened.

As part of the asset registration process for DRRs, Market Participants are required to submit two default offers, each consisting of 24-hourly parameters, for use in the Day-Ahead Energy and Operating Reserve Market and the Real-Time Energy and Operating Reserve Market, respectively. These default offer parameters must include the data elements described in Section 4 of this BPM.

To register a DRR that will also serve as a Capacity Resource or as an LMR, the Market Participant must also utilize the Module E Capacity Tracking (MECT) tool and comply with all registration deadlines as described in BPM-011 Resource Adequacy. For more information on the registration and qualification process for a DRR to serve as a Capacity Resource or as an LMR, please refer to BPM-011 Resource Adequacy.

[7] *www.misoenergy.org > Markets and Operations > Market Participation*

Load Modifying Resources (LMRs)

Registering demand response as a Load Modifying Resource commits the resource to respond to any MISO Emergency when called upon by MISO. In recognition of this responsibility, the resource is granted ZRCs in an amount commensurate with the amount of load reduction provided by the resource at the expected time of MISO's annual peak demand. Given MISO's current composition, the expected peak occurs during the period June through August during the hours from 2:00 pm through 6:00 pm. Market Participants must submit a variety of information at registration. While the following lists are intended to assist the Market Participant in understanding the required information, MPs are encouraged to review BPM-011 Resource Adequacy for details and contact Capacity Market Administration with any questions.

Demand Resource LMR

For a Demand Resource LMR, qualification and registration information includes:

1) The Demand Resource must be equal to or greater than 100 kW (grouping several smaller resources is allowed in meeting this standard).
2) Submitting monthly availability (in megawatts) and notification time (in hours) for the upcoming Planning Year.
3) Submitting the documentation listed below if the LMR is only available less than 6 months or requires a notification time greater than or equal to 6 hours. If requested by MISO, the documentation below should be available within five (5) Business Days if an LMR is available less than 9 months or requires a notification time greater than 2 hours:
    a) Attestation by a senior employee describing the physical capability of the LMR
    b) LMR operational characteristics or seasonal load output
    c) Timeline from notice to output (Notification Only)
    d) Regulatory or contractual limitations.
4) The Demand Resource must be available to be scheduled for a Demand reduction at the targeted Demand reduction level or by moving to a specified firm service level with no more than 12 Hours advance notice from MISO. For the 2022/2023 Planning Year, a Demand Resource with a notification time requirement greater than 6 hours but less than or equal to 12 hours and a minimum of 10 interruptions allowed during the Planning Year will receive 50% credit as a Planning Resource. For the 2022/2023 Planning Year, Demand Resources with notification time requirements greater than 6 hours but less than or equal to 12 hours with less than 10 interruptions allowed will receive no credit.

5) Once Scheduling Instructions are given by MISO that require a Demand reduction, the Demand Resource must be capable of ramping down to meet the targeted Demand reduction level or achieve the firm service level by the Hour designated by MISO's Scheduling Instructions.
6) Once the targeted level of Demand reduction or firm service level is achieved, the Demand Resource must be able to maintain the targeted level of Demand reduction or firm service level continuously for at least four (4) consecutive hours.
7) The Demand Resource must be capable of being interrupted at least the first five (5) times during the Planning Year when called upon by MISO. For the 2022/2023 Planning Year, Demand Resources with a notification time requirement less than or equal to 6 hours will receive credit as a Planning Resource based on a multiplier of: (i) 80% if 5 to 9 interruptions per Planning Year are allowed on the Demand Resource; or, (ii) 100% if 10 or more interruptions per Planning Year are allowed on the Demand Resource. Beginning in the 2023/2024 Planning Year, the Demand Resource must have a notification time equal to or less than six (6) hours and be capable of being interrupted for: (i) at least the first five (5) times requested in the Summer Season; (ii) at least the first five (5) times requested in the Winter Season; (iii) at least the first three (3) times requested in the Spring Season; and (iv) at least the first three (3) times requested in the Fall Season, based on their physical availability when called upon by the Transmission Provider for an Emergency during any applicable Season in the Planning Year for which the Demand Resource receives credit as a Planning Resource. These obligations only apply to Seasons in which a Demand Resource clears the Planning Resource Auction
8) Market Participants with Demand Resources can demonstrate a real power test for accreditation. The real power test of the Demand Resource may be from a MISO called event or a self-scheduled implementation in accordance with section 4.2.9.8 of BPM-011. If a Demand Resource test is not performed for accreditation, additional options outlined in BPM-011 may be utilized.
9) If the MP with the Demand Resource does not conduct a real power test under MISO's Tariff (Section 69.A.3.5.j) and is thus not accredited via a real power test, the MP can choose to opt out with potential 3x performance penalties and a credit requirement. If the MP has a regulatory preclusion it can document, it will not be subject to higher penalties. If the MP opts out or has a regulatory exclusion, the MP may provide operational data, or develop an alternative mechanism, subject to the approval of MISO, by which the demand reduction capability can be demonstrated

and the MP must participate in at least one of the voluntary LMR drills MISO conducts.

10) When a Demand reduction is requested by MISO, unless the Demand Resource is unavailable due to maintenance requirements or for reasons of Force Majeure, the resultant reduction must be a reduction that would not have otherwise occurred within the next twenty-four (24) hour period. There shall be no penalties assessed to a Market Participant representing the entity that has designated the ZRCs from the LMR if the Demand Resource is unavailable for interruption as a result of maintenance requirements or for reasons of Force Majeure, or in the event the specified Demand reduction had already been accomplished for other reasons (e.g., economic considerations, self-scheduling at or above the credited level of Demand Resource, or local reliability concerns in accordance with instructions from the LBA).
11) A Demand Resource for which curtailment is voluntary or optional during Emergency events declared by MISO pursuant to MISO's emergency operating procedures will not qualify as an LMR.
12) Demand Resources that are offered into the Energy and Operating Reserve Markets as price sensitive Bids are nevertheless obligated to be interrupted during an Emergency pursuant to MISO's emergency operating procedures, regardless of the projected or actual Energy Market LMP.
13) MISO will use the MECT tool to ensure that there is only one MP using ZRCs from a Demand Resource.
14) A Market Participant must provide written documentation to MISO from the RERRA having jurisdiction over the Market Participant, or from customers represented by the LMR Market Participant, with the *amount* and *type* of Demand Resource and the procedures for achieving the Demand reduction. For a Market Participant without state or other retail regulatory accreditation procedures for a Demand Resource, the Market Participant must secure verification from a third-party auditor that is unaffiliated with the Market Participant to provide documentation of the Demand Resource's ability to reduce to the targeted Demand reduction level or to a specified firm service level when called upon by MISO or provide past performance data that demonstrates such reduction capabilities.

Behind the Meter Generation (BTMG) LMR

A Market Participant that owns or possesses equivalent contractual rights in a behind-the-meter generator can request accreditation as a BTMG resource by:

1) Registering such resource(s) with MISO as documented in BPM-011 Resource Adequacy
2) Demonstrating Generation Verification Test Capacity (GVTC) capability for each Planning Year on an annual basis as established in BPM-011 Resource Adequacy, by conducting a real power test or using operational data, and by submitting the GVTC results to MISO no later than October 31 prior to such Planning Year for existing accredited BTMG. All new BTMGs, or an existing accredited BTMG that has an increased installed capacity, shall submit their GVTC to MISO prior to qualification as established in BPM-011 Resource Adequacy.
3) Submitting generator availability data (including, but not limited to, NERC GADS information) into a database provided by MISO and as established in BPM-011 Resource Adequacy. A BTMG greater than or equal to 10 MW (based on GVTC) shall provide MISO with generator availability data. A Market Participant is not required to report generator availability data for a BTMG less than 10 MW if the Market Participant has never provided such data for that BTMG. A Market Participant that begins reporting generator availability data for such a BTMG must continue to report such data.
4) Confirming the BTMG can be available to provide energy with notice not to exceed 12 Hours.
5) Submitting monthly availability (in megawatts) and notification time (in hours) for the upcoming Planning Year.
6) Submitting the documentation listed below if the LMR is only available less than 6 months or requires a notification time greater than or equal to 6-hours. If requested by MISO, the documentation below should be available within five (5) Business Days if an LMR is available less than 9 months or requires a notification time greater than 2-hours: Beginning with the 2022/2023 Planning Year, a BTMG with a notification time requirement greater than 6 hours but less than or equal to 12 hours and a minimum of 10 interruptions allowed during the Planning Year will receive 50% credit as a Planning Resource. For the 2022/2023 Planning Year, BTMG with notification time requirements greater than 6 hours but less than or equal to 12 hours with less than 10 interruptions allowed will receive no credit. For the 2023/2024 Planning Year, the Market Participant must demonstrate that the BTMG is capable of being deployed at the accredited MW level for: (i) at least the first five (5) times requested in the Summer Season; (ii) at least the first five (5) times requested in the Winter Season; (iii) at least the first three (3) times requested in the Spring Season; and (iv) at least the first three(3) times requested in the Fall Season, based on their physical

capability when called upon by the Transmission Provider during an Emergency, during any applicable Season in a Planning Year for which the BTMG receives credit as a Planning Resource.

7) Attestation by a senior employee describing the physical capability of the LMR
8) LMR operational characteristics or seasonal load output
9) Timeline from notice to output (Notification Only)
10) Regulatory or contractual limitations

LMR Registration

Each LMR must be registered with MISO in advance of receiving accreditation. Only Certified Market Participants may register LMRs, and this process is completed by accessing the Module E Capacity Tracking (MECT) tool through the secure Market Portal.

To qualify as a Planning Resource the LMR must meet all the Tariff provisions, summarized in Section 3.1.

For more information on the process and deadlines associated with registering LMRs, refer to BPM-011 Resource Adequacy.

Emergency Demand Response (EDR) Resources

A Market Participant within MISO's footprint may register an Emergency Demand Response resource if it has the ability to cause a reduction in demand in response to receiving an EDR Dispatch Instruction from MISO because the Market Participant: (i) is the operator of a facility capable of reducing demand; (ii) is a Load Serving Entity (LSE) or Aggregator of Retail Customers (ARC) with a contract that entitles the Market Participant to reduce Load at such facility, or; (iii) has the ability to cause an increase in output from a btmg or storage resource to enable a net demand reduction, in response to receiving an EDR Dispatch Instruction from MISO. Only a Market Participant is allowed to register an EDR resource making itself eligible to submit EDR offers to MISO to reduce demand during an emergency event.

The Market Participant must be able to receive an EDR Dispatch Instruction from MISO via Extensible Markup Language (XML). Additionally, the Market Participant must utilize metering equipment that meets the requirements established in the Tariff, including, but not limited to, the ability to provide integrated hourly kWh values on a Commercial Price Node (CPNode) basis. A Market Participant with a registered EDR resource may provide hourly kWh values for non-interval metered demand reductions (e.g., direct Load control) using the alternative Measurements and

Verification Criteria provided in Attachment TT of the Tariff. Measurement of demand reductions will be made on an aggregated applicable CPNode basis to enable the Market Participant's demand reduction to be identified with an LMP; EDR offers can set LMP.

A Market Participant that intends to use a btmg resource for the purpose of reducing demand shall confirm to MISO in writing that: (i) it holds all necessary permits (including, but not limited to, environmental permits) applicable to the operation of the generation resource; (ii) it possesses rights to operate the generation resource that are equivalent to ownership of such unit; and (iii) the generation resource is not a designated Network Resource. Unless notified otherwise, MISO shall deem such representation applies each time the generation resource is used to reduce demand during an emergency event and that the generation resource is being operated in compliance with all applicable permits, including any emissions, run-time limits or other operational constraints that may be imposed by such permits. The Market Participant shall be solely liable for identification of, and compliance with, all such applicable permits.

If the generation resource designated by a Market Participant historically has operated during non-Emergency conditions, the Energy that can be offered under the EDR Initiative is the increase in output from a btmg resource to enable a net Demand reduction, in response to receiving an EDR Dispatch Instruction from MISO. Determination of such output shall be based on the EDR offer and the amount of load reduction provided, as described in the Measurement and Verification protocols.

A Market Participant with a registered EDR resource shall be required to identify if the Demand reduction can be variable (curtail to the firm service level) or alternatively provide a specific level of Demand reduction. Upon receipt of an EDR Dispatch Instruction, the Market Participant shall either: (i) curtail to the firm service level specified in their EDR offer or (ii) provide a specific level of Demand reduction as specified in their EDR offer. Market Participants electing the first option shall be required to identify an expected peak Load in their EDR offer, which can change daily.

The Market Participant is responsible for maintaining Demand reduction information, including the amount in MWh of reduced Demand during emergency events whenever the Market Participant responds to an EDR Dispatch Instruction from MISO. The Market Participant shall provide this information to MISO in accordance with the procedures specified in BPM-005 Market Settlements.

EDR Registration

Prior to participating in the EDR Initiative, a Market Participant must complete and submit all required EDR registration forms posted on MISO's public website (Markets and Operations > Market Participation > Supplemental Registration). An EDR Participant and its associated load asset or btmg asset must be defined in the EDR registration form. The required registration process includes:

- Submit a case through the Help Center at: https://help.misoenergy.org/
- Attach the following documents to the case:
  - EDR Certification Form
  - EDR Registration Form
- Note the case must be submitted first and then the documents can be attached. Please refer to the MISO Help Center Online Guide located in the Learning Center at the following link:
  - https://miso.csod.com/catalog/CustomPage.aspx?id=221000305&tab_page_id=221000305

In addition to the above documentation, the following documentation is required for ARCs (due to the potential quantity of documents, please send these files to help@misoenergy.org):

- ARC EDR Physical Location Worksheet
- All registration forms
- Section XX: Certificate Confirming Fulfillment of Requirements for Applicants Seeking to Participate as Aggregator of Retail Customers (ARC)

An EDR Participant shall verify in writing through the EDR Certification Form that it has received any required approvals from all applicable state regulatory agencies to enable the entity to participate in the EDR Initiative.

This documentation must be received by MISO at least 30 days prior to the requested effective date of the EDR resource and the effective start date must be the first day of the month. MISO shall notify the Market Participant when it has met all required qualifications as set forth in Schedule 30, following which the Market Participant is eligible to submit EDR offers beginning on the first day of the month following its approval.

A Market Participant that wants an EDR resource to be accredited with Zonal Resource Credits under Module E-1 must separately register that resource as an LMR, as described in Section 3.1 of this BPM.

For questions related to EDR registration, refer to BPM-001 Market Registration or contact the Client Services & Readiness team at help@misoenergy.org.

3.2 Registration as an Aggregator of Retail Customers (ARCs)

An Aggregator of Retail Customers (ARC) is a Market Participant sponsoring one or more DRRs, LMRs, and/or EDRs provided by end-use customers that the ARC does not serve at retail. An ARC can, but need not, be an LSE sponsoring a DRR, LMR, or EDR that is the end-use customer of another LSE.

An entity may choose to participate as an ARC provided they have met the registration requirements outlined in the BPM for Market Registration (BPM-001) and have received approvals from all required parties, including ensuring that their respective Relevant Electric Retail Regulatory Authority (RERRA) allows for ARC participation. LSEs can aggregate their own end-use customers subject to their retail regulatory authority approval; therefore, they need not register as ARCs to do so.

ARC Registration

An applicant will indicate its desire to register as an ARC during the Market Participant Application process. BPM-001 Market Registration contains complete information on the registration process. If the Market Participant did not register as an ARC during the initial Market Participant application, it may choose to submit required documentation in accordance with applicable timelines. If the Market Participant intends to register a DRR as an ARC, the Applicant needs to start the registration process at least 30 days prior to the Commercial Model deadline date to allow for registration and approvals (DRR Type I and DRR Type II). Additional information regarding the registration of LMRs as an ARC can be found in BPM-011 Resource Adequacy.

As a pre-requisite, the ARC must ensure it has followed registration procedures for its DRRs, LMRs, or EDRs, including the submission of all required documentation by stated deadlines. Applicants or Market Participants seeking to register as an ARC are required to complete the following document as proof that the entity meets applicable RERRA laws, regulations, or orders regarding participation in MISO’s Energy and Operating Reserve Markets (complying with Tariff 38.6):

- *Certificate Confirming Fulfilment of Requirements for Applicants Seeking to Participate as Aggregator of Retail Customers (ARC), including a list of all RERRA areas that the ARC intends to operate in*

An ARC can bundle multiple end-use loads to form an asset, but all loads must be located within a single LSE within an LBA. Each asset may be comprised of one or more Enrollments. Enrollments may be comprised of one or more physical or virtual locations. This applies for DRRs and EDRs. LMRs may only be aggregated up to a Load Zone CPNode level.

Additional data for each end-use load comprising the asset must be provided by applicable deadlines. Market Participants with DRR Type I and/or Type II resources will provide such data through the Demand Response Tool. Market Participants with EDRs will provide the information listed below by completing a physical location template. Market Participants with LMRs will provide the information listed below during registration in the MECT. The Applicant or Market Participant will provide information including, but not limited to, the following for each end-use load comprising the ARC's asset:

- The Local Balancing Authority Area where the end-use loads are located; [8]
- The LSE serving each end-use load that the ARC will control;
- The Relevant Electric Retail Rate Authority (RERRA[9]) having jurisdiction over the LSE;
- Expected demand reductions of each registered DRR, LMR, or EDR resource;
- The Measurement & Verification methodology to be used for each identified demand resource;
- The names of relevant contact persons or entities, postal and e-mail addresses, and telephone numbers; and,
- A list of end-use customer accounts that comprise the demand resources being registered, including names, addresses, account numbers, and meter numbers of such end-use customers.

In addition, the ARC must certify the following for each of its end-use customers:

- Where the utility serving the customer at retail distributed more than four (4) million MWh in the prior fiscal year -
    - The ARC must certify that the laws, regulations, or order(s) of the RERRA do not preclude the end-use customer from participating directly in MISO's

[8] *An ARC can bundle multiple end-use loads to form an asset, but all such loads must be located within a single LSE. In addition, a single end-use load can be a DRR Asset. An ARC may register more than one asset.*
[9] *The RERRA will typically be a state public service/utilities commission, but it could also be the board of a public power entity or a rural electric cooperative.*

Energy and Operating Reserve Markets, providing Capacity or obtaining Zonal Resource Credits under Module E-1 of the Tariff, or being an EDR resource; or,

- Where the utility serving the customer at retail distributed four (4) million MWh or less in the prior fiscal year -
    - The ARC must certify that the laws, regulations, or order(s) of the RERRA *specifically permit* the retail customer to participate directly in MISO's Energy and Operating Reserve Markets, providing Capacity under Module E-1 of the Tariff, or being an EDR resource.

The Market Participant registering as an ARC is required to provide the contact information of the RERRA via the submission of the Section XX form. For DRR Type I and Type II registrations, a pull-down list of RERRAs is available in the Demand Response Tool; if the appropriate RERRA is not listed, the ARC will need to notify MISO (Market Settlements), and the RERRA will then be added so that the ARC can complete the registration. The ARC is responsible for initial and subsequent validation of the RERRA, notifying MISO of any changes.

Concurrent with MISO review of the application, the LBA and the LSE named by the ARC candidate will be notified, triggering concurrent review regarding the information presented by the ARC. The LBA and LSE have ten (10) business days from receipt of the submitted enrollment to "Confirm" or "Object to" the enrollment. Inaction on the part of the LBA or LSE will not result in delay of application approval. For DRR Type I and Type II, the Demand Response Tool will list the applicable reasons for "objection" as well as providing a field for Comments (e.g., helpful details regarding the reasons for "objection"). For EDRs, the "objection" reasons are provided in the physical location template. For LMRs, if the "objection" occurs after the LMR registration deadline (March 1st), the ARC will be given one chance to correct the error or clarify the enrollment and if "objection" after the second attempt, the registration will be reviewed by MISO. If the ARC candidate asset is ultimately denied by MISO as a result of the above processes, any further dispute resolution of the resource application occurs through the Tariff's dispute resolution procedures.[10]

ARC Participation and Review Process

ARC participation is different from other participation in the markets administered by MISO for several reasons. This section attempts to summarize certain issues related to ARC participation.

[10] *MISO Tariff Attachment HH: Dispute Resolution Procedures*

General issues discussed here include the potential for double-counting, communication protocols related to information sharing between ARCs, LBAs, LSEs, and MISO, and re-constitution of load for settlement.

Regarding double-counting, ARC registration requirements include physical addresses and other information which may then be cross-checked by MISO, the LSE, and the LBA with other demand resources registered in MISO Markets. If apparent double counting occurs between MPs during the registration process, MISO will accept end-use customers in a demand resource into a MISO Market on a first-come first-serve basis. LBAs are requested to review and provide important location details (e.g., EPNodes) based on end-use customer addresses and other information and are thus made aware of ARC resources within their service areas. LSEs are requested to review if the end-use customer(s) is already included in an LMR, DRR or EDR for that LSE, if the end-use customer(s) is served by the LSE, account numbers, demand reduction capabilities for assets registering within their service territories and validating and/or providing the CPNode to represent the enrollment.

LSE Responsibilities for EDRs registered by ARCs

Items for review include:

- Correct LSE is listed
- CPNode is owned by the LSE and is still active and not terminated
- Customer account number
- Customer meter number
- Physical location address (Note abbreviations and shortened versions of the street address are acceptable)
- No duplicate account numbers

The following are the confirm/object reasons: Please note other reasons could be included dependent upon changes in the EDR registration process.

- Confirm
- Object – the customer is already registered as part of a LMR, DRR, or EDR for the LSE
- Object – the customer is not served by the LSE
- Object – duplicate account number
- Object – the LSE CPNode provided for this location/customer is incorrect

If MISO does not receive confirm/object within ten business days, the registrations are auto approved unless the approval is subject to RERRA review with respect to a utility with sales equal to or less than 4 million MWhs/fiscal year, in which case failure of the RERRA to confirm within ten business days will result in auto rejection.

With respect to information access for LBAs, the Tariff provides that the LBAs will participate with MISO in reviewing the composition of CPNodes. LBAs will have access to the electrical location and magnitude of resources in an ARC's portfolio of resources to perform operational planning studies. Further, LBAs will be notified of ARC demand reduction offers that have been cleared in the day-ahead and real-time markets to perform reliability assessments and planning roles in the day-ahead and real-time horizon.

LBA Responsibilities for EDRs registered by ARCs

Items for review include:

- Correct LBA is listed
- CPNode is still active and not terminated
- Customer account number
- Customer meter number
- Physical location address (abbreviations and shortened versions of the street address are acceptable)
- No duplicate account numbers

The following are the confirm/object reasons: Please note other reasons could be included dependent upon changes in the EDR registration process.

- Confirm
- Object – invalid location information
- Object – duplicate account number
- Object – invalid customer account information

If MISO does not receive confirm/object within ten business days, the registrations are auto approved unless the approval is subject to RERRA review with respect to a utility with sales equal to or less than 4 million MWhs/fiscal year, in which case failure of the RERRA to confirm within ten business days will result in auto rejection.

To the extent that MISO is required to disclose information specific to ARC demand reduction, MISO will need to follow the Disclosure of Certain Confidential Market Participant Data to Balancing Authorities and Transmission Operators provisions set forth in Section 38.9.1(A) of Module C of the Energy and Operating Reserve Markets Tariff.

LSEs will have access to all pertinent metering, settlements, and Measurement & Verification (M&V) information associated with the operation of an ARC in an LSE's zone upon submission of requested meter data. Upon submission of settlement data by the ARC, the LSE has ten (10) business days to complete its review and confirm or object to the settlement. If objected by the LSE, the ARC then has ten (10) business days in which to resubmit or dispute the objection. If resubmitted, the LSE then has five (5) business days to review. This process continues, including dispute resolution, until the settlement is approved or denied by MISO, or expires.[11] Also as part of the settlement process, LSEs will have access to data on Actual Energy Injections associated with DRRs (and LMRs/EDRs), within seven (7) days of the Operating Day, so that LSEs can verify ARC-related charges. LSEs will also be notified of cleared ARC load reduction offers in real-time through settlement data.

With specific regard to DRR participation and RERRA approvals:

- MISO will not accept offers from new DRRs until after the ten-day deadline and the Commercial Model has been loaded to production
- MISO will automatically accept a DRR's registration following the ten-day deadline, unless the RERRA objects and unless the approval is subject to RERRA review with respect to a utility with sales equal to or less than 4 million MWhs/fiscal year, in which case failure of the RERRA to confirm within ten business days will result in auto rejection;
- RERRAs can reject a DRR's registration at any time, including after the ten-day notice period, and the demand asset will be promptly removed from participating in MISO's markets; and,
- If an otherwise prohibited end-use customer is registered in a DRR, or an end-use customer becomes non-compliant after having registered with MISO, then MISO will not allow the customer to participate in its markets.

MISO shall review the participation of an ARC in the Energy and Operating Reserve Market when the ARC's settlements submitted under Section 38.6of the Tariff are successfully disputed more than ten percent (10%) of the time by a relevant LSE. The ten (10) percent threshold is based on disputes made by a relevant LSE, irrespective of the RERRA, against an ARC and its representing end-use customers served by the relevant LSE for failure to actually perform as indicated during

[11] *If a settlement is not confirmed within 103 calendar days of the event, it will expire.*

a given demand response event. This threshold will be addressed quarterly, based on the ARC's rolling average performance with regard to demand response events.

MISO shall have thirty (30) days to conduct a review pursuant to this Section of the Tariff. MISO shall refer the matter to the RERRA and may refer the matter to the Independent Market Monitor, if the review indicates the relevant ARC and/or LSE is engaging in activity that is inconsistent with the Energy and Operating Reserve Market Tariff.

3.3 Resource Testing

Prior to participation, each demand resource and/or btmg unit that the Market Participant is proposing to use must document its ability to interrupt load within a prescribed time limit when instructed to do so. The prescribed time limit will depend on the particular service the resource is being qualified to provide. *See* Section 7 in this BPM for more details on Resource Testing. Additional requirements related to LMR testing may be found in the BPM for Resource Adequacy (BPM-011).

3.4 Credit Requirements

To participate in the MISO Markets, all Market Participants must have an approved credit application and must have established a Total Credit Limit with MISO Credit Department in accordance with MISO Credit Policy. Additional details on what is required in the credit application can be found in BPM-001 Market Registration or found in Attachment L of the MISO Tariff.

3.5 Changes to Registration

Once a Market Participant is certified, changes may occur in the information originally provided, as specified in the Tariff. Depending on the desired change and the type of demand resource in question, the Market Participant may need to submit documentation or use one of MISO's tools that supports the registration and maintenance of such information. Changes to registrations must follow the applicable timelines.

For questions regarding changes to the following demand response options, please contact the Client Services & Readiness team:

- DRR (Type I or Type II)
- EDR Resource
- ARC Participation

For questions regarding changes to LMRs, please contact the Capacity Market Administration team.

4 Economic Energy, Operating Reserves, Short-Term Reserve and Ramp Capability Product

The provision of economic energy is a service different from the provision of operating reserve and other Ancillary Services. Section 2.2 of this BPM refers to the former as, "Economic Demand Response" and to the latter as "Operating Reserve Demand Response." However, the two services are intimately linked through the algorithms MISO uses to schedule the future outputs of DRRs, i.e. the Security Constrained Unit Commitment (SCUC) and the Security Constrained Economic Dispatch (SCED) algorithms. Working together, the SCUC and SCED "co-optimize" (i.e., maximize the market benefits derived from) the provision of these services by simultaneously determining which service (or services where qualified), and how much, each DRR should provide in each forthcoming hour of the day. See BPM-002 Attachment A for further insight into the SCUC and SCED optimization algorithms. In light of this interrelationship and because the provision of the two services share much in common, this section concurrently addresses both Economic Demand Response and Operating Reserves Demand Response.

4.1 Demand Response Resource Characteristics

As stated earlier, DRR-Type I and DRR-Type II resources are the only resources eligible to provide Economic Demand Response in MISO markets.

A DRR-Type I is defined in Module A of the Tariff as:

> *A Resource owned by a single Load Serving Entity or ARC within the MISO Balancing Authority Area and that (i) is registered to participate in the Energy and Operating Reserve Markets, (ii) that is capable of supplying a specific quantity of Energy, Contingency Reserve, Short-Term Reserve or Capacity, at the choice of the Market Participant, to the Energy and Operating Reserve Market through Behind the Meter Generation and/or controllable Load, (iii) is capable of complying with the Transmission Provider's instructions and (iv) has the appropriate metering equipment installed. Each Demand Response Resource – Type I will be modeled as a Commercial Pricing Node consisting of defined Elemental Pricing Nodes maintained and approved by the Transmission Provider that comprise injections of customer demand response within a single Local Balancing Authority Area for the purposes of scheduling, reporting Actual Energy Injections, and settling Energy, Contingency Reserve, and Short-Term Reserve transactions. The Demand Response Resource – Type I can be modeled as aggregations of whole or portions of Elemental Pricing Nodes. Given the appropriate qualification,*

Demand Response Resource-Type I Resources can provide the following products: Energy, Contingency Reserve, Short-Term Reserve, and capacity under Module E.

A DRR-Type II is defined in Module A of the Tariff as:

A Resource owned by a single Load Serving Entity or ARC within the MISO Balancing Authority Area and that (i) is registered to participate in the Energy and Operating Reserve Markets, (ii) is capable of supplying a range of Energy, Operating Reserve, Up Ramp Capability, Down Ramp Capability, and/or Short-Term Reserve at the choice of the Market Participant, to the Energy and Operating Reserve Market through Behind The Meter generation and/or controllable Load, (iii) is capable of complying with Transmission Provider's Setpoint Instructions and (iv) has the appropriate metering equipment installed. Such Resources will be modeled and/or otherwise treated in a manner comparable as Generation Resources and must comply with the same Applicable Reliability Standards as Generation Resources. Given the appropriate qualification, Demand Response Resource-Type II Resources can provide the following products: Energy, Operating Reserve, Up Ramp Capability, Down Ramp Capability, Short-Term Reserve, and/or capacity under Module E-1.

To comply with the MISO settlements process, the individual EPNodes comprising a DRR must be EPNodes associated with one Load Serving Entity (LSE).

The two types of DRRs differ primarily with respect to their flexibility in responding to dispatch instructions. 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 continuous range of values.

Modeling of DRR-Type I

No special modeling of a DRR-Type I is required in the MISO Network Model, where a DRR-Type I capable load is modeled as regular load. Commercial modeling of DRR-Type I is done using a "DRRNODE1" CPNode, which is similar to the Load Zone CPNode. More information can be found in section 4.2.3 of the Network and Commercial Models BPM 010.

Modeling of DRR-Type II

Because a DRR-Type II may consist of both behind-the-meter generators and controllable load, special modeling is required to account for the DRR-Type II properly as a Resource. For Network Model purposes, the load and generator combination is represented by a single equivalent generator. The Commercial Model representation of a DRR-Type II is similar to that of modeling a traditional Generator, in which a single EPNode-CPNode relationship is used.[12] More information can be found in Section 4.2.4 of the Network and Commercial Models BPM 010.

Figure 4-1 below shows an example of a DRR-Type II resource supplying 10 MW of demand response. This amount is the difference between the net output (-90 MW) and the Minimum Limit (-100 MW).

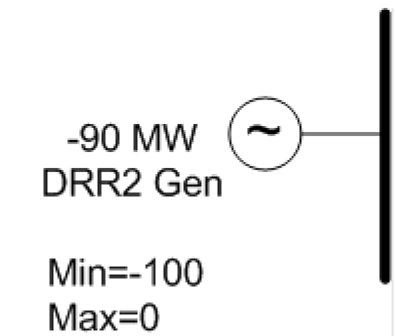


Figure 4-1

4.2 CPNode LMP Determination

The MISO settlement system pays MPs for their energy injections and charges MPs for their energy withdrawals using LMPs corresponding to their respective CPNodes. For each Operating Day, the Day-Ahead / Real-Time (DART) system calculates the LMPs at each EPNode for the Day Ahead Market and again for the Real Time Market. For resources that inject into a single EPNode or loads that withdraw from a single EPNode, their respective CPNode LMPs are simply their respective EPNode LMPs. However, DRR-Type I resources may consist of aggregations of suitable loads located at different EPNodes. In such cases, the hourly LMPs at each CPNode are calculated as a weighted average of the respective hourly LMPs at the EPNodes, where the weighting factors are the respective weighting factors based on the Target Demand Reductions that the Market Participant sponsoring the DRR submitted when the resource was registered. The calculation is described as follows:

[12] *End-use customer assets can be aggregated as long as all assets originate electrically from a single EPNode.*

$$CPNLMP_h = \sum_{i=1}^{k} (\text{Weighting Factor}_i * EPNLMP_{hi})$$

Where “h” indexes each of the 24 hours in the Operating Day and “i" indexes each of the EPNodes comprising the resource’s CPNode.

4.3 Qualifications to Provide Energy

Both types of DRRs are qualified to provide Energy to the market. However, a DRR-Type I is only capable of delivering two levels of output: either zero or its Targeted Demand Reduction. In contrast, a DRR-Type II can deliver varying levels of output spanning a continuum and is also capable of following MISO 5-minute Setpoint Instructions. Because a DRR-Type II is treated as if it were a traditional generator, it must be capable of providing telemetered output data.

4.4 Qualifications to Provide Operating Reserves, STR and RCP

To provide Operating Reserves and/or other Ancillary Services including Short-Term Reserve and the Ramp Capability Product, a DRR must be able to deliver energy to the grid within a prescribed time limit specific to the Operating Reserve product offered and must satisfy all other requirements set forth in the Energy and Operating Reserve Market Tariff. Exhibit 4-1 displays these time limits based on reliability standards adhered to by MISO.

Exhibit 4-1: Operating Reserve Response Time Requirements

Product	Maximum Allowed Response Time	Minimum Continuous Duration	Data Telemetry	Notes
Regulation DRR-Type II	4 Seconds	60 Minutes	2 Seconds	1, 2, 3
Spinning Reserve DRR-Type I DRR-Type II	10 Minutes	60 Minutes	None 10 Seconds	4, 5
Supplemental Reserve DRR-Type I DRR-Type II	10 Minutes	60 Minutes	None 10 Seconds	4, 5
Short-Term Reserve DRR-Type I DRR-Type II	30 Minutes	60 Minutes	None 10 Seconds	5, 6
Note 1: Must provide both REG UP and REG DOWN service. Note 2: Must respond to AGC instructions within four seconds. Note 3: Must be capable of automatically responding to frequency deviations. Note 4: DRR-Type I resources only need to provide five-minute interval data within 5 days after a contingency event. Note 5: Must be physically located within MISO footprint. Note 6: DRR Type I can only provide offline Short-Term Reserve. DRR Type II can provide online and offline Short-Term Reserve				

Regulation

Only DRR-Type II resources can provide Regulation Service because this service requires near-continuous changes in output over a range of values. In addition, the resource must meet the qualifications for providing Regulation service,[13] including the following:

- Fully deployable in both the regulation-up and regulation-down directions
- Capable of automatically responding to and mitigating frequency deviations via speed governor or similar device
- Capable of responding to Automatic Generation Control (AGC) signals within 4 seconds and telemetering its output data at 2-12 second periodicity
- Capable of providing the Regulation Service for a minimum continuous duration of sixty minutes or for the maximum duration specified by Applicable Reliability Standard.

[13] *For details, consult BPM-002 Energy and Operating Reserve Markets, section 4.2.*

Spinning Reserve

Both types of DRR resources are eligible to register to provide Spinning Reserve Service. In addition, these resources must be:

- Capable of deploying 100% of their cleared Spinning Reserve (including Spinning Reserve cleared to meet Supplemental Reserve Requirements) within the 10-minute Contingency Reserve Deployment Period
- Capable of sustaining 100% of their cleared Spinning Reserve as energy for a continuous duration of 60 minutes or the maximum duration specified by Applicable Reliability Standards
- Capable of automatically responding to and mitigating frequency deviations if required by Applicable Reliability Standards[14]
- Capable of providing telemetered output data that can be scanned every 2-12 seconds periodicity (except for DRRs-Type I, which need only provide five-minute interval data no later than 5 days after they reduce load in response to a contingency event)
- Physically located within the Market Footprint
- Any resource that is qualified to provide Regulating Reserve is also qualified to provide Spinning Reserve. A DRR Type-II registered as a Regulation Qualified Resource must also be registered in the Energy and Operating Reserve Markets as a Spin Qualified Resource and as a Supplemental Qualified Resource. Registration is necessary to allow cleared on-line Regulation Qualified Resources to supply Spinning and/or Supplemental Reserve through substitution of such Resources for Spin Qualified Resources. Currently, DRRs can only clear up to forty (40) percent of the spinning reserve requirement, measured in MWs. A special type of DRR Type I called a Batch-Load Demand Resource (BLDR), described in section 10 below, can provide spinning reserve if a Spin Qualified Resource.

Supplemental Reserve

Both types of DRR can provide Supplemental Reserve Service if the resource:

- Is capable of deploying 100% of its cleared Supplemental Reserve within the 10-minute Contingency Reserve Deployment Period
- Can deploy 100% of their cleared Supplemental Reserve for a continuous duration of 60 minutes, or the maximum duration specified by Applicable Reliability Standards

[14] *Current standards do not require Spinning Reserve to be frequency responsive.*

- Has a Minimum Down Time of less than or equal to three hours if a Quick-Start Resource
- Can provide telemetered output data that can be scanned every 2-12 seconds periodicity (except for DRRs-Type I, which need only provide five-minute interval data no later than 5 days after they reduce load in response to a contingency event)
- Is physically located within the market footprint

Any resource that is qualified to provide Spinning Reserve is also qualified to provide Supplemental Reserve. Any Resource registered as a Spin Qualified Resource must also be registered in the Energy and Operating Reserve Markets as a Supplemental Qualified Resource to allow cleared Spin Qualified Resources to supply Supplemental Reserve through substitution of such Resources for Supplemental Qualified Resources. A special type of DRR Type I called a Batch-Load Demand Resource (BLDR), described in section 9 below, can provide supplemental reserve if a Supplemental Qualified Resource.

Ramp Capability Product

Only DRR Type-II resources are eligible to provide the Ramp Capability Product. The Ramp Capability Product is cleared in the Day-Ahead or Real-Time Energy and Operating Reserve Markets to reserve ramp capability to respond to net load variations and includes the following features:

- The Up Ramp Capability and Down Ramp Capability requirements are designed to model both the expected net energy demand change and additional uncertain variation across all market processes and across different system operational conditions at a system level (zonal values will be calculated).
- The contribution of a resource to the ramp capability constraint is limited by its operating limits and its ramp rate over the modeled deployment time. No Market Participant offer price is needed. Market Participants will be able to indicate their offered dispatch status as either “Economic” or “Not Participating”.
- Ramp capability is not explicitly “deployed.” Rather Ramp Capability prepositions resources so that adequate ramp is available in subsequent dispatch intervals. Ramp Capability Requirement Demand Curve will enforce this constraint as a soft constraint.

See BPM-002 sections 3.4 and 4.2.1.4 for additional Ramp Capability information.

Short-Term Reserve

Both types of DRRs can provide Short-Term Reserve Service; DRR Type IIs can provide Short-Term Reserve in both online and offline mode, while DRR Type Is can only provide offline. The Short-Term Reserve Product is cleared in the Day-Ahead or Real-Time Energy and Operating Reserve Markets to reserve 30-minute flexible capacity and includes the following features:

- It can be provided by online or offline resources that can provide energy within the STR deployment period of 30 minutes.
- The product separately addresses market-wide, sub-regional and local short-term reserve needs through a market-wide requirement and post reserve deployment constraints.
- Online Short-Term Reserve is cleared on an opportunity cost basis and is deployed as energy dispatch. Offline Short-Term Reserve is cleared based on an offer price and requires operator commitment instructions.
- Demand curves for Short-Term Reserve are defined to represent the value of the product. When the cleared Short-Term Reserve level is less than the market-wide requirement, the Market-Wide Short-Term Reserve Demand Curve sets the Market-Wide Short-Term Reserve constraint shadow price as defined in MISO Tariff Schedule 28. Sub-regional and local Short-Term Reserve requirements are established using Post Reserve Deployment Constraints and are valued at the Post Reserve Deployment Constraints Demand Curves as defined in MISO Tariff Schedule 28C.

MISO sets the Market-Wide Short-Term Reserve Requirement based on offline analysis. Sub-regional and local Short-Term Reserve requirements are established using Post Reserve Deployment Constraints. These constraints dynamically determine requirements based on the loss of generation elements and associated change in flow, and the flow limits.

4.5 DRR Offers

MISO maintains a Day-Ahead Schedule Offer and a Real-Time Schedule Offer for each DRR-Type I and DRR-Type II resource. These are standing Offers that are maintained for each market (DA and RT) independent of the other. Initially the standing Offers are established at the time the DRR is registered with MISO and may be updated by the sponsoring Market Participant. Updates may be designated as updating the Day-Ahead Schedule Offer only, the Real-Time Schedule Offer only, or both.

Starting in July 2016, the Real Time Offer Override Enhancement (RTOE) capability went live. RTOE allows the Market Participant to programmatically request overrides of resource capability offers in real time, through the Market Portal's DART MUI or XML. Overrides are grouped in nine independent sets. Complete sets must be submitted when requesting an override (see Exhibit 4-2). Market Participant overrides will be valid for the current market hour and next market hour. Market Participant override termination date/time will be adjusted if the underlying offer is updated subsequent to the override request, termination date/time will be set to least of a) existing termination date; or b) start of updated schedule market hour.

Exhibit 4-2: Real Time Offer Override Enhancement (RTOE) Sets

Set	Gen/DRR2 Override Parameters	SER Parameters	DRR1 Parameters	EAR Override Parameters
Run Times	Notification Time		Notification Time	Notification Time
Operating Limits	Economic Min, Eco Max, Regulation Min, Reg Max, Emergency Min, Emer Max	Reg Min, Reg Max	Target Demand Reduction MW	Economic Min, Eco Max, Regulation Min, Reg Max, Emergency Min, Emer Max
Offline Response	OfflineRespMax OfflineSTRMax			OfflineRespMax
Ramp Rates	RR Up, RR Down, Reg RR (bi-directional)	Ramp Rate Bidirectional		RR Up, RR Down, Reg RR (bi-directional)
Self Schedules	SelfMWEnergy, SelfMWSpin, SelfMWOnlineSupp, SelfMWReg, SelfMWOfflineSupp	SelfMWReg	SelfMWSpin, SelfMWOnlineSupp	SelfMWEnergy, SelfMWSpin, SelfMWOnlineSupp, SelfMWReg,
Dispatch Status	Energy Dispatch Status, Reg Status, Spinning Reserve Status, Online Supp Status, Offline Supp Status, Ramp Capability Status Online STR Dispatch Status Offline STR Dispatch Status	Reg Status	Online Supp Status, Spin Status Offline STR Dispatch Status	Energy Dispatch Status, Reg Status, Spinning Reserve Status, Online Supp Status, Ramp Capability Status Online STR Dispatch Status

Set	Gen/DRR2 Override Parameters	SER Parameters	DRR1 Parameters	EAR Override Parameters
Commit Status	Energy Commit Status	Commit Status	Energy Commit Status	Energy Commit Status
Off Control, EEE Flag	OffControlFlag, EEE Flag	OffControlFlag, EEE Flag	OffControlFlag, EEE Flag	OffControlFlag, EEE Flag

MISO uses DRR offers as inputs to the SCUC and SCED (Real-Time Unit Dispatch System only uses SCED). Such offers may be submitted for the Day-Ahead and Real-Time Energy and Operating Reserve Markets. The contents of these offers are briefly described next. Detailed descriptions of the data elements comprising DRR offers can be found in the BPM for the **Energy and Operating Reserve Markets (BPM-002)**.

DRR-Type I

Exhibit 4-3 and Exhibit 4-4 identify the data elements comprising a DRR-Type I offer.

Exhibit 4-3: DRR-Type I Economic Data Summary

Data Element	Units	DAM Offer	RTM Offer	Notes
Energy Offer	$/MWh	Hourly	Hourly	2
Hourly Curtailment Offer	$/Hr	Hourly	Hourly	2
Shut-Down Offer	$	Daily	Daily	2
Spinning Reserve Offer	$/MW	Hourly	Hourly	1,2,3
Supplemental Reserve Offer	$/MW	Hourly	Hourly	1,2,3
Self-Scheduled Spinning Reserve	MW	Hourly	Hourly*	1
Self-Scheduled Supplemental Reserve	MW	Hourly	Hourly*	1
Off-Line Short-Term Reserve Offer	$/MW	Hourly	Hourly*	1
Note 1: If qualified to provide the service. Note 2: The Targeted Demand Reduction is valid for the indicated hour. A DRR-Type I resource is capable of delivering this full reduction or no reduction, i.e., intermediate values are infeasible Note 3: Up to 3 MW/Price pairs may be submitted. Note *: Offer parameters can be overwritten in Real-Time Market using Real-Time Offer Override (RTOE). Override is effective next dispatch interval				

Exhibit 4-4: DRR-Type I Operating Parameter Data Summary

Data Element	Units	DAM Offer	RTM Offer	Notes
Targeted Demand Reduction Level	MW	Hourly	Hourly*	2,3
Minimum Interruption Duration	hh:mm	Daily	Daily	3
Maximum Interruption Duration	hh:mm	Daily	Daily	3
Minimum Non-Interruption Interval	hh:mm	Daily	Daily	3
Shutdown Time	hh:mm	Hourly	Hourly	3
Shutdown Notification Time	hh:mm	Hourly	Hourly*	3
Energy Commitment Status	Select	Hourly	Hourly*	
Spinning Reserve Dispatch Status	Select	Hourly	Hourly*	1
Supplemental Reserve Dispatch Status	Select	Hourly	Hourly*	1
Maximum Daily Contingency Reserve Deployment	MWh	N/A	Daily	1
Off-line Short-Term Reserve Dispatch Status	Select	Hourly	Hourly	1

Note 1: If qualified.

Note 2: The Targeted Demand Reduction is valid for the indicated hour. A DRR-Type I resource is capable of delivering this full reduction or no reduction, i.e., intermediate values are infeasible.

Note 3: Default Offers are used if no values are submitted for the day.

Note *: Offer parameters can be overwritten in Real-Time Market using Real-Time Offer Override (RTOE). Override is effective next dispatch interval

DRR-Type II

Because DRR-Type II resources are able to provide a greater range of output to the markets, their Offers are more complex than DRR-Type I Offers. Exhibit 4-5 through Exhibit 4-7 identify the data elements comprising a DRR-Type II offer.

Exhibit 4-5: DRR-Type II Economic Data Summary

Data Element	Units	DAM Offer	RTM Offer	Notes
Energy Offer Curve	MW,$/MWh	Hourly	Hourly	5
No-Load Offer	$/Hr	Hourly	Hourly	4,6
Regulating Reserve Capacity Offer	$/MWh	Hourly	Hourly	1,5,8
Regulating Reserve Mileage Offer	$/MW	Hourly	Hourly	1
Spinning Reserve Offer	$/MWh	Hourly	Hourly	1,5,8
On-Line Supplemental Reserve Offer	$/MWh	Hourly	Hourly	1,2,5,8
Off-Line Supplemental Reserve Offer	$/MWh	Hourly	Hourly	3,5,8
Off-Line Short-Term Reserve Offer	$/MWh	Hourly	Hourly	1
Hot Start-Up Offer	$	Daily	Daily	4,7
Intermediate Start-Up Offer	$	Daily	Daily	4,7
Cold Start-Up Offer	$	Daily	Daily	4,7
Self-Scheduled Regulation	MW	Hourly	Hourly*	1
Self-Scheduled Spinning Reserve	MW	Hourly	Hourly*	1
Self-Scheduled On-Line Supplemental Reserve	MW	Hourly	Hourly*	1,2
Self-Scheduled Off-Line Supplemental Reserve	MW	Hourly	Hourly*	3
Self-Scheduled Energy	MW	Hourly	Hourly*	
Fast Ramping Resource Flag	True/False	N/A	Hourly	

Note 1: If qualified.
Note 2: If not Spin Qualified.
Note 3: Quick-Start Resources only
Note 4: Default Offers are used if no values are submitted for Energy and Operating Reserve Markets.
Note 5: Can take the form of a Block Offer or a Slope Offer. See BPM-011 for further information.
Note 6: For a DRR-Type II, its “No Load Offer” is the hourly price for maintaining a readiness to reduce load.
Note 7: For a DRR-Type II, its “Startup Offer” is the daily price for being available to reduce load.
Note 8: Up to 3 MW/Price pairs may be submitted.
Note *: Offer parameters can be overwritten in Real-Time Market using Real-Time Offer Override (RTOE). Override is effective next dispatch interval

Exhibit 4-6: DRR-Type II Commitment Operating Parameter Data Summary

Data Element	Units	DAM Offer	RTM Offer	Notes
Hot Notification Time	hh:mm	Hourly	Hourly*	
Hot Start-Up (*DR Shut-Down*) Time	hh:mm	Hourly	Hourly	
Hot to Intermediate Time	hh:mm	Daily	Daily	
Intermediate Notification Time	hh:mm	Hourly	Hourly*	
Intermediate Start-Up (*DR Shut-Down*) Time	hh:mm	Hourly	Hourly	
Hot to Cold Time	hh:mm	Daily	Daily	
Cold Notification Time	hh:mm	Hourly	Hourly*	
Cold Start-Up (*DR Shut-Down*) Time	hh:mm	Hourly	Hourly	
Maximum Daily Starts (*DR Shutdowns*)	Integer	Daily	Daily	
Maximum Daily Energy	MWh	Daily	Daily	
Minimum Run (*DR Shutdown*) Time	hh:mm	Daily	Daily	
Maximum Run (*DR Shutdown*) Time	hh:mm	Daily	Daily	
Minimum Up (*DR Down*) Time	hh:mm	Daily	Daily	
Commitment Status	Select	Hourly	Hourly	1
Maximum Daily Reg Up Deployment	MWh	N/A	Daily	
Maximum Daily Regulation Down Deployment	MWh	N/A	Daily	
Maximum Daily Contingency Reserve Deployment	MWh	N/A	Daily	
Note 1: Default Offers are used if no values are submitted for Energy and Operating Reserve Markets. Note *: Offer parameters can be overwritten in Real-Time Market using Real-Time Offer Override (RTOE). Override is effective next dispatch interval.				

Exhibit 4-7: DRR-Type II Dispatch Operating Parameter Data Summary

Data Element	Units	DAM Offer	RTM Offer	Notes
Hourly Economic Minimum Limit	MW	Hourly	Hourly*	1
Hourly Economic Maximum Limit	MW	Hourly	Hourly*	1
Hourly Regulation Minimum Limit	MW	Hourly	Hourly*	1
Hourly Regulation Maximum Limit	MW	Hourly	Hourly*	1
Hourly Emergency Minimum Limit	MW	Hourly	Hourly*	1
Hourly Emergency Maximum Limit	MW	Hourly	Hourly*	1
Maximum Off-Line Response Limit	MW	Hourly	Hourly*	1,4,5
Maximum Off-Line STR Response Limit	MW	Hourly	Hourly	1, 6
Energy Dispatch Status	Select	Hourly	Hourly*	1
Regulating Reserve Dispatch Status	Select	Hourly	Hourly*	1
Spinning Reserve Dispatch Status	Select	Hourly	Hourly*	1
On-line Supplemental Reserve Dispatch Status	Select	Hourly	Hourly*	1
Off-line Supplemental Reserve Dispatch Status	Select	Hourly	Hourly*	1,4
Hourly Single-Directional-Up Ramp Rate	MW/min	N/A	Hourly*	1,3
Hourly Single-Directional-Down Ramp Rate	MW/min	N/A	Hourly*	1,3
Hourly Bi-Directional Ramp Rate	MW/min	N/A	Hourly*	1,3
Hourly Ramp Rate	MW/min	Hourly	Hourly	1,2,3
Single-Directional-Up Ramp Rate Curve	MW/min	N/A	Hourly	3
Single-Directional-Down Ramp Rate Curve	MW/min	N/A	Hourly	3
Bi-Directional Ramp Rate Curve	MW/min	N/A	Hourly	3
Ramp Capability Dispatch Status	Select	Hourly	Hourly*	1
On-line Short-Term Reserve Dispatch Status	Select	Hourly	Hourly*	
Off-line Short-Term Reserve Dispatch Status	Select	Hourly	Hourly*	6

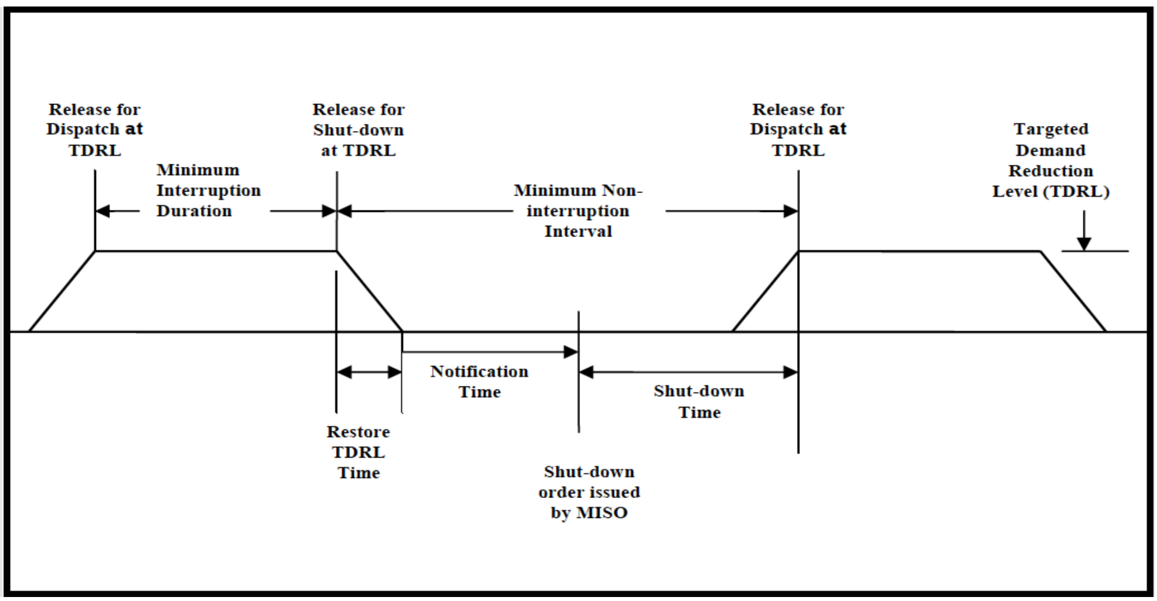
Note 1: Default Offers are used if no values are submitted for Energy and Operating Reserve Markets.
Note 2: Hourly Ramp Rate is used in the Day-Ahead Market and RAC.
Note 3: Ramp Rates may be submitted by MPs at any time and remain fixed until changed by MPs.
Note 4: Only applicable to Quick-Start Resources
Note 5: Participant-limited to the level achieved during last deployment or test of Offline Supplemental Reserves issued by MISO
Note 6: Only applicable to Off-Line Short-Term Reserve Qualified Resources
Note *: Offer parameters can be overwritten in Real-Time Market using Real-Time Offer Override (RTOE). Override is effective next dispatch interval.

4.6 Commitment and Dispatch

MISO uses two optimization algorithms, SCUC and SCED, to optimally schedule Resources in a least cost manner to meet the energy balance in its Day-Ahead and Real-Time Markets. Security Constrained Unit Commitment (SCUC) optimally commits Resources in a least cost manner considering Start Up (Shutdown) Offers and No Load (Hourly Curtailment) Offers. Security Constrained Economic Dispatch (SCED) optimally dispatches Resources to operating levels to meet Day-Ahead or Real-Time needs. Both algorithms are employed to simultaneously clear Supply Offers and Demand Bids for each time interval, efficiently allocate transmission capacity to Day-Ahead or Real-Time Schedules by resolving transmission congestion and commit and dispatch Resources at least-cost to meet the Energy and Congestion Management requirements throughout the Operating Day.

DRR-Type I

Exhibit 4-8: DRR-Type I Operation Timeline



DRR-Type I Commitment Status

Exhibit 4-9: DRR-Type I Commitment and Dispatch

Parameter	Use	Format and Validation
Shutdown Time Notification	The Shut-Down Notification Time is used in evaluating the commitment in the Day-Ahead Energy and Operating Reserve Market and the Real-Time Energy and Operating Reserve Market. This parameter, in conjunction with the associated Shut-Down Time, establishes the time required to shut down the Resource at the Targeted Demand Reduction Level.	The Shut-Down Notification Time parameter is submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer. These times are accepted in hh:mm format. The default value is 00:00. This value cannot exceed 23:59.
Shut-Down Time	The Shut-Down Time is used in evaluating commitment in the Day-Ahead Energy and Operating Reserve Market and the Real-Time Energy and Operating Reserve Market. This parameter, in conjunction with the associated Shut-Down Notification Time, establishes the time required to shut down the Resource at the Targeted Demand Reduction Level.	The Shut-Down Time parameter is submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer. This time is accepted in hh:mm format.
Minimum Interruption Duration	MISO schedule commitments in the Day-Ahead Energy and Operating Reserve Market and the Real-Time Energy and Operating Reserve Market must be for at least as many consecutive hours as specified by Minimum Interruption Duration. Commitment times may be for greater than the Minimum Interruption Duration if a DRR -Type I is economic for additional hours.	The Minimum Interruption Duration is submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer. This time is accepted in hh:mm format.
Minimum Non-Interruption Interval	The Day-Ahead Energy and Operating Reserve Market and the Real-Time Energy and Operating Reserve Market commitments respect the Minimum Non-Interruption Interval in determining when a DRR –Type I is available for shut down.	The Minimum Non-Interruption Interval is submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer. This time is accepted in hh:mm format. The default value is 00:00.
Maximum Interruption Duration	The Maximum Interruption Duration restricts the number of consecutive hours a DRR -Type I can be committed during the Day-Ahead Energy and Operating Reserve Market and the Real-Time Energy and Operating Reserve Market.	The Maximum Interruption Duration is submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer. This time is accepted in hh:mm format. The default value is 99:99.
Maximum Daily Contingency Reserve Deployment	The Maximum Daily Contingency Reserve Deployment restricts the amount of contingency reserve that may be deployed on a DRR-Type I during one Operating Day in the Real-Time Energy and Operating Reserve Market. It is not used in the Day-Ahead Market or RAC process.	The Maximum Daily Contingency Reserve Deployment is submitted as part of the Real-Time Schedule Offer. The format is MWh.

Exhibit 4-9 summarizes how DRR-Type I operating parameters are used in MISO's Day-Ahead Energy and Operating Reserve Market and Reliability Assessment Commitment (RAC) process to commit and economically dispatch these resources.

Both a Day-Ahead Schedule Offer and Real-Time Schedule Offer have an associated DRR-Type I commitment status. The commitment status impacts the decisions made in unit commitment. The three commitment status options are:

- *Not Participating* – Designates the DRR-Type I is not available for Energy commitment in the Energy and Operating Reserve Markets for that Hour but could be available for Contingency Reserve clearing depending on the Spinning Reserve or Supplemental Reserve Dispatch Status.
- *Emergency* – Designates the DRR-Type I is available for commitment for Energy in Emergency situations only.
- *Economic* – Designates the DRR-Type I is available for commitment for Energy by MISO.

For a DRR – Type I that is a designated Capacity Resource, the *Not Participating* Commitment Status is only applicable if that Resource is unavailable due to a forced or planned outage or other physical operating restrictions.

The single value commitment status can vary by hour in the Day-Ahead Schedule Offer or Real-Time Schedule Offer and will override the default status. The default status is set during asset registration. If the MISO SCUC algorithm commits the DRR Type I resource, then because of the on/off property of this asset, it is cleared for energy.

DRR-Type I Offer Dispatch Status

Dispatch Status for a DRR-Type I can be selected on an hourly basis for Spinning Reserve and Supplemental Reserve (if it is a Spin Qualified Resource), or for Supplemental Reserve (if it is a Supplemental Qualified Resource but not a Spin Qualified Resource).

Spinning Reserve or Supplemental Reserve Dispatch Status selections made in combination with Commitment Status selections allow a DRR-Type I to choose whether they can be committed for Energy only or dispatched for Spinning Reserve or Supplemental Reserve only, as applicable, under both normal and Emergency conditions. Valid DRR-Type I Dispatch Status selections are: Economic, Self-Schedule, Emergency, Not Qualified or Not Participating. For a DRR-Type I that is a designated Capacity Resource and is qualified to provide Spinning Reserve and/or Supplemental Reserve, the Not Participating Spinning Reserve Dispatch Status or Supplemental Reserve Dispatch Status is only applicable if such Resource is unavailable due to a forced or planned outage or other physical operating restrictions.

Exhibit 4-10 shows the valid Dispatch Status and Commit Status selection combinations to achieve the desired results.

Exhibit 4-10: Valid DRR-Type I Commit and Dispatch Status Combinations

Commit Status	Spin or Supp Dispatch Status	Normal Operations				Emergency Operations[15]			
		Energy Only	Spin or Supp Reserve Only	Either	None	Energy Only	Spin or Supp Reserve Only	Either	None
Economic	Economic			√				√	
Economic	Not Participating	√				√			
Economic	Not Qualified	√				√			
Economic	Self-Schedule			√				√	
Economic	Emergency	√						√	
Not Participating	Economic		√				√		
Not Participating	Not Participating				√				√
Not Participating	Not Qualified				√				√
Not Participating	Self-Schedule		√				√		
Not Participating	Emergency						√		
Emergency	Economic		√[16]					√	
Emergency	Not Participating					√			
Emergency	Not Qualified					√			
Emergency	Self-Schedule		√[22]					√	
Emergency	Emergency				√			√	

(Note 22 - Not available to Resources designated as Capacity Resources for Module E Purposes)

[15] *Emergency Operations are initiated after all capacity that has not been designated as Emergency has been committed and prior to the declaration of an EEA 1.*
[16] *If not committed for Energy during an Emergency.*

Exhibit 4-10: Valid DRR-Type I Commit and Offline Short-Term Reserve Dispatch Status Combinations

Commit Status	Offline Short-Term Reserve Dispatch Status	Normal Operations				Emergency Operations[17]			
		Energy Only	Offline STR Only	Either	None	Energy Only	Offline STR Only	Either	None
Economic	Economic			√				√	
Economic	Not Participating	√				√			
Not Participating	Economic		√				√		
Not Participating	Not Participating				√				√
Emergency	Economic		√[18]					√	
Emergency	Not Participating				√	√			

DRR-Type I Dispatch status may be selected as part of the Day-Ahead and Real-Time Schedule Offer and will override the default status. The default status value is set during asset registration. For a DRR Type I that is a Spin Qualified Resource, if the MP elects ‘not participating’ for its Commit Status and either ‘economic’ or ‘self-schedule’ for its dispatch status, then the DRR Type I resource can be cleared for Spinning Reserve, but the MP will not be guaranteed recovery of any ShutDown Offers because the resource has not been committed by MISO through its SCUC algorithm.

DRR-Type I Self-Schedule

DRR-Type I resources can only submit Self-Schedules for Energy, Spinning Reserve or Supplemental Reserve in amounts less than or equal to their Targeted Demand Reduction Levels (BPM-002 Section 4.2.4.3.4). Submitting a Self-Schedule for Spinning Reserve or Supplemental Reserve will generally ensure that the DRR-Type I resource clears for Contingency Reserve provided that the DRR-Type I has not been committed for Energy.[19] If the Self-Schedule MW value is less than the Targeted Demand Reduction Level, the Resource may clear Spinning Reserve or Supplemental Reserve above the Self-Schedule MW amount, based upon the DRR-Type I Spinning Reserve Offer or Supplemental Reserve Offer, on an economic basis as part of the Energy and Operating Reserve Markets clearing process. A Self-Schedule is a price taker up to Self-Schedule MW level.

[17] *Emergency Operations are initiated after all capacity that has not been designated as Emergency has been committed and prior to the declaration of an EEA 1.*
[18] *If not committed for Energy during an Emergency.*
[19] *MISO can relax any self-schedule constraint if warranted by unusual system conditions.*

MISO will reduce Self-Schedules if such schedules cannot be physically implemented based upon the submitted Targeted Demand Reduction Level. Additionally, MISO may reduce accepted Self-Schedules as necessary to manage transmission constraints, maintain Operating Reserve requirements, satisfy Energy demand and/or maintain reliable operating conditions. In no case will MISO violate the DRR-Type I operating parameters; consequently, it will either accept the Self-Schedule or de-commit the DRR-Type I resource.

DRR-Type II

Exhibit 4-11 presents an Operational Timeline for DRR-Type II resource commitment and dispatch.

Exhibit 4-11: DRR-Type II Operation Timeline

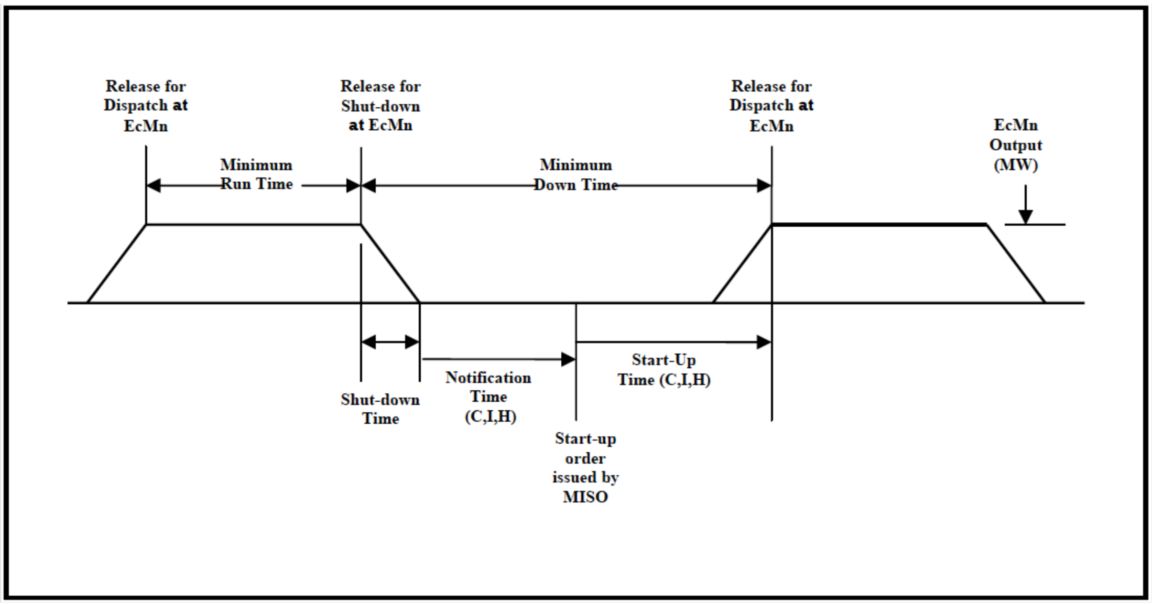


Exhibit 4-12 below summarizes how DRR-Type II operating parameters are used in MISO's Day-Ahead and Real-Time Energy and Operating Reserve Market and Reliability Assessment Commitment ("RAC") processes to commit and economically dispatch DRR Type II resources. Section 4.2.3 of BPM – 002 further describes commitment and dispatch of DRR Type II, similar to generation resources.

Exhibit 4-12: DRR-Type II Commitment and Dispatch

Parameter	Use	Format and Validation
Start-up Notification Time	The Start-up Notification Time is used in evaluating the commitment in the Day-Ahead Energy and Operating Reserve Market and the Real-Time Energy and Operating Reserve Market. This parameter, along with the associated Start-up Time, establishes the time required for the resource to begin following dispatch instructions to vary its load.	The Start-up Notification Time parameter is submitted as part of the Day-Ahead and Real-Time Schedule Offer. These times are accepted in hh:mm format. These values must be less than or equal to 23:59.
Start-up Time	See Above	The Start-Up Time parameter is submitted as part of the Day-Ahead and Real-Time Schedule Offer. These times are accepted in hh:mm format.
Hourly Economic Minimum Limit	The Hourly Economic Minimum Limit designates the minimum Energy output, in MW, from the Resource under non-Emergency conditions. This value may vary from hour to hour through submission in the Day-Ahead Schedule Offer and Real-Time Schedule Offer. The Overall Economic Minimum Limit affects both commitment and dispatch in both the Day-Ahead and Real-Time Energy and Operating Reserve Markets. Energy and Operating Reserve Market dispatch is from Hourly Economic Minimum Limit to Hourly Economic Maximum Limit under normal conditions.	The Hourly Economic Minimum Limit may be submitted to override the default Offer, for both the Day-Ahead Schedule Offer and Real-Time Schedule Offer. The data value accepted may be to the tenth of a MW. This value is expected to be negative, indicating the amount of baseline load when no Energy is cleared. See example in Figure 4-1.
Hourly Economic Maximum Limit	The Hourly Economic Maximum Limit designates the maximum Energy available, in MW, from the Resource under non-Emergency conditions. This value may vary from hour to hour through submission in the Day-Ahead Schedule Offer and Real-Time Schedule Offer. The Overall Economic Maximum Limit affects both commitment and dispatch in both the Day-Ahead and Real-Time Energy and Operating Reserve Markets. Energy and Operating Reserve Market dispatch is from Hourly Economic Minimum Limit to Hourly Economic Maximum Limit under normal conditions	The Hourly Economic Maximum Limit may be submitted to override the default Offer as part of the Day-Ahead Schedule Offer and/or Real-Time Schedule Offer. The data value accepted may be to the tenth of a MW.
Hourly Regulation Minimum Limit	The Hourly Regulation Minimum Limit designates the minimum operating level, in MW, at which the Resource can operate while scheduled to potentially provide Regulating Reserves. This value may vary from hour to hour through submission in the Day-Ahead Schedule Offer and Real-Time Schedule Offer. The Hourly Regulation Minimum Limit does not affect commitment but may affect Energy dispatch in both the Day-Ahead and Real-Time Energy and Operating Reserve Markets.	The Hourly Regulation Minimum Limit may be submitted to override the default offer as part of the Day-Ahead Schedule Offer and/or Real-Time Schedule Offer. The data value accepted may be to the tenth of a MW.
Hourly Regulation Maximum Limit	The Hourly Regulation Maximum Limit designates the maximum operating level, in MW, at which the Resource can operate while scheduled to potentially provide Regulating	The Hourly Regulation Maximum Limit may be submitted to override the default Offer as part of the

Parameter	Use	Format and Validation
	Reserves. This value may vary from hour to hour through submission in the Day-ahead Offer and Real-Time Schedule Offer. The Hourly Regulation Maximum Limit does not affect commitment but may affect Energy dispatch in both the Day-Ahead and Real-Time Energy and Operating Reserve Market.	Day-Ahead Schedule Offer and/or Real-Time Schedule Offer. The data value accepted may be to the tenth of a MW.
Hourly Emergency Minimum Limit	The Hourly Emergency Minimum Limit designates the lowest level of energy, in MW; the Resource can produce and maintain a stable level of operation under Emergency conditions.	The Hourly Emergency Minimum Limit may be submitted to override the default Offer as part of the Day-Ahead Schedule Offer and/or Real-Time Schedule Offer. The data value accepted may be to the tenth of a MW.
Hourly Emergency Maximum Limit	The Hourly Emergency Maximum Limit designates the highest level of Energy, in MW; the Resource can produce and maintain a stable level of operation under Emergency conditions.	The Hourly Emergency Maximum Limit may be submitted to override the Default Offer as part of the Day-Ahead Schedule Offer and/or Real-Time Schedule Offer. The data value accepted may be to the tenth of a MW.
Minimum Run Time	MISO scheduled commitments in the Day-Ahead Energy and Operating Reserve Market and the Real-Time Energy and Operating Reserve Market are for at least as many consecutive hours as specified by the Minimum Run Time. Commitment times may be for greater than the Minimum Run Time if a Resource is economic for additional hours.	The Minimum Run Time is submitted as part of the Day-Ahead and Real-Time Schedule Offer. This time is accepted in hh:mm format.
Minimum Down Time	The Day-Ahead Energy and Operating Reserve Market and the Real-Time Energy and Operating Reserve Market commitments respect the Minimum Down Time in determining when a unit is available for Start-Up.	The Minimum Down Time is submitted as part of the Day-Ahead and Real-Time Schedule Offer. This time is accepted in hh:mm format.
Maximum Run Time	The Maximum Run time restricts the number of hours a unit can be run during the Day-Ahead Energy and Operating Reserve Market or during a study period for the Real-Time Energy and Operating Reserve Market.	The Maximum Run Time is submitted as part of the Day-Ahead and Real-Time Schedule Offer. This time is accepted in hh:mm format.
Maximum Daily Starts	The Maximum Daily Starts are the maximum number of times a unit may receive a Start-Up per day during the Day-Ahead Energy and Operating Reserve Market or during a study period of the Real-Time Energy and Operating Reserve Market.	The Maximum Daily Starts are submitted as part of the Day-Ahead and Real-Time Schedule Offer. These times are accepted in integer number of times.
Maximum Daily Energy	The Maximum Daily Energy is the maximum MWh a Resource is able to supply over a 24 hour period during the Day-Ahead Energy and Operating Reserve Market or during a study period of the Real-Time Energy and Operating Reserve Market.	The Maximum Daily Energy is submitted as part of the Day-Ahead and Real-Time Schedule Offer, in MWh.
Maximum Daily Contingency Reserve Deployment	The Maximum Daily Contingency Reserve restricts the amount of contingency reserve	The Maximum Daily Contingency Reserve

Parameter	Use	Format and Validation
	that may be deployed on a DRR-Type II in the Real-Time Energy and Operating Reserve Market. It is not used in the Day-Ahead Market or RAC process.	Deployment limit is submitted as part of the Real-Time Schedule Offer. The format is MWh.
Maximum Daily Regulation Up Deployment	The Maximum Regulation Up Deployment restricts the amount of Regulating Reserve Up that may be deployed on a DRR-Type II in the Real-Time Energy and Operating Reserve Market. It is not used in the Day-Ahead Market or RAC process.	The Maximum Daily Regulation Up Deployment limit is submitted as part of the Real-Time Schedule Offer. The format is MWh.
Maximum Daily Regulation Down Deployment	The Maximum Daily Regulation Down Deployment restricts the amount of Regulating Reserve Down that may be deployed on a DRR-Type II in the Real-Time Energy and Operating Reserve Market. It is not used in the Day-Ahead Market or RAC process.	The Maximum Daily Regulation Down Deployment limit is submitted as part of the Real-Time Schedule Offer. The format is MWh.

4.7 Market Price Determination

This section briefly describes MISO market clearing processes that determine prices in the Day-Ahead Energy and Operating Reserve Markets and the Real-Time Energy and Operating Reserve Markets.

Day-Ahead Markets

Offers for Energy and Operating Reserve submitted to the Day-Ahead Energy and Operating Reserve Markets are simultaneously cleared for each hour of the following Operating Day using SCUC and SCED computer-based algorithms to satisfy the Energy Demand Bids and Operating Reserve requirements of that Operating Day.

The Day-Ahead market clearing process produces hourly ex-ante Locational Marginal Energy Prices (LMPs) at each EPNode and hourly ex-ante Market Clearing Prices (MCPs) at each CPNode for Regulating Reserve, Spinning Reserve, Supplemental Reserve, Ramp Capability Product, and Short-Term Reserve. The pricing algorithm has been enhanced with the Extended Locational Marginal Pricing ("ELMP") mechanism that allows the cost of committing Fast Start Resources, and the Energy cost of Fast Start Resources dispatched at limits to set prices. It also produces hourly schedules for Energy Demand, Energy supply, Regulating Reserve, Spinning Reserve and Supplemental Reserve, Up and Down Ramp Capability, and Short-Term Reserve for each Resource that was offered into the Day-Ahead Market. If the 40% constraint on the amount of DRRs that clear Spinning Reserve in the Day-Ahead Market binds, then the MCP for cleared DRRs will differ from the MCP for cleared Generation Resources.

Real Time Markets

Offers for Energy and Operating Reserve submitted to the Real-Time Energy and Operating Reserve Markets are simultaneously cleared every five minutes using the SCED computer-based algorithm to satisfy the forecasted 5-minute Energy Demand and Operating Reserve requirements of the Real-Time Markets based on actual operating conditions, as captured by MISO's State Estimator. Like the Day-Ahead, the ELMP mechanism allows the cost of committing Fast Start Resources ("FSR"), the Energy cost of Fast Start Resources dispatched at limits and Emergency Demand Response Resources to set price. ELMP also provides the mechanism to introduce emergency pricing, in an ex-post manner, to prevent inefficient price depression during system or local area shortage conditions when MISO utilizes Emergency Resources, including the Emergency range of available resources, Emergency Demand Response Resources, Load Modifying Resources, External Resources that are qualified as Planning Resources or Emergency Energy purchases.

The Real-Time market clearing process produces five-minute ex-ante LMPs for Energy along with five-minute ex-ante MCP values for Regulating Reserve, Spinning Reserve, Supplemental Reserve, Ramp Capability Product, and Short-Term Reserve, and five-minute Dispatch Targets for each Resource operating in the Real-Time markets.

The SCED operating in real-time is supported by a Reliability Assessment Commitment (RAC) process that identifies in advance of Real-Time dispatch the need for additional resources to ensure that sufficient capacity will be online to meet Real-Time operating conditions. The RAC process utilizes the same SCUC algorithm employed in the Day-Ahead Markets to minimize the cost of committing the capacity needed to meet forecasted Energy Demand, confirmed Energy Interchange Schedule Exports, and forecasted Operating Reserve requirements.

The RAC process identifies the need for committing additional Resources after the clearing of the Day-Ahead Energy and Operating Reserve Market, after posting the Day-Ahead Markets results but before the start of the Operating day, or anytime during the Operating Day, as required.

Under LMP, DRR Type IIs within their limits can set price. Under ELMP, FSRs and EDRs can set price. Any DRRs can set MCPs for products they are qualified to provide. The BPM for **Energy and Operating Reserve Markets (BPM-002)**, provides more detailed descriptions of how the Day-Ahead and Real-Time Energy and Operating Reserve Markets operate. If the 40% constraint on the amount of DRRs that clear Spinning Reserve in the Real-Time Market binds, then the MCP for cleared DRRs will differ from the MCP for cleared Generation Resources

4.8 DRR Performance Assessment

Because it is impossible to directly measure the energy that a DRR resource would have consumed in the absence of the dispatch instruction to reduce load, its Demand reductions will be imputed through comparisons between the DRR's Consumption Baseline and its actual hourly metered consumption. Tariff Attachment TT provides detailed M&V criteria.

Consumption Baseline

The selection, development and application of appropriate Consumption Baselines are part of the Measurement and Verification process. The specific Baseline adopted depends, in part, on the specific product being delivered:

- Regulating Reserve service
- Contingency Reserve service
- Energy
- Capacity

Regulating Reserve Service

As stated earlier, only DRR-Type II resources are eligible to provide Regulating Reserve service. The Consumption Baseline used to estimate the amount of Regulating Reserve delivered by a DRR-Type II in any 5-minute Dispatch Interval uses the same measurement approach as used by generation resources providing this service.

Contingency Reserve Service

Contingency Reserve consists of Spinning Reserve and Supplemental Reserve. The Consumption Baselines are identical for both reserve products but are different for DRR-Type I and DRR-Type II resources.

A DRR-Type II providing Contingency Reserve service must provide telemetered demand data, scanned at 10-second intervals, to MISO. When a contingency event occurs, the DRR-Type II resource's Consumption Baseline is its telemetered average demand in the 10-second interval just prior to the start of the contingency event. The amount of contingency reserve deployed is then measured by the difference between its Consumption Baseline value and its telemetered demand in the 10-second interval occurring exactly 10 minutes after the start of the event.

The Consumption Baseline for a DRR-Type I resource is different because this resource is not required to provide telemetered data. The measurement and verification of Demand Response Type I Resource output is captured and calculated in the Demand Response Tool. The DRR-Type I Consumption Baseline is its metered demand for the 5-minute interval immediately preceding the start of the contingency event. The amount of contingency reserve deployed is then measured by the difference between its metered demand for the 5-minute interval ending 10 minutes after the start of the contingency event. BLDR Resources (section 9 below) have a different measurement for assessing deployment. To the extent that an event starts or ends within a 5-minute interval reading, MISO requires that the Market Participant sponsoring the resource provide the actual load values for a DRR: (a) at the start of the event; (b) at 5 minutes into the event; and, (c) at 10 minutes into the event. The Market Participant should be prepared to provide supporting calculations based on the interval meter readings.

Energy

Four different generic Consumption Baselines exist for DRRs delivering the energy product:

- Metered Generation
- Calculated Baseline
- Direct Load Control
- Custom Baseline

Metered Generation

This type of Consumption Baseline only applies to behind-the-meter generation (btmg). For a btmg resource, the Consumption Baseline is the resource's actual metered generation over the hour beginning two hours prior to the hour in which the DRR is initially instructed to reduce load. The DRR's deemed demand reduction in response to a dispatch instruction in any hour is the difference between its metered output and its Consumption Baseline.

Calculated Baseline

This type of Consumption Baseline only applies to demand resources that reduce load. For a demand resource the Consumption Baseline is a profile of hourly demand (for the load behind the DRR asset) based on an averaged sample of historical data which may be adjusted for factors that reflect specific, on-the-day conditions, such as temperature. Unless the Market Participant sponsoring the DRR submits an alternative design for MISO approval, the default Consumption Baseline will be designed as follows:

- Separate hourly demand profiles will be determined for non-holiday weekdays and for weekends/holidays
- The "weekday" hourly profile will be based on the average of the ten (10), but not less than five (5), most recent weekdays that are not holidays or other non-standard "event" days

- The “weekend/holiday” hourly profile will be based on the average of the four (4), but not less than two (2), most recent weekend days or holidays that are not “event” days
- An “event” day is one during which there was, for the resource in question, a real-time energy or ancillary services dispatch, or a scheduled outage
- The maximum look-back window will be limited to 45 days
- If the 45-day window contains insufficient days to meet the minimum number of days described above, the profiles will be constructed based on the available days within the 45-day window that qualify, supplemented by the largest (MW) matching “event” day(s) values for that resource within that same window as necessary to obtain the minimum number of values.

The Market Participant sponsoring a DRR will have the option (at registration) to accept the unadjusted Consumption Baseline or to modify it by applying one of the following adjustment mechanisms:

Symmetric Multiplicative Adjustment (SMA)

- Adjusts each baseline hourly value (MW) during the event up or down by the ratio of (a) the sum of hourly demands for the three hours beginning four hours prior to the event and (b) the sum of those same three hourly baseline demands
- The adjustment is limited to a change in any individual baseline hour of plus or minus 20 percent.
- If multiple events occur during the same day, the SMA is calculated only for the first event, but applied to all events that day.

Weather Sensitive Adjustment (WSA)

- Adjusts each baseline hourly value (MW) up or down by a Weather Adjustment Factor
- The Weather Adjustment Factor is determined by a mathematical relationship derived through a regression analysis that considers the DRR load and historical hourly temperature data.

If the Market Participant sponsoring a DRR wishes to select either of the Adjustments described above or one of the non-default Consumption Baselines, the Market Participant must submit appropriate documentation to MISO for approval. Documentation must be credible and replicable analysis that supports the use of the applicable adjustment. The WSA baseline approach requires a complete, rigorous and defensible study or report that shows the complete statistical methods and analysis used to determine the Weather Adjustment Factor. The SMA baseline approach requires three (3) months of hourly data to be submitted with analysis used to justify the approach. Submitted documentation will be shared with the applicable LSE.

Example calculations of Calculated Baselines are provided in Appendix A. In addition, Calculated Baselines will not be adjusted for events beginning prior to 5:00 am Eastern Standard Time.

Direct Load Control

This type of baseline only applies to direct load control (DLC) programs consisting of many small, distributed resources that are not interval metered; consequently, only DRR-Type I resources are eligible.

A DLC Consumption Baseline will be statistically estimated from hourly metered demand data. MISO must approve the specific statistical methodology to be employed before the Market Participant can utilize a DLC Consumption Baseline. The input provided for the DLC Consumption Baseline becomes the performance (demand reduction) for that resource during an Event.

Custom Baseline

The Market Participant sponsoring a DRR may develop a custom Consumption Baseline if none of the three standard baselines described above would produce reasonable estimates of the resource's demand reductions. MISO must approve of the specific methodology to be employed before the Market Participant can utilize such a baseline. For custom Consumption Baselines, the input provided becomes the Consumption Baseline that will be subtracted from metered amounts to determine performance (demand reduction).

Capacity

The Consumption Baseline employed to determine a DRR's compliance with an instruction to reduce load during an emergency condition will be the same employed to estimate its delivered energy during normal conditions, i.e., those described in the preceding sections. The performance of Demand Resources in their role as Planning Resources is addressed in Section 6.

Metering

All MPs sponsoring DRRs are responsible for providing meter data appropriate to the services being provided. Revenue quality metering and telemetry equipment is required for DRR-Type II in order to support Regulation Reserve requirements. A DRR comprised of btmg must directly meter such generation. All DRRs must possess telemetry capabilities commensurate with the services to be provided. *See* MISO Tariff Module C Section 38.2.5.e for additional detail on metering requirements. In addition, aggregated resources have specific metering requirements, detailed further in the section below on Meter Data Submission Types.

Meter Data File Formats

This section defines the details of the meter data that must be supplied by Market Participants for uploading settlement and compliance data into the Demand Response Tool system. Settlement and compliance data submitted by Market Participants will be available, through the system, to the LSE.

Two file formats are supported for submission of meter data: daily and interval. The daily file must always have 24 hour-ending (HE) values. The interval file must have sufficient data for the load reduction period and must match the hour, minute, and second of the required intervals. For an enrollment that contains more than one registered location, one set of entries should be provided for each registered location unless otherwise specified. Enrollments that contain virtual locations should provide one set of entries.

The file to be submitted must be of type ".xls". The format of each file is described in the tables below.

Daily File Format

Column Header Name	Type	Definition	Example
Enrollment	Text preceded "R" or "r"	DRT-generated ID for an enrollment	R9999
Unique ID	Text	LBA account number assigned to the location	12345
Date	Date format mm/dd/yyyy	Date for which load is submitted	06/15/2012
UOM	Text	Units of Measurement for meter data, which must always be value = kW (represents integrated energy consumption over the interval)	kW
Type	Text	Type of meter data submitted	See meter data submission types listed below
HE1 through HE 24	Integer	Meter value for each hour	100, 83, 89, 93, …, 99

Interval File Format

Column Header Name	Type	Definition	Example
Enrollment	Text preceded "R" or "r"	DRT-generated ID for an enrollment	R9999
Unique ID	Text	LBA account number assigned to the location	12345
Date	Date format mm/dd/yyyy hh:mm:ss	Beginning Date and Time for consumption over the interval	06/15/2012 13:26:33
Type	Text	Type of meter data submitted	Compliance
UOM	Text	Units of Measurement for meter data, which must always be value = kW (represents integrated energy consumption over the interval)	kW
Value	Integer	Meter value for the interval	100

Meter Data Submission Types

This section describes the meter data types that can be submitted for each type of Enrollment program. Various types of meter data are supported:

1. Hourly Load: Hourly load data used for economic energy settlements. This information will be used to calculate the baseline and to determine the actual load during an economic Event. In the case of an aggregate enrollment, the load must be provided for each registered location of the aggregate.
2. Compliance: Five (5) minute interval data used for compliance. This information will be used to calculate the baseline and to determine the actual load during an Ancillary Service Event. In the case of an aggregate enrollment, the load must be provided for each registered location of the aggregate. Used only for Interval Reading.
3. HourlyCBL: Baselines are calculated outside of the DRT system (designated as "Manual" baseline on the enrollment) by the participant. The data submission also requires HourlyLoad for each HourlyCBL provided. In the case of an aggregate enrollment, the aggregate baseline should be provided as a submission for one of the registered locations.
4. HourlyGen: Generation meter data will be used to determine the quantity of load reduction. In the case of an aggregate enrollment, there must be generation values for each registered location.
5. HourlyDLC: Hourly load reduction based on a statistical sample approved by MISO, the number of active sites controlled, and weather conditions during the event

4.9 Market Settlements

The payments made for DRR performance are treated differently for those sponsored by LSEs serving them at retail than for those sponsored by ARCs. Each treatment is described in the following sections. The reader is cautioned that these descriptions are intended to provide settlement information only in the most conceptual terms. Please consult the BPM for Market Settlements (BPM-005), and associated attachments MS-OP-029 Market Settlements Calculation Guide and MS-OP-031 Post Operating Processor Calculation Guide, for the controlling language, descriptions, and formulas.

Settlements are further complicated by the fact that, while demand resources are always compensated at LMP, the cost allocation to pay for such services differ according to a comparison of the LMP with the Net Benefits Price Threshold (NBPT). The NBPT is a single value applicable for an entire month and is posted no later than the 15th of the prior month. See a tab under https://www.misoenergy.org/markets-and-operations/settlements/market-settlements/ for more information. When the LMP equals or exceeds the NPBT, charges for the energy provided are recovered from all other real-time "buyers"[20] within the Reserve Zones that benefit; when the LMP falls short of the NPBT, then the LSE serving the load behind the DRR is charged. This can lead to a variety of possible settlement conditions, and the primary ones are described in the following sections.

LSE-Sponsored DRRs

Currently, most DRRs are sponsored by their LSE. In many states, this arrangement is dictated by state regulatory policy, commission rules, etc. In return for some incentives provided by the LSE, the retail customer may agree to not consume some of the energy it is entitled to purchase through its retail tariff. Since the DRR is sponsored by its LSE, there are fewer net settlement issues.

Day-Ahead Energy and Operating Reserve Market Settlements – For DRR Energy that is cleared into the Day-Ahead Energy and Operating Reserve Market, LMP will be paid to the MP with the DRR by purchasers in the day-ahead market. From a settlement perspective, DRR Energy is indistinguishable from energy provided by other resources.

For a DRR providing Operating Reserve, Ramp Capability, and Short-Term Reserve, the MP will be credited for the Day-Ahead cleared Regulation Amounts, Spinning Reserve Amounts, Supplemental Reserve, Ramp Capability, and Short-Term Reserve Amounts multiplied by the applicable Day-Ahead hourly MCPs. MCP will be paid to the MP with the DRR by purchasers in the day-ahead market of the same Reserve Zone.

Real-Time Energy and Operating Reserve Market Settlements – In the Real-Time Energy and Operating Reserve Market, each LSE will be credited (or charged) for Energy based upon the incremental difference between its real-time energy transactions and its Day-Ahead scheduled energy transactions multiplied by the applicable Real-Time LMPs.

The LSE with the DRR will be unaffected when the LMP is below the NBPT, as the credit for the DRR reduction is exactly offset by an identical charge for that same amount of energy. From the LSE's viewpoint, it simply buys less net energy. For example, the LSE might schedule the

[20] A real-time "buyer" is a Market Participant who purchases power in real-time without an offsetting purchase in the day-ahead market. For example, if an LSE schedules 100 MWh in day-ahead and consumes 105 MWh in real-time, it would be a real-time "buyer" of 5 MWh. Note that resources may also be real-time "buyers" in order to cover day-ahead positions not fully provided in real-time.

purchase of 100 MWh (including the amount the DRR would have used) in day-ahead. In real-time, other usage is as predicted, except for the DRR that "provides" 5 MWh (its load reduction). In this case, the LSE would simply receive payment for the 5 MWh (the net position). However, the MP with the DRR may also receive a "make whole" credit equal to that needed to fully recover the DRR's Production Cost if the LMP revenues do not recoup such costs and the DRR was committed by MISO through the SCUC process. Production Cost is the sum of the DRR's Shutdown Offer(s) plus the sum of its hourly Curtailment Offers plus the sum of its hourly Energy Offers.[21]

When the LMP equals or exceeds the NBPT, then the LSE will be credited for the full amount of the DRR reduction, while only being charged its pro-rata share across all buyers of the Reserve Zones that benefit. Ignoring this relatively small charge, the LSE effectively benefits in two ways: first, it will only be charged for energy consumed (95 MWh in the example above); second, it will in addition receive a credit for the 5 MWh reduction.

For Operating Reserve, the MP will be settled based upon the incremental difference between the DRR's Real-Time cleared Operating Reserve and its Day-Ahead scheduled Operating Reserve multiplied by the applicable RT MCPs. For DRRs not committed by MISO as part of its SCUC process, clearing Spin Reserve Service and deployed during a Contingency Reserve Deployment (CRD) event, credits will be entirely based on the applicable LMP at its CPNode. No make whole payments will be made for the MWs deployed during the dispatch intervals for the CRD event, regardless of hourly curtailment offers exceeding LMPs. By eliminating these make-whole payments, the Market Participant is allowed to add the expected cost of deployment in excess of expected Market revenues (net cost of deployment) to its Spinning Reserve Offer through a probabilistic cost adder by multiplying the Market Participant's expected possibility of deployment by the net cost of deployment. Incorporating deployment risk into the Spinning Reserve Offer will more accurately reflect the cost of selecting and deploying these resources during a CRD Event, which provides for better alignment with Market-based procurement of Spinning Reserves.

[21] *The terms, "ShutDown Offer" and "Curtailment Offer," when applied to a DRR mean, respectively, its price to be available to initiate load reduction when instructed, and its hourly price to maintain its load reduction, when instructed. Note that a DRR may incur multiple shutdown costs if it is released from commitment, then recommitted at a later time.*

Additional charges related to system reliability, asset performance, Operating Reserve and the distribution of system losses are also settled in the Real-Time Energy and Operating Reserve Market.

ARC-Sponsored DRRs

The settlement procedure for ARCs works in the same way described above for LSEs, except that the MP receiving payments or charges related to the DRR is the ARC, not the LSE. For certain market charges (e.g., Revenue Neutrality Uplift), the LSE's Real-Time energy purchases will be adjusted to reflect the RT energy reductions of the DRR.

5 Emergency Demand Response

The Emergency Demand Response Initiative is established in Schedule 30 of the Tariff and is designed to encourage Market Participants that have demand response capabilities available to them to offer those resources to MISO for use during North American Electric Reliability (NERC) Energy Emergency Alert 2 (“EEA2”) or Energy Emergency Alert 3 (“EEA3”) events. EDR resources are only dispatched during such events in response to dispatch instructions from MISO. LMRs are eligible to provide EDR service but must include a one-to-one relationship between the registration of an LMR and an EDR.

In addition to encouraging demand response participation, the EDR Initiative provides information MISO needs to commit and dispatch available EDR resources in economic merit order, i.e., by first curtailing those loads that customers value the least (or dispatching btmg with the lowest production costs) and progressively curtailing loads of increasing value (or btmg with increasing production costs) until the target level of demand reduction has been achieved. Such an efficient dispatch will minimize Market Participants’ total costs of responding to Emergency Events.

When an EEA2 or EEA3 Event is imminent, MISO will develop a schedule of EDR Dispatch Instructions based on the information provided in the EDR offers for that Operating Day. After the Event has been declared, MISO will send EDR Dispatch Instructions to the affected MPs who will then be solely responsible for compliance using the EDR resources they offered.

After the Emergency Event ends, the responses of each EDR resource to its EDR Dispatch Instructions will be measured by comparing the resource’s metered hourly loads (or net output of btmg) with its Consumption Baseline (or its generation baseline for btmg). The methodology used to determine Consumption Baselines is discussed below.

Each Market Participant will be compensated for the net demand response reductions its EDR resource delivered in response to their EDR Dispatch Instructions, but not for excess reductions, and will be exempt from related RSG Charges. Any Market Participant whose EDR resources do not fully comply with their respective EDR Dispatch Instructions will be assessed a penalty as described later.

MISO will recover the total payments made to Market Participants with dispatched EDRs in any Hour, net of any noncompliance penalties collected for that Hour, from the LSEs located in the Local Balancing Authority Area(s) where the Emergency Event(s) occurred in that Hour. Thus, these payments will be recovered from the parties that benefit most from the demand reductions that gave rise to the payments.

5.1 EDR Characteristics

A Market Participant may participate in the EDR Initiative if it controls a resource that can either: *reduce* Loads (either by reducing demand by a fixed number of MW or by curtailing use to a fixed target amount) in response to a request from MISO; or *increase* the outputs of btmg resources beyond what they would normally produce, in response to receiving EDR Dispatch Instructions from MISO. In addition, the Market Participant must be able to receive EDR Dispatch Instructions from MISO via an Extensible Markup Language (XML) interface, as more fully described in Section 5.3. Lastly, a Market Participant must be able to provide integrated hourly energy consumption data on a CPNode basis.

5.2 EDR Offers

When an EDR resource is first registered, the Market Participant sponsoring it will submit a default EDR Offer, which will remain valid until updated. MPs may submit updated offers at any time prior to DA Market Close for application to the following Operating Day. All Offers are applicable to every hour of the day and will remain valid until modified or revoked by the Market Participant. Updated Offers may take the form of a declaration that the EDR resource will be unavailable for interruption until a new Offer is submitted.

Exhibit 5-1 presents the information that a valid EDR Offer must contain. If any of these data elements are missing in the Offer submittal, MISO will substitute the corresponding data elements from the previous Offer.

Exhibit 5-1: EDR Resource Offer Data

Data Element	Unit	Note
Maximum Demand Reduction	MW	1,2
Reduction to Firm Load Level	MW	1,2
Curtailment Price	$/MWh	3
Shutdown Cost	$	
Advance Notification	hh:mm	
Interval when Reduction is Available	hh:mm to hh:mm	
Minimum Down Time	hh:mm	
Maximum Down Time	hh:mm	
Daily Availability	Yes/No	
Any Temporary Limitations	Text Field	

1. Reductions must be expressed in increments of 0.1 MWh per hour.
2. Enter either Maximum Demand Reduction or Reduction to Firm Load Level – not both.
3. Curtailment Price cannot exceed $3,500 per MWh.

EDR resources are not subject to the usual must-offer obligations because participation in the EDR Initiative is voluntary. However, any EDR resources that also qualify as LMRs under Module E-1 of the Tariff will have a must-offer obligation during MISO-declared Emergencies and thus cannot declare the portion of load that is an LMR as unavailable for curtailment.

5.3 Commitment and Dispatch

On a day when an Energy Emergency Alert (EEA 2) is anticipated, MISO will use the data in EDR Offers valid for that day to develop EDR Dispatch Instructions that minimize customers' total collective costs of achieving the load reductions needed to offset the supply resource shortfall. Typically, this will produce EDR Dispatch Instructions that call on EDR resources in order of their increasing EDR Production Costs, which consists of the EDR resource's Curtailment Cost (dispatch price multiplied by expected MWh curtailed) and its Shutdown Cost (or its one-time Startup Cost for btmg). However, because the EDR curtailment schedules are based on constrained optimizations that account for EDR resource inflexibilities and other operating constraints, including their location on the transmission grid, they may not reflect simple, monotonic rankings of EDR Production Costs.

Each Dispatch Instruction will include the following information:

- Hour the demand reduction is to commence

- Amount of demand reduction or the firm load level to be achieved
- Schedule of incremental changes to the reduction level, if any
- Duration of each demand reduction level

Dispatch Instructions and all other communications between MISO and Market Participants with EDRs will be via XML interface.

5.4 EDR Performance Assessment

As with other forms of demand response, an EDR resource's demand reductions must necessarily be imputed through comparisons between its metered hourly consumption and its Consumption Baseline.

Consumption Baseline

The Consumption Baseline is the actual usage of the facility containing the EDR resource in the Hour prior to the start of the instructed demand reduction.

For EDR resources that are under direct load control, the Market Participant must provide: a description of the direct Load control system, a description of Load Research data used in the measurement and verification analysis, a description of the methodology used to produce the estimate, and a description of all source information for the variables used in the analysis.

Metering

All MPs sponsoring EDR resources are responsible for providing meter data for the Hour prior to the start of the reduction and for every Hour in which the reduction occurred. This can be done through a third-party Meter Data and Management Agent (MDMA). MDMAs must provide meter data to MISO prior to noon EST of the 53rd day after the Operating Date. Along with a record of its meter readings, Market Participants utilizing on-site generation must also provide a written statement from the Market Participant certifying that the Demand reductions were made in response to MISO's EDR Dispatch Instructions and that they would not otherwise have occurred.

5.5 EDR Market Settlement

Market Participants with a registered EDR are compensated at the higher of the revenues resulting from hourly LMPs (i.e., applying the hourly Real-Time LMPs at each EDR resource's CPNode to the resource's instructed hourly demand reductions), or the EDR resource's Production Costs for the total period of reduction. EDR Production Costs are defined as the shutdown cost plus the lesser of the amount of hourly Demand reduction or the hourly Dispatch

Instruction, multiplied by the EDR Curtailment Price applicable to the period of actual Demand reduction.

To qualify for compensation an EDR resource must comply with MISO's EDR Dispatch Instructions. If an EDR resource reduces its Demand by an amount that exceeds the reduction level specified in the EDR Dispatch Instruction, it will only be compensated for the amount specified in the MISO Dispatch Instruction. However, the MP will not be subjected to RSG charges for its excessive reductions.

Payments made in excess of market revenue will be funded on pro rata basis via Load Ratio Share to Market Participants in the Local Balancing Authority Area(s) where the Emergency event occurred.

Meter data is required within 53 days following the Operating Date of the Emergency event. Settlement will occur on the relevant applicable settlement statement after submission of meter data.

Penalty for Underperformance

An EDR resource that reduces Demand in any Hour by less than the amount specified in the EDR Dispatch Instruction will be fully compensated if the reduction is not less than the Demand Reduction Tolerance level (which is set equal to 95 percent of the EDR Dispatch Instruction amount) for that Hour. An EDR resource that reduces demand by less than the Demand Reduction Tolerance level will be charged an amount equal to the Demand Reduction Shortfall multiplied by the Real-Time LMP of the load zone in which the EDR resource is located. The Demand Reduction Shortfall is equal to the Demand Reduction Tolerance minus the actual Demand reduction, or zero, whichever amount is greater. Failure to reduce demand at a level higher than the Demand Reduction Tolerance level will also result in a loss of guaranteed cost recovery.

Revenue collected from the underperformance penalty will be distributed pro rata via Load Ratio Share to Market Participants in the Balancing Authority Area(s) where the Emergency event occurred.

6 Demand Response as a Planning Resource

Module E-1 of the Tariff defines a Load Modifying Resource (LMR) as a Demand Resource or BTMG that satisfies the requirements for being a Planning Resource. An LMR is not required to be a Network Resource[22]. An LMR need only be available for interruption during Emergency Events. The Emergency Operating Procedures (e.g., SO-P-EOP00-002 and SO-P-EOP-00-004) describe how and when LMRs will be called during an Emergency Event.

LMRs may also qualify as Emergency Demand Response (EDR) resources by meeting the requirements in Schedule 30 of the Tariff. LMRs may also participate in Planning Resource Auctions as briefly described later in this BPM. More detailed information regarding LMR participation under Module E-1 is contained in BPM-011 Resource Adequacy.

Each LMR must be registered, reviewed, and approved annually by MISO in advance of receiving capacity accreditation as a Planning Resource. Only Market Participants may register LMRs and this process is completed by accessing the Module E Capacity Tracking (MECT) tool through the secure Market Portal.

6.1 Utilization of LMR Capacity

LMR capacity has value because it can be used to meet the Planning Reserve Margin Requirement (PRMR) of an LSE. The Market Participant registering the LMR (either the LSE or an ARC) may choose to treat an LMR as a Planning Resource for conversion into Zonal Resource Credits (ZRCs). When such treatment is requested (and accepted) the LMR's accredited capacity will be entered into the MECT and the Market Participant can use these ZRCs to meet its PRMR, offer them into the PRA or trade these ZRCs with other MPs.

6.2 LMR Performance Assessment

Following an Emergency Event in which a LMR was instructed to curtail its load, the Market Participant that registered the LMR will collect data needed to perform the calculations comparing the LMR's actual load with a Consumption Baseline adopted at the time of registration and subsequently updated as needed. The Market Participant will certify the results of this analysis

[22] Excess BTMG – the unforced capacity of an LMR BTMG in excess of an LSE's PRMR, can participate in the PRA as long as it demonstrates deliverability since it represents a net injection onto the transmission system Deliverability can be demonstrated by being granted commensurate Transmission Service or Interconnection Service. LMR DRs have no deliverability requirement. See the BPM for Resource Adequacy.

and submit them to MISO via the Demand Response Tool (DRT). MISO will use these results to determine if the LMR reduced by the targeted MW level (or to a specified firm service level if applicable), when called upon to do so by MISO. Additional details are available in Tariff Attachment TT. Each LMR will be evaluated on its individual performance and not in aggregate across a Market Participant's portfolio.

Consumption Baseline

The Consumption Baseline for a DR will be the expected value of the DR's average hourly load, rounded to the nearest kWh, for each of the 24 hours in a day. A Consumption Baseline is required for each DR that is included in an LSE's Resource Plan. A default Consumption Baseline will be calculated for each hour in a day, as being the simple averages of hourly meter data from the ten business days prior to an Emergency Event. *See* attachment TT of the Tariff for additional details. The default baseline procedure will be used unless the Market Participant proposes an alternative Consumption Baseline procedure at the time it registers the DR and it is accepted by MISO. For an LMR that agrees to reduce load to a specified level, its demand reduction will be the difference between its Consumption Baseline and the specified level.

Following an Emergency Event in which the LMR resource was deployed, the Market Participant that registered it shall collect and provide the hourly meter data to calculate the resource's Consumption Baseline in the Demand Response Tool and submit them to MISO within 53 days from the time the resource was deployed. MISO will review these metering data to verify that the Demand Resource reduced load by the targeted MW level, or to a specified firm service level, when called upon by MISO.

Metering

BTMG consisting of one or more generating units that have been identified by MISO must have metering equipment for operational security purposes. BTMG consisting of multiple generating units at a single site that have been identified by MISO must have metering equipment but may be metered as a single unit, in which case they will be treated as a single unit for purposes of LMR performance evaluation.

6.3 LMR Settlements

LMRs interact with MISO Settlements process in two ways:

- MPs trading ZRCs associated with an LMR that clears in a Planning Resource Auction are paid or charged based on the market clearing prices as established in the auction.

- If an LMR does not meet the Measurement and Verification protocol selected during registration (reduced by the targeted MW level or to a specified firm service level if applicable) during Emergency Events, the Market Participant that registered it may be penalized. Compensation for LMRs called during Emergency Events and performing consistent with their Scheduling Instructions is the avoidance of market energy charges.

Planning Resource Auction Settlements

MISO will settle each Planning Resource Auction (PRA) by charging the applicable Auction Clearing Price (ACP) for each Season for that Planning Year to MPs with PRMR and crediting the applicable ACP for the Season to MPs with cleared ZRC offers. The invoice credit will be available through the Market Portal daily during the Planning Year.

Penalty for Nonperformance

Unless the LMR is unavailable as the result of maintenance or for reasons of Force Majeure, the Market Participant representing the LMR will be penalized when the LMR fails to perform as instructed during an Emergency Event. *See* Tariff, Section 69A.3.9 of Module E-1. However, no penalties will be assessed if an LMR is unavailable for interruption due to its Load being off the Transmission System for external reasons, or if the targeted Demand reduction had already been achieved for other reasons (*e.g.*, economic considerations or local reliability concerns). MISO will credit the proceeds of LMR penalties to only those MPs representing the LSEs in the LBA area(s) that experienced the Emergency that triggered the use of an LMR. Such revenues shall be distributed on a Load Ratio Share basis. An LMR, unavailable or unresponsive for reasons other than exempted by MISO, could be disqualified from participation for the rest of the Planning Year. Disqualification results in removal of ACP payments. In addition, the MP will be charged the applicable ACP for the remainder of the Planning Year, and proceeds will be redistributed pro rata based on the LSE's PRMR in the LRZ. Additional details can be found in Section 69A.3.9 of Module E-1.

6.4 LMRs that dual-register as EDRs

Resources that register both as an LMR and an EDR have the following characteristics: a one-to-one relationship must occur between the registration of an LMR and an EDR; and the exact same end-use accounts must make up the defined LMR and EDR. At the current time, separate registration processes are required to dual-register the resource. All the requirements and characteristics specified in section 3.1 above under LMRs must be met. For example, the joint LMR/EDR resource must meet the specified availability and notification times, and minimum run times as registered under LMRs in Section 3.1. ARCs that dual-register resources must meet the requirements, as specified in Section 3.2 above, separately for both the EDR and LMR registrations. In addition, by registering as an EDR, the Market Participant can submit EDR Offers and must be able to receive EDR Dispatch Instructions via XML. Commitment and Dispatch will occur as specified as part of the SO-P-EOP00-002 and SO-P-EOP-00-004Emergency process. There can be only one selected Consumption Baseline for a dual-registered LMR/EDR resource. Payment for performance is based as specified under the EDR Initiative; any shortfall charges are based on the LMR paradigm. LMRs should not report their availability in the DSRI for days when they have active EDR Offers. It is the responsibility of the Market Participant to ensure there is no double counting of MWs offered across the dual registration types. Double counted MWs may be subject to underperformance penalties.

7 Resource Testing

To participate in MISO markets each resource must demonstrate its ability to interrupt load within a prescribed time limit after being instructed to do so. The prescribed time limit will depend on the service the resource is being qualified to provide.

7.1 DRR-Type I

DRR resources must provide information similar to what is provided by generating resources, including submission of data through the GADS or DADS, as appropriate. Annual testing and verification are required. Details may be found in the BPM for Energy and Operating Reserve Markets (BPM-002).

7.2 DRR-Type II

See DRR Type I above.

7.3 EDR Resources

There are no ex-ante resource testing requirements applicable to EDR resources, unless the resource is dual registered as an LMR; such resources are measured and verified during the Emergency Events to which they respond.

7.4 Load Modifying Resources

Demand Resources (DRs)

Market Participants with Demand Resources should demonstrate a real power test for capacity accreditation. The real power test of a Demand Resource may be from a MISO called event or a self-scheduled implementation in accordance with section 4.2.9.8 of BPM-011 Resource Adequacy. If a Demand Resource test is not performed for accreditation, additional options outlined in BPM-011 Resource Adequacy section 4.2.9 may be utilized.

BTMGs

BTMG capacity accreditation generally follows the same documentation requirements of generating resources. BTMG greater than 10 MW must submit performance and event data to GADS as well as an annual Generation Verification Test Capacity (GVTC). BTMG below this limit are only required to submit an annual GVTC and can accept the class average EFORd assigned to the unit type by MISO. Additional details regarding BTMG testing requirements may be found in BPM-011 Resource Adequacy section 4.2.8.

8 Credit Requirements

MISO's Credit Policy requires all Market Participants to have an approved credit application and an established Total Credit Limit with MISO Credit Department. Attachment L of the Tariff describes in detail how MISO will determine a Market Participant's Total Credit Limit requirement as well as the procedures it will follow in evaluating the Market Participant's creditworthiness. It also contains all of the requisite forms and describes the procedures for a Market Participant to follow to establish its Total Credit Limit. Attachment L of the Tariff is available on MISO website:

https://docs.misoenergy.org/legalcontent/Attachment_L_-_Credit_Policy.pdf

The remainder of this section briefly describes how MISO will determine the increase to a Market Participant's Total Credit Limit requirement contributed by the product offered by a given demand resource.

8.1 Economic Energy

As a supplier, the credit requirements for a new MP with a DRR are based on two factors: the amount of energy (MWh) that can be produced from the resource in an hour, and the historical average day-ahead LMP for the appropriate CP Node. The formula used to determine the credit requirement (in dollars) is the product of: (a) the maximum MWh value just described, times; (b) 600 hours, times; (c) the historical average LMP for the preceding three-month period, times; (d) 5%. For example, if a given DRR resource could produce 1 MWh in an hour and the historical average LMP was $30/MWh, the credit requirement would be equal to 1 × 600 × 30 × 5%, or $900. This credit requirement is reduced for ARCs as specified in Attachment L of the Tariff. *See* Attachment L for credit conditions for existing certified MPs.

8.2 Operating Reserve Services

Credit requirements for Operating Reserve Services are included in the credit requirements for Economic Energy. No additional credit requirements are applicable.

8.3 Emergency Demand Response

There are no additional credit requirements related to the provision of EDR service. Please see Attachment L of the Tariff for general credit requirements.

8.4 Planning Resources

There are no additional credit requirements related to the offer of Planning Resources (LMR) unless a Market Participant with a Demand Resource has waived its obligation to conduct a real power test per Tariff section 69.A.3.5.j as described above in section 3.1 of this document.

9 Batch Load Demand Response

This section describes the business rules governing Contingency Reserves provided by Batch-Load Demand Response (BLDR) resources.

9.1 Introduction

A BLDR resource is a load caused by a cyclical production process. During most of its duty cycle the load consumes energy at some nominal level but periodically reduces load for a short interval, typically less than 10 minutes. The following Exhibit illustrates the actual consumption pattern of one such load in the MISO footprint.

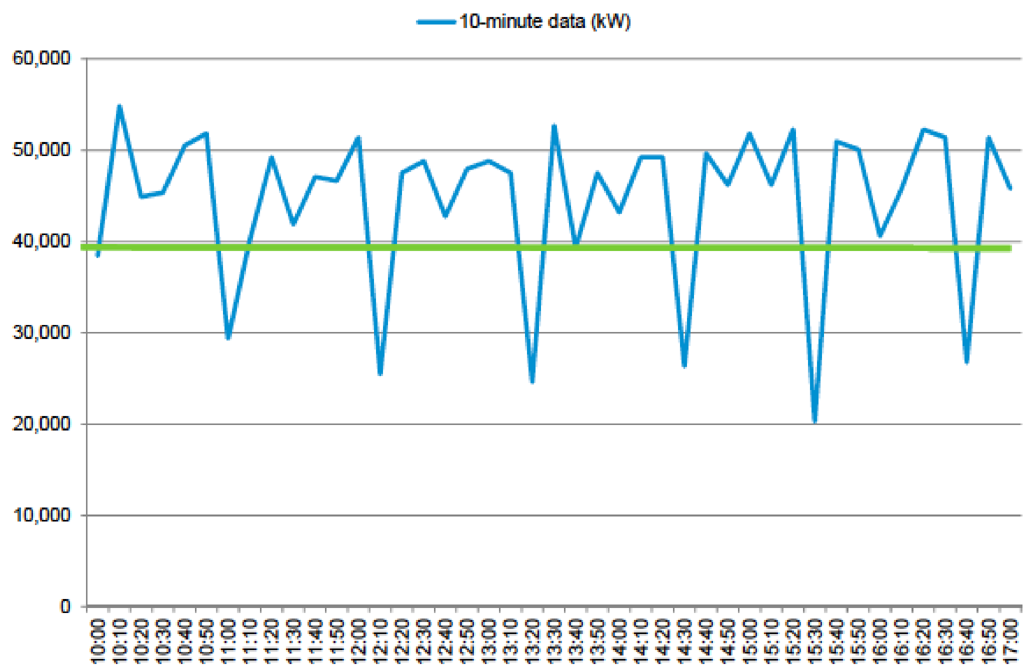


Exhibit 9-1: Batch Load Consumption Pattern of One MISO Market Participant

The MISO Tariff currently requires Contingency Reserve products to fully deploy their cleared Contingency Reserve within the 10-minute period (Contingency Reserve Deployment Period) following receipt of a MISO deployment instruction, as prescribed in ERO Standard BAL 002-0. In contrast with other Contingency Reserve assets, a BLDR resource may be capable of releasing little or no energy within the mandatory Contingency Reserve Deployment Period if it receives the MISO dispatch instruction while its load is not at the “top” of the cycle, as illustrated in Exhibit 10-

2. Nonetheless, by remaining at the bottom of its cycle, the BLDR resource helps MISO in meeting the BAL standard by not exacerbating the ACE deviation, which it would do if it resumed operations of its batch load process. This latter effect must be weighed when evaluating the resource that, most of the time, could release significant amounts of energy to assist MISO in responding to a contingency event.

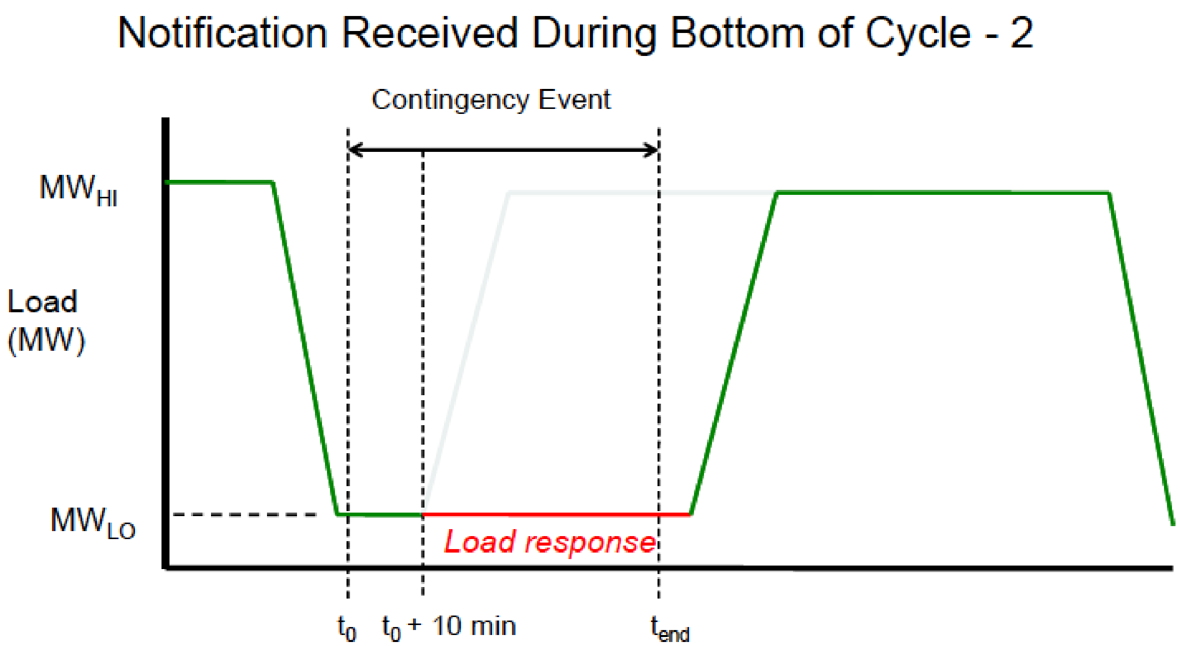


Exhibit 9-2: Operating Reserve Energy to Deliver

Because it is impossible to know ex ante where a BLDR resource will be when instructed to deploy its Contingency Reserve, the best that can be done is to credit the resource with the expected value of the amount of that reserve. Each BLDR resource will be responsible for estimating this expected value at the start of each day during which it offers Contingency Reserve into the market and will offer no more Contingency Reserve than that expected value amount.

When a BLDR resource is instructed to deploy its Contingency Reserve, it is also obligated to maintain its energy reduction until the contingency event ends.

The inability of any single BLDR resource to fully deliver the expected value of its Contingency Reserve will not impact MISO if the resource represents a small portion of total cleared Contingency Reserve. This will also be true if no single BLDR resource represents a large portion of a portfolio of BLDR resources whose duty cycles are relatively uncorrelated in time, because the diversification effect will drive the portfolio's performance toward deploying an amount of Contingency Reserve that approximates the expected value of its total cleared Contingency Reserve.

9.2 Registration and Scheduling Contingency Reserve from BLDR Resources

Market Participants desiring to register a DRR Type I as a BLDR resource will have to so indicate during the registration process. Qualifications for using this M&V approach include submittal of the most recent three months of 5' interval data and the asset being at its low duty cycle no longer than 10'. MISO will review the submitted data to decide whether to approve this M&V method. This baseline method is only available for contingency reserve assessment and not energy. After registration, the MP must retain a rolling three months of 5' interval data that MISO can audit at any time.

At the current time, there is a 40% cap on using Demand Response Resources for provision of Spinning Reserve service. BLDR procurement will be included in the 40% cap imposed in the Spinning Reserve market. If the total amount of Operating Reserve provided by all BLDR resources is small (e.g., less than 10 percent) the selection of BLDR is a non-issue. As Exhibit 9-1 shows, a large BLDR load might offer about 30 MW of Spinning Reserve to the market, which is well below the 40 percent limit; however, if many BLDR loads begin offering Spinning Reserve, the total amount could easily get capped at the 40 percent limit.

On the positive side, aggregating BLDR loads will have the combined effect of diversifying away the likelihood that all, or most, loads are at the bottom of their cycles when called to deploy their energy. As the number of BLDR loads increases their combined response to a contingency event, the combined response ability will approach a normal distribution whose expected value of the total Contingency Reserve that will be deployed is equal to the sum of the expected values of the Contingency Reserve that will be deployed by each BLDR resource.

MISO's current Tariff allows the system operators to adjust the amounts of Contingency Reserve they procure based on contemporaneous system conditions. The current business rule is to place BLDR procurement under the 40% cap that currently exists in the spin market. The Supplemental Reserve market has no such caps.

9.3 Measurement and Verification of BLDR Contingency Reserve

BLDR resources are a special category of DRR Type – I resources. The current Tariff requires all DRR Type-I resources to provide 5-minute interval data to MISO no later than five (5) days after the end of the contingency event. This data must span the period starting five (5) minutes prior to when the contingency event began and ending at least 60 minutes later.

The DRR-Type I Consumption Baseline is its metered demand for the five (5)-minute interval immediately preceding the start of the contingency event. The amount of Contingency Reserve deployed is then measured by the difference between its Consumption Baseline value and its metered demand for the five (5)-minute interval ending ten (10) minutes after the start of the contingency event. If this M&V methodology is applied to a BLDR resource that is at the bottom of its duty cycle when it receives MISO's deployment instruction, the resource will be in noncompliance and will have little incentive to suspend its cyclical production process. Suspending production provides value to MISO because it assists in controlling the ACE. In addition, it could also bring about an earlier end to the contingency event. For these reasons, a separate M&V methodology is needed for BLDR resources.

If the resource ramps down to its minimum demand and remains at that level until the end of the contingency event, it will be in full compliance. To make this assessment, MISO requires a snapshot of the BLDR resource's normal consumption pattern. In such cases, the resource's eligible amount of deployed Contingency Reserve will be the smaller of the difference between the resource's demand for the five (5)-minute interval immediately preceding the end of the contingency event and: 1) its demand for the five (5)-minute interval beginning ten (10) minutes immediately following the end of the event; or, 2) the 50% trimmed mean of the five (5)-minute intervals for the three (3) hours immediately following the Contingency Reserve Deployment Period.

The Market Participant sponsoring a BLDR may develop a custom Consumption Baseline if the above approach would not produce reasonable estimates of the resource's demand reductions.

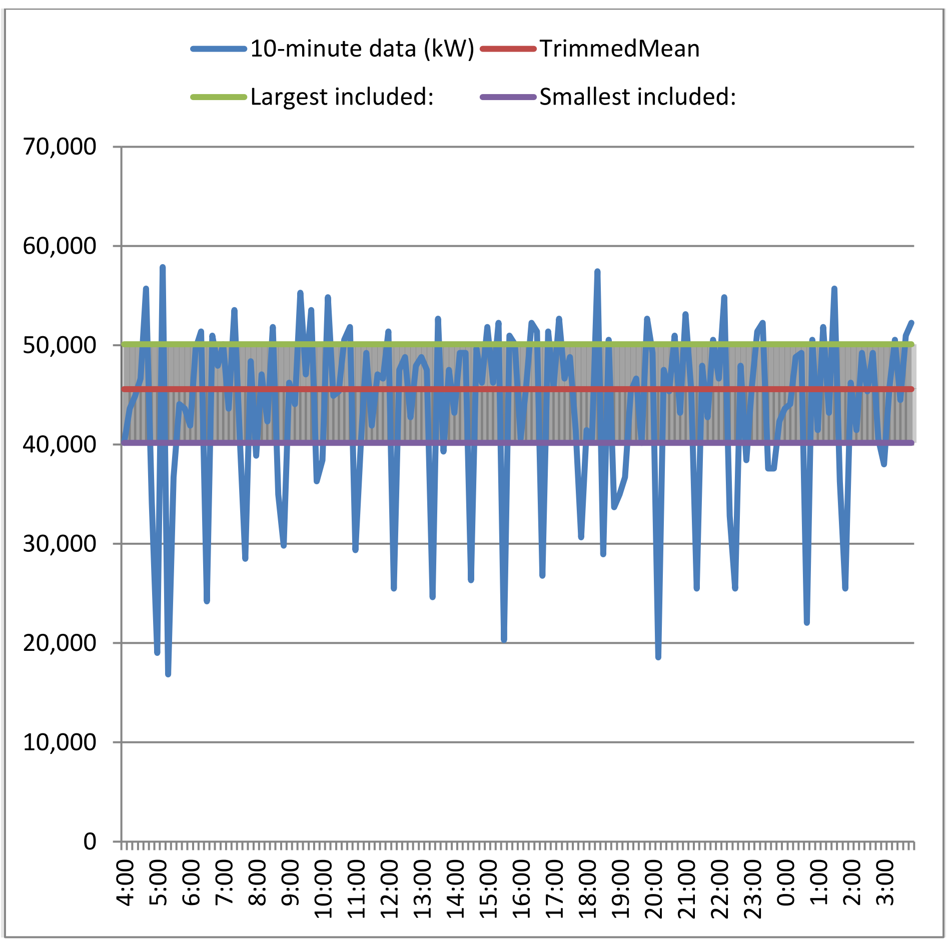
Example

- Demand 10-min. following end of dispatch = 43 MW
  Demand during dispatch = 30 MW
  Calculated response = 43 – 30 = 13 MW

- 50% trimmed mean for the next 3 hours = 45 MW
  Demand during dispatch = 30 MW
  Calculated response = 45 – 30 = 15 MW
- 13 MW < 15 MW; 13 MW response

How this would work:

The “trimmed” mean removes X% of the largest and smallest values from the data. This has the effect of reducing the impact of “outliers”. As part of an M&V protocol, this technique would remove the cyclic lows and any dispatch down. This method would also remove the highest values that are probably not reflective of typical demand. *See* illustration below.



9.4 Compensating BLDR Resources for Contingency Reserve

A BLDR resource will receive compensation comparable to that which a DRR Type – I resource would receive for its capacity and energy. The current Tariff compensates a DRR Type – I resource for being available to provide Contingency Reserve through capacity payments. In addition, when the resource reduces its load as instructed, it received energy payments for its foregone energy. This same compensation will apply to BLDR resources.

9.5 Underperformance Penalties

The underperformance penalties[23] that currently apply to DRR Type – I resources will apply to BLDR resources when they are out of compliance. However, as stated earlier, a BLDR resource cannot control where it will be in the duty cycle when it receives a deployment instruction, so it should not be deemed out of compliance based solely on the amount of Contingency Reserve capacity it actually delivers. The resource will only be out of compliance if it fails to take action to shut down or resumes its batch load operation during the Contingency Reserve Deployment Period after receiving a deployment instruction. Exhibit 2 illustrates this situation. Although the resource deploys no Contingency Reserve energy, it is complying because none was available for deployment when the resource received the instruction to deploy. The resource would also be complying if some Contingency Reserve was available and all of that was deployed.

[23] *See the Tariff, 40.3.4 e and h*

10 APPENDIX A: CONSUMPTION BASELINE EXAMPLES

This Appendix provides examples of the calculations related to Consumption Baselines.

10.1 Calculated Baseline (without adjustment)

Example:
Weekday Type: average for each hour from most recent 10 qualifying days.

The example (below) shows the demands for 24 days (the Event Day and the 23 most recent days) for a particular Hour. The Event occurred on a Monday, so the “weekday” type calculation is appropriate, requiring the 10 most recent qualifying days. The Wednesday twelve days prior (E-12) is excluded from this calculation, as it was also an Event Day. Days selected for the calculation are shown in blue highlight.

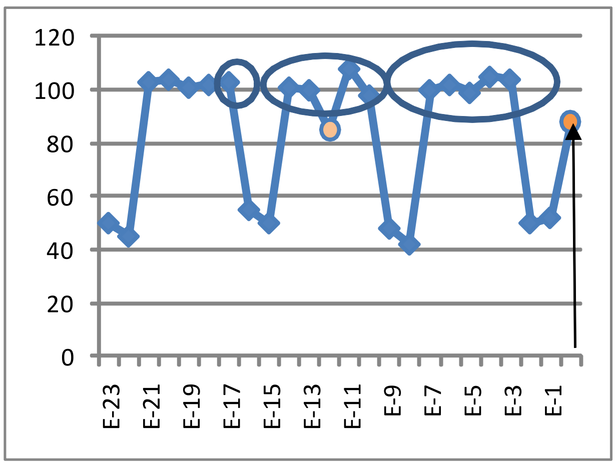
For the Hour shown in the example, the average of the 10 qualifying days is 102 MW, which becomes the Calculated Baseline for this Hour. Comparing this value to the metered load during this same Hour of the Event results in the load reduction: 102 – 88 = 14 MW.

A similar procedure would be followed for each Hour of the Event when MISO expects the load reduction to occur. The Event begins at the time when the Scheduling Instruction needs to be issued to fulfill the requisite load reduction; Calculated Baselines begin in hours after the Event has begun plus allowance for the specified notification time. For example, if the notification requirements were 2 hours and MISO required load reduction at 1400 hours, the Event begins at 1200 hours when the Scheduling Instruction needs to be issued to drop load by 1400 hours. . Calculated Baselines are calculated starting at 1400 hours.

BASELINE EXAMPLES: **CALCULATED BASELINE, NO ADJUSTMENT**

	DAY	LOAD [1]	Load Reduction
Saturday	E-23	50	
Sunday	E-22	45	
Monday	E-21	103	
Tuesday	E-20	104	
Wednesday	E-19	101	
Thursday	E-18	102	
Friday	E-17	103	
Saturday	E-16	55	
Sunday	E-15	50	
Monday	E-14	101	
Tuesday	E-13	100	
Wednesday	E-12	85	
Thursday	E-11	108	
Friday	E-10	98	
Saturday	E-9	48	
Sunday	E-8	42	
Monday	E-7	100	
Tuesday	E-6	102	
Wednesday	E-5	99	
Thursday	E-4	105	
Friday	E-3	104	
Saturday	E-2	50	
Sunday	E-1	52	
Monday	E	88	14

Demand reduction is equal to the difference between the Event Day and the Baseline. (Ignores other Event Days within history.)



Baseline Average: 102

(1) Load = Load during same hour from these days; one particular hour shown here.
E = Event Day
Note: Wednesday (E-12) also an Event day.

10.2 Calculated Baseline (with symmetrical multiplicative adjustment)

For the Symmetrical Multiplicative Adjustment, each Calculated Baseline hour during the Event, as determined using the “without adjustment” procedure described above, will be adjusted by a ratio. That ratio is determined by comparing a particular three-hour, load-weighted average value of the load on the Event Day with those same three hours from the Calculated Baseline (without adjustment). This ratio is limited to plus or minus 20% (i.e., the value of the ratio is limited to between 0.8 and 1.2). The “particular” three-hour period for which the ratio is calculated is the three-hour period beginning four hours prior to the Event, that is to say, the calculation skips the hour immediately prior to the start of the Event. The Event begins at the time when the Scheduling Instruction needs to be issued to fulfill the requisite load reduction, as described in the previous example. Once the ratio is determined, all the unadjusted Calculated Baseline hourly values during the Event are multiplied by the ratio. Then, these adjusted values are compared to the metered hourly values during the Event to determine the demand reduction.

In the example shown, values highlighted in blue are the three hours totaled to form the numerator of the ratio; values highlighted in green are the three hours totaled to form the denominator of the ratio. In this example, the assumption is the notification period required by the Market Participant is 30 minutes or less. As shown, this ratio is 1.186, which lies between 0.8 and 1.2 and so may be used to adjust each of the Calculated Baseline hourly values during the Event. If this ratio had been outside the 0.8 to 1.2 range, the nearest range limit (0.8 or 1.2) would be used to make the adjustments.

Each of the (unadjusted) Calculated Baseline hourly values is multiplied by the ratio to determine the adjusted Calculated Baseline values. These values are then compared to the actual hourly demands during the Event, the difference being the demand reduction.

BASELINE EXAMPLES **CALCULATED BASELINE, Symmetric Multiplicative Adjustment**

Demand reduction is equal to the difference between the Event Day and the adj. Baseline. (Ignores hour prior to Event.)

	HOUR ENDING	LOAD	Unadj. Baseline	Adj. Baseline	Load Reduced
	E-3	122	100		
	E-2	120	102		
	E-1	121	104		
Ignore →	E	122	103		
Event Hours	E+1	90	103	122.2	**32.2**
	E+2	90	101	119.8	**29.8**
	E+3	90	102	121.0	**31.0**
	E+4	90	104	123.4	**33.4**

Step1: Calculate Unadjusted Baseline for each hour.
See Calculated Baseline, No Adjustment for one example hour.

Step2: Calculate quantity-weighted ratio using 3 hours,
skipping immediately prior hour.

Sum Actual Load, 3 prior hours:	363
Sum Unadjusted Baseline, 3 prior hours:	306
Preliminary Ratio:	1.186

Step3: Use this result to adjust each baseline hour, up to ±20%.

Is Ratio between 0.8 and 1.2?	Yes
If "Yes", use Prelim. Ratio; if "No", use boundary (0.8 or 1.2) = FINAL RATIO:	**1.186**
Example for Hour Ending "E+1":	
Unadj. Baseline =	103
Ratio times Unadj. Baseline =	122.2

Step4: Calculate demand reduction: Adj.Baseline - Actual

10.3 Calculated Baseline (with weather adjustment)

For the Weather Adjustment to the Calculated Baseline, each Calculated Baseline hour during the Event, as determined using the "without adjustment" procedure described previously, will be adjusted by an amount that reflects the impact of the difference between the temperatures during the Event and the average temperatures during the period used to calculate the baseline values. The weather adjustment consists of (1) determining the difference between the temperature during each Event Hour and the average for that same Hour during the period used to determine the unadjusted Calculated Baseline values, and (2) determining the impact on the Calculated Baseline of that temperature difference. Calculated Baselines begin in hours after the Event has begun plus allowance for the specified notification time.

The Market Participant will have previously submitted the results of regression analysis describing the relationship between temperature and load. These results are expressed as kW per degree and represent the number of kWs increased (or decreased) for each 1° increase (or decrease) in temperature. The Market Participant may submit up to five (5) unique temperature set points in integer Fahrenheit degree format; for each set point, the Market Participant should provide a "factor": the kW-per-degree impact of temperature variations up to this temperature. Therefore, temperatures below the first set point (lowest temperature) will be adjusted using the first "factor"; temperatures above the last set point (highest temperature) will not be adjusted. Please see the example provided (below) for a three-interval illustration.

For each Hour during the Event, the following procedures apply:

1. Determine the unadjusted Calculated Baseline (kW),
2. Determine the average temperature for that same hour from each day used in the calculation of the unadjusted baseline,
3. Compare the temperature for each Hour during the Event with the average temperature determined in Step 2,
4. Determine from the regression results the change in the unadjusted Calculated Baseline (kW) related to the temperature differential,
5. Add this result (positive or negative) to the unadjusted Calculated Baseline to determine the weather adjusted Calculated Baseline value (kW).

The difference between the weather adjusted Calculated Baseline and the load during that same Event Hour is the demand reduction.

BASELINE EXAMPLES: **CALCULATED BASELINE, Weather-Sensitive Adjustment**

	HOUR ENDING	LOAD	Day of Event TEMP	Baseline TEMP (1)	Baseline LOAD (1)	Adj. Baseline	Load Reduction
	E-2	1040					
	E-1	1080					
	E	1120					
Event Hours	E+1	920	88	81	950	**1106.0**	**186.0**
	E+2	900	89	82	980	**1139.0**	**239.0**
	E+3	890	91	84	1020	**1185.0**	**295.0**
	E+4	910	90	85	1010	**1130.0**	**220.0**
	E+5	900	85	85	1050	**1050.0**	**150.0**
	E+6	910	83	84	1060	**1039.0**	**129.0**

(1) Average of corresponding values during these same hours from Baseline days.

	Set Point	Factor
WSA1	85	21
WSA2	95	24
WSA3	150	18
WSA4		
WSA5		

Step1: Calculate Baseline temperatures and loads each hour using "without adjustment" method.
Step2: Use INPUTS provided through DR Tool (See Table inset) to adjust Baseline:
Read Set Points as "up to" temperature shown.
Increase (Decrease) Baseline load by "Factor" until Event Temp. reached.
Step3: Determine Load Reduction from Adjusted Baseline and Load.

Example: Shown above, the temperature in Hour E+1 exceeds the Baseline temperature for that hour. Thus, the Baseline load needs to be adjusted to reflect this higher temperature.
As the temperature increases from 81 to 88, the load increases as shown in the box above.
E.g., for any temperature "up to" 85, load changes by 21 kW per degree.
For the entire increase from 81 → 88, LOAD increases by 21+21+21+21+24+24+24 = 156 kW
Therefore, the customer Baseline LOAD is increased from its Unadj. value of 950 by 156 to 1106.

10.4 Firm Service Level Baseline

For the Firm Service Level selection, performance assessment is based on whether the asset moved down to its Firm Service Level. Any potential energy credits and charges, however, are calculated based on a comparison to a Consumption Baseline.

11 Glossary

The following list is provided as a reading aid and should not be interpreted as a complete definition for any of the acronyms shown.

ARC	**Aggregator of Retail Customers** Businesses that combine one or more retail customers and represent those customers' combined capabilities for demand response in the wholesale markets
BLDR	**Batch Load Demand Response** A special category of DRR-Type I resource that can reduce its load, or maintain its already reduced load beyond the normal BLDR duty cycle, to provide Demand reduction for economic, reserve, or Emergency services
BPM	**Business Practices Manual** A set of manuals designed to provide Market Participants with detailed information regarding how to conduct business in the various markets administered by MISO
BTMG	**Behind the Meter Generation** (1) General: Electrical generation that due to its location and metering is not "seen" by MISO through telemetry. (2) Specific: A defined term in the Tariff that refers to Behind the Meter Generation participating as a Load Modifying Resource in the MISO markets.
CPNode	**Commercial Pricing Node** A nodal level created for commercial purposes that aggregates certain EPNodes; all Market Settlement activity is performed at a CPNode, and it is the level where LMPs and MCPs are publicly available
DR	**Demand Resource** Interruptible Load or Direct Control Load Management and other resources that can reduce Demand during an Emergency
DRR	**Demand Response Resource** Retail customer facilities or operations that are capable of voluntarily reducing their demand on the system

DSRI	**Demand Side Resource Interface On-line User Guide** The guide to manage Load Modifying Resources, including obtaining access state availability of assets, receive and respond appropriately to scheduling instructions, deploy resources, view event history, and participate in drills.
EDR	**Emergency Demand Response** (Initiative or Resource) A MISO-classification that provides for load reductions under Emergency conditions
EPNode	**Elemental Pricing Node** The lowest level of nodal relationship in the MISO market; EPNodes are modeled as part of the Physical Network Model to represent points on the Transmission System where energy is injected or withdrawn
FERC	**Federal Energy Regulatory Commission**
LBA	**Local Balancing Authority** An operational entity that is responsible for compliance to NERC for certain Reliability Standards
LMP	**Locational Marginal Price** A nodal price for energy that combines the price of energy, transmission losses, and congestion
LMR	**Load Modifying Resource** A Tariff term that refers to resources that have qualified as planning resources, that is, resources that contribute towards the system's ability to meet the resource adequacy requirement. LMRs consist of two distinct resource types: Demand Resources and Behind the Meter Generation.
LSE	**Load Serving Entity** The business that provides power to retail customers
MCP	**Market Clearing Price** An equilibrium price paid for various ancillary reserves

MECT	**Module E Capacity Tracking tool** The Web-based computer program and interface that allows Market Participants to enter various data related to their loads and Module E requirements.
MISO	**Midcontinent Independent System Operator, Inc.** The operator / administrator of the transmission grid
MP	**Market Participant** A legal entity that is qualified, pursuant to procedures established by MISO to: Submit Bilateral Transaction Schedules; Submit Bids to purchase, and /or Offers to supply electricity in the Day-Ahead and/or Real-Time Energy Markets; Hold Financial Transmission Rights (FTRs) and submit bids to purchase, and /or offers to sell such rights; and Settle all payments and charges with MISO
NERC	**North American Electric Reliability Corporation**
PRA	**Planning Resource Auction** An annual auction held to allow Load Serving Entities an opportunity to meet their obligations for obtaining required capacity for a given Planning Year
PRMR	**Planning Reserve Margin Requirement** The total capacity requirement, measured in MW, for an LSE, based on its customers' load coincident with MISO's peak during the planning year
RSG	**Revenue Sufficiency Guarantee** RSG is the financial mechanism through which MISO obtains and transfers funds to offset direct costs incurred by suppliers that are not compensated through normal market prices.
SCED	**Security Constrained Economic Dispatch** A model that selects units for dispatch from among those previously committed on the basis of their marginal economic costs
SCUC	**Security Constrained Unit Commitment** A model that selects units for commitment on a co-optimized basis, based upon their economic offers, operational parameters, and congestion

Tariff	**Open Access Transmission, Energy and Operating Reserve Markets Tariff** The FERC-approved set of rules under which MISO operates
TDRL	**Targeted Demand Reduction Level**

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