



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

4.2.3.4.6 Resource Offer Commitment Status

Both Day-Ahead Schedule Offers and Real-Time Schedule Offers for Generation Resources and DRRs-Type II have an associated Offer commitment status. The commitment status impacts the considerations made in unit commitment. The five commitment statuses for Generation Resources and DRRs-Type II are:

- **Outage** – Designates the Resource is not available for consideration in Energy and Operating Reserve Markets commitment because the Resource is on a Generator Planned Outage or Generator Forced Outage.
- **Emergency** – Designates the Resource is available for commitment in Emergency situations only.
- **Economic** – Designates the Resource is available for commitment by MISO.
- **Must-Run (self-commit)** – Designates the Resource as committed per MP request and is available for dispatch by MISO.
- **Not Participating²²** – Designates that the Resource will not participate in the Day-Ahead and/or Real-Time Energy and Operating Reserve Market but is otherwise available.

The single value commitment status is submitted via the Day-Ahead Schedule Offer and Real-Time Schedule Offer and will override the default commit status. The default value is set during asset registration.

The Day-Ahead Energy and Operating Reserve Market and the Real-Time Energy and Operating Reserve Market may commit a unit outside of the hours it has submitted as "Must-Run" if the unit has an "Economic" status.

4.2.3.4.7 Resource Offer Dispatch Status

Dispatch Status can be selected on an hourly basis for Energy, Regulating Reserve, Spinning Reserve, Supplemental Reserve, Ramp Capability, and Short-Term Reserve on a Resource by Resource basis as part of the Day-Ahead and Real-Time Schedule Offer and such selections will override the default dispatch status values. The default dispatch status values are set during asset registration.

²² Not available to Resources designated as Capacity Resources for Module E Purposes



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Exhibit 4-15 shows the valid Dispatch Status selections. Dispatchable Intermittent Resources are not eligible to provide Operating Reserves, and therefore, do not provide Dispatch Statuses for Operating Reserve products.

Exhibit 4-15: Valid Dispatch Status Selections

Status	Product					Up and Down Ramp Capability	On-line and Off-line Short-Term Reserve
	Energy	Regulating Reserve	Spinning Reserve	On-Line ²³ Supplemental Reserve	Off-line Supplemental Reserve ²⁴		
Economic	√	√	√	√	√	√	√
Self-Schedule	√	√	√	√	√	N/A	N/A
Emergency	N/A	N/A	N/A	N/A	√	N/A	N/A
Not Qualified	N/A	√	√ ²⁵	√	√	N/A	N/A
Not Participating	N/A	√	N/A	N/A	√ ²⁶	√	√

The five valid Dispatch Status selections and rules associated with each are as follows. The default value is set during asset registration.

- **Economic** – Designates that Generation Resources or DRRs-Type II that have been committed are available for dispatch by MISO and Dispatch Targets for Energy, Regulating Reserve, Spinning Reserve and Supplemental Reserve may be calculated for the Resource. For Generation Resources and DRRs-Type II that are Quick-Start

²³ Only applies to Resources that are not Spin Qualified Resources, or to Spin Qualified Resources that have selected “Not Qualified” for an Hour, and that are Supplemental Qualified Resources. Based on current reliability standards which do not require Spinning Reserve to be frequency responsive, resources that are synchronized to the system will always be Spin Qualified Resources.

²⁴ Only applicable to uncommitted Quick-Start Resources.

²⁵ Can only be selected if Regulating Reserve “Not Qualified” status is selected and Resource cannot meet reliability standards relating to provision of Spinning Reserve. Based on current reliability standards which do not require Spinning Reserve to be frequency responsive, resources that are synchronized to the system will always be Spin Qualified Resources.

²⁶ Not available to Resources designated as Capacity Resources for Module E purposes.



Energy and Operating Reserve Markets Business Practices Manual

BPM-002-r23

Effective Date: SEP-30-2022

Resources that have not been committed, only the selection for Off-Line Supplemental Reserve would apply.

- **Self-Schedule** – Indicates that the product is Self-Scheduled. The MW amounts of the Self-Schedules for Energy, Regulating Reserve, Spinning Reserve or Supplemental Reserve will be indicated as part of the Day-Ahead Schedule Offer or Real-Time Schedule Offer.
- **Not Qualified** – Indicates that Resource is not qualified to provide Regulating Reserve, Spinning Reserve, On-Line Supplemental Reserve and/or Off-Line Supplemental Reserve in an Hour. This status is only selected in the event of a physical Resource restriction that prevents the otherwise qualified Resource from providing the service in that Hour.
- **Not Participating** – Indicates that the Resource has elected not to provide either Regulating Reserve or Off-Line Supplemental Reserve in an Hour but is otherwise available to provide the service.
- **Emergency** – This option is only available to Generation Resources and DRRs-Type II that are Quick-Start Resources. Selection of this status option indicates that the Resource will be cleared for Off-Line Supplemental Reserve only in an Emergency.

4.2.3.4.8 Ramp Capability Dispatch Status

Ramp Capability Dispatch Status can be selected on an hourly basis on a Resource by Resource basis as part of the Day-Ahead and Real-Time Schedule Offer and such selections will override the default dispatch status values. The default dispatch status values are set during asset registration. The two valid Ramp Capability Dispatch Status selections and rules associated with each are as follows. The default value is set during asset registration.

- **Economic** – Designates that Generation Resources or DRRs-Type II that have been committed are available for ramp capability by MISO.
- **Not Participating** – Designates that Generation Resources or DRRs-Type II are not participating for ramp capability and won't be committed or dispatched to meet ramp needs.

4.2.3.4.9 Short-Term Reserve Dispatch Status

On-line and off-line Short-Term Reserve Dispatch Status can be selected on an hourly basis on a Resource by Resource basis as part of the Day-Ahead and Real-Time Schedule Offer and such selections will override the default dispatch status values. The default dispatch status values are



Energy and Operating Reserve Markets Business Practices Manual

BPM-002-r23

Effective Date: SEP-30-2022

set during asset registration. The two valid selections and rules associated with each are as follows. The default value is set during asset registration.

- **Economic** – Designates that Generation Resources or DRRs-Type II that have been committed are available for Short-Term Reserve by MISO. For Generation Resources and DRRs-Type II that are Off-Line Short-Term Reserve Resources that have not been committed, only the selection for Off-Line Short-Term Reserve would apply.

Not Participating – Designates that Generation Resources or DRRs-Type II are not participating for Short-Term Reserve.

4.2.3.4.10 Resource Self-Schedule

MPs may submit Self-Schedules, which consist of a fixed quantity (in MW) of Energy, Regulating Reserve and Spinning Reserve or On-Line Supplemental Reserve²⁷ per hour that may be dispatched from the Resource if it is on-line. In addition, an MP with a Quick-Start Resource may choose to Self-Schedule Off-Line Supplemental Reserve from that Resource.

- To submit a Self-Schedule for Energy, the MP submits a Resource Self-Schedule MW value for Energy and sets Energy Dispatch Status to Self-Schedule. If the Self-Schedule MW value is less than the Resource's Hourly Economic Maximum Limit, the Resource may be dispatched above the Self-Schedule MW amount, based upon the Resource's Energy Offer, on an economic basis as part of the Energy and Operating Reserve Markets clearing and dispatch process.
- To submit a Self-Schedule for Regulating Reserve, the MP submits a Resource Self-Schedule MW value for Regulating Reserve and sets the Regulating Reserve Dispatch Status to Self-Schedule. If the Self-Schedule MW value is less than the Resource's Regulating Reserve capability, the Resource may clear Regulating Reserve above the Self-Schedule MW amount, based upon the Resource's Regulating Reserve Offer, on an economic basis as part of the Energy and Operating Reserve Markets clearing process. The maximum amount of Regulating Reserve that can be self-scheduled on a Resource is equal to the lesser of i) the applicable bi-directional ramp rate multiplied by the Regulation Response Time or ii) the difference between the applicable regulation maximum limit and regulation minimum limit divided by 2. The Self-Schedule MW value shall be relaxed if necessary, to enforce Resources limits or ramp rates and may be relaxed if necessary, to manage transmission congestion, the Sub-

²⁷ If not a Spin Qualified Resource.



**Energy and Operating Reserve Markets
Business Practices Manual**

BPM-002-r23

Effective Date: SEP-30-2022

Regional Power Balance constraint, supply Energy and/or meet Operating Reserve requirements.

- To submit a Self-Schedule for Spinning Reserve or On-Line Supplemental Reserve, the MP submits a Resource Self-Schedule MW value for Spinning Reserve or On-Line Supplemental Reserve and sets the Spinning Reserve Dispatch Status or On-Line Supplemental Reserve Dispatch Status to Self-Schedule. If the Self-Schedule MW value is less than the Resource's Spinning Reserve or On-Line Supplemental Reserve capability, the Resource may clear Spinning Reserve or On-Line Supplemental Reserve above the Self-Schedule MW amount, based upon the Resource's Spinning Reserve Offer or On-Line Supplemental Reserve Offer, on an economic basis as part of the Energy and Operating Reserve Markets clearing process. The maximum amount of Contingency Reserve that can be self-scheduled on an on-line Resource is equal to the lesser of i) the applicable ramp rate multiplied by the Contingency Reserve Deployment Period or ii) the difference between the applicable maximum limit and minimum limit. The Self-Schedule MW value shall be relaxed if necessary to enforce Resources limits or ramp rates and may be relaxed if necessary to manage transmission congestion, the Sub-Regional Power Balance constraint, supply Energy and/or meet Operating Reserve requirements.
- Self-Schedules for Off-Line Supplemental Reserve can only be submitted for an uncommitted Quick-Start Resource that is a Supplemental Qualified Resource. To submit a Self-Schedule for Off-Line Supplemental Reserve, the MP submits a Resource Self-Schedule MW value for Off-Line Supplemental Reserve and sets the Off-Line Supplemental Reserve Dispatch Status to Self-Schedule. If the Self-Schedule MW value is less than the Resource's Maximum Off-Line Response Limit, the Resource may clear Off-Line Supplemental Reserve above the Self-Schedule MW amount, based upon the Resource's Off-Line Supplemental Reserve Offer, on an economic basis as part of the Energy and Operating Reserve Markets clearing process. The maximum amount of Supplemental Reserve that can be self-scheduled on an off-line Resource is equal to the lesser of i) the Maximum Off-Line Response Limit or ii) the applicable economic maximum limit of the Resource. The Self-Schedule MW value shall be relaxed if it becomes necessary to commit the Resource.

In all cases, the minimum amount of Self-Schedule MW for Energy, Regulating Reserve, Spinning Reserve or Supplemental Reserve is equal to 1 MW, with the exception of Self-Scheduled Energy



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

for DRR-Type II resources. A DRR-Type II may self-schedule Energy MW less than zero in its negative operating range.

Submitting a Self-Schedule value does not guarantee the unit is committed; the MP must designate the commitment status as “Must-Run” to achieve this result. A Self-Schedule is a price taker up to Self-Schedule MW level. Any amounts cleared above Self-Scheduled amounts are eligible to set price.

Submitted Self-Schedules will be reduced by MISO if such submitted schedules cannot be physically implemented based upon submitted Resource limits and ramp rates. Additionally, MISO may reduce accepted Self-Schedules as necessary to manage transmission constraints, the Sub-Regional Power Balance Constraint, maintain Operating Reserve requirements, satisfy Energy demand and/or maintain reliable operating conditions. In no case will the Transmission Provider violate the Resource limits or ramping capabilities.

4.2.4 Demand Response Resources-Type I (“DRR-Type I”) Offer Requirements

The following Subsection describes the economic and operational Offer data for DRRs-Type I and how these data are used in commitment and dispatch decisions.

4.2.4.1 Offer Information Summary

DRR-Type I Offers consist of data submitted by MPs for consideration in commitment and dispatch activities. Such Offer data may be submitted for the Day-Ahead and Real-Time Energy and Operating Reserve Markets.



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Exhibit 4-16 identifies the data that may be included in a DRR-Type I Offer and the markets in which they apply.



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Exhibit 4-16: DRR-Type I Offer Data Summary

DRR-Type I Offer Data	Units	Day-Ahead Schedule Offer	Real-Time Schedule Offer	Notes
Economic Offer Data				
Energy Offer	\$/MWh	Hourly	Hourly	2
Hourly Curtailment Offer	\$/hr	Hourly	Hourly	2
Shut-Down Offer	\$	Daily	Daily	2
Spinning Reserve Offer	\$/MWh	Hourly	Hourly	1, 2, 4
Supplemental Reserve Offer	\$/MWh	Hourly	Hourly	1, 2, 4
Off-Line Short-Term Reserve Offer	\$/MWh	Hourly	Hourly	1, 4
Self-Scheduled Spinning Reserve	MW	Hourly	Hourly	1
Self-Scheduled Supplemental Reserve	MW	Hourly	Hourly	1
Commitment and Dispatch Operating Parameter Offer Data				
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
Shut-Down Time	hh:mm	Hourly	Hourly	3
Shut-Down 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
Contingency Reserve Status	Select	Hourly	Hourly	1
Off-line Short-Term Reserve Dispatch Status	Select	Hourly	Hourly	1
Maximum Daily Contingency Reserve Deployment	MWh	NA	Daily	1
Maximum Daily Energy Curtailment	MWh	Daily	Daily	1
<p>Note 1: If qualified.</p> <p>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.</p> <p>Note 3: Default Offers are used if no values are submitted for the day.</p> <p>Note 4: DRRs-Type I may submit up to three MW/Price pairs for reserve offers</p>				

MISO maintains a Day-Ahead Energy and Operating Reserve Market Offer and a Real-Time Energy and Operating Reserve Market Resource Offer for each DRR-Type I. These Offers are standing offers and are maintained for each market independently of the other. Updates to DRR-Type I Offers may be designated as updating the Day-Ahead Energy and Operating Reserve Market Offer only, the Real-Time Energy and Operating Reserve Market Offer only, or both. If a submittal update is not received prior to the applicable Offer submittal timelines, the previous Offer data is in place and used unless otherwise removed or set to “Unavailable”.

4.2.4.2 Economic Offer Data

The economic Offer data parameters for a DRR-Type I as identified in



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022



**Energy and Operating Reserve Markets
Business Practices Manual**

BPM-002-r23

Effective Date: SEP-30-2022

Exhibit 4-16 are described in more detail below.

4.2.4.2.1 Energy Offer

An Energy Offer in \$/MWh is submitted as part of the Day-Ahead Schedule Offer, Real-Time Schedule Offer, or both. A single value may be submitted for each hour of the day for the Day-Ahead Energy and Operating Reserve Market and for the Real-Time Energy and Operating Reserve Market that represents an Energy Offer at the Targeted Demand Reduction Level. The \$/MWh Offer values may range from -\$500 to \$9999.99. An Energy Offer above the Energy Offer Soft Price Cap (\$1,000/MWh) will be verified by the IMM before it is used to set price in the Energy and Operating Reserve Markets. The Energy Offer will be capped at the higher of the Energy Offer Soft Price Cap (\$1,000/MWh) or its verified cost-based incremental Energy Offer and the verified cost-based incremental Energy Offer will be capped at Energy Offer Hard Price Cap (\$2,000/MWh).

There is no connection between the Energy Offer for the Day-Ahead and Real-Time Energy and Operating Reserve Market (i.e., Day-Ahead Schedule Offers only roll over to the next Day-Ahead Energy and Operating Reserve Market. Day-Ahead Schedule Offers do not roll over into the Real-Time Energy and Operating Reserve Market and vice-versa.). A data submission to one hour of the Day-Ahead Energy and Operating Reserve Market does not affect the same hour for the Real-Time Energy and Operating Reserve Market and vice-versa. If Energy Offers are not submitted for any hour for either market, then the values are treated as the quantity zero (0).

4.2.4.2.2 Shut-Down Offers and Hourly Curtailment Offers

The Shut-Down Offer may be submitted as part of the default Offer and then overridden on a daily basis through submission of the Day-Ahead Schedule Offer and/or Real-Time Schedule Offer. The Hourly Curtailment Offer may be submitted on an hourly basis through submission of the Day-Ahead Schedule Offer and/or Real-Time Schedule Offer. The Real-Time Offer Shut-Down Offers and Hourly Curtailment Offers may be modified at any time prior to 1430 EPT (OD-1) for consideration in the pre Day-Ahead RAC. The Shut-Down Offers may be only one value for the day whereas the Hourly Curtailment Offers may vary for each hour of the day. If a DRR-Type I was shut down more than once per day during the commitment, each shut down would be considered separately.

4.2.4.2.3 Operating Reserve Offers

DRRs-Type I that are Spin Qualified Resources may submit Spinning Reserve Offers for use in the Energy and Operating Reserve Markets. DRRs-Type I that are Supplemental Qualified



**Energy and Operating Reserve Markets
Business Practices Manual**

BPM-002-r23

Effective Date: SEP-30-2022

Resources may submit Supplemental Reserve Offers for use in the Energy and Operating Reserve Markets. Along with asset registration Spinning and Supplemental Reserve qualifications and Spinning and Supplemental Reserve Dispatch Statuses, the choice of DRR-Type I Contingency Reserve Status will determine whether the Resource will be eligible to clear Spinning Reserves or Supplemental Reserves in the Day-Ahead and Real-Time markets. The allowed range for Contingency Reserve Offers is currently \$0 to \$100.00. If a DRR-Type I is committed for Energy, it cannot provide Spinning Reserve or Supplemental Reserve. If Operating Reserve Offer prices are not submitted for any hour for either market, then the values are treated as the quantity zero (0).

DRRs-Type I may submit up to three MW/Price pairs for each operating reserve product which includes Spinning Reserves and Supplemental Reserves. Similar to Energy Offer Curves, the MP may designate whether the Contingency Reserve Offer MW/Price pairs are considered as a slope or block Offer. The MW/Price pairs must be monotonically increasing for price and strictly increasing for MW.

4.2.4.2.4 Off-Line Short-Term Reserve Offers

DRRs-Type I that are Off-Line Short-Term Reserve Qualified Resources may submit Off-Line Short-Term Reserve Offers for use in the Energy and Operating Reserve Markets. Along with asset registration Off-Line Short-Term Reserve qualifications the choice of DRR-Type I Off-Line Short-Term Reserve Status will determine whether the Resource will be eligible to clear Short-Term Reserve in the Day-Ahead and Real-Time markets. The allowed range for Off-Line Short-Term Reserve Offers is currently \$0 to \$100.00. If a DRR-Type I is committed for Energy, it cannot provide Off-Line Short-Term Reserve. If an Off-Line Short-Term Reserve Offer price is not submitted for any hour for either market, then the value is treated as the quantity zero (0).

DRRs-Type I may submit up to three MW/Price pairs for Off-Line Short-Term Reserve. Similar to Energy Offer Curves, the MP may designate whether the Off-Line Short-Term Reserve Offer MW/Price pairs are considered as a slope or block Offer. The MW/Price pairs must be monotonically increasing for price and strictly increasing for MW.

4.2.4.3 Commitment and Dispatch Operating Parameter Offer Data

The Resource Offer parameters used in Day-Ahead Energy and Operating Reserve Market and RAC commitment and dispatch decisions are shown in Exhibit 4-17.



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Exhibit 4-17: DRR -Type I Offer Parameters

Parameter	Validation	Use
<i>Shut-Down Notification Time</i>	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.	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.
<i>Shut-Down Time</i>	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.	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.
<i>Minimum Interruption Duration</i>	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.	MISO schedule 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 Minimum Interruption Duration. Commitment times may be for greater than the Minimum Interruption Duration if a DRR -Type I is economic for additional hours.



**Energy and Operating Reserve Markets
Business Practices Manual**

BPM-002-r23

Effective Date: SEP-30-2022

Parameter	Validation	Use
<i>Minimum Non-Interruption Interval</i>	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.	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.
<i>Maximum Interruption Duration</i>	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.	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.
<i>Contingency Reserve Status</i>	The Contingency Reserve Status is submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer. Valid entries for Contingency Reserve Status are “online” and “offline”.	The Contingency Reserve Status determines whether the DRR – Type I will be considered to clear and deploy Spinning Reserves, or whether it will be considered to clear and deploy Supplemental Reserves. See Sections 0 and 8.2.9 for more information on the Contingency Reserve Status.
<i>Maximum Daily Contingency Reserve Deployment</i>	The Maximum Daily Contingency Reserve Deployment is submitted as part of the Real-Time Schedule Offer, in MWh.	The Maximum Daily Contingency Reserve is the maximum MWh a Resource is able to deploy as Contingency Reserve over a 24 hour Operating Day of the Real-Time Energy and Operating Reserve Market.

Further explanation of specific DRR -Type I parameters used for commitment purposes is provided below along with a graphical representation of how they tie together as depicted in

Exhibit 4-18:

- ***Shut-Down Notification Time*** – The minimum time required from the time an order is received from MISO to the time demand reduction procedures can be initiated. This value must be less than or equal to 23 hours, 59 minutes.
- ***Shut-Down Time*** – The total time required from the time demand reduction procedures begin to the time the DRR -Type I has reduced demand equal to the Targeted Demand Reduction Level.
- ***Minimum Interruption Duration*** – The minimum number of hours at the Targeted Demand Reduction Level that the DRR-Type I owner requires MISO to schedule when committing the Resource or when deploying Contingency Reserve on that Resource. The Minimum Interruption Duration applies from the point where the DRR-Type I has reduced consumption by the Targeted Demand Reduction Level to the point where MISO releases the DRR-Type I for de-commitment. MPs should exclude the Shut-Down Time and Restore TDRL Time (as defined in



**Energy and Operating Reserve Markets
Business Practices Manual**

BPM-002-r23

Effective Date: SEP-30-2022

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- Exhibit 4-18) from the Minimum Interruption Duration to ensure the software recognizes the constraints described by all of the DRR-Type I parameters on cycling the Resource in the commitment process. DRR-Type I clearing in the Day-Ahead Energy and Operating Reserve Market or committed in the RAC will have schedules for consecutive hours that are equal to or greater than the Minimum Interruption Duration.
 - **Minimum Non-Interruption Interval** – The minimum number of hours that the DRR-Type I owner requires between the time the DRR-Type I is released to restore the Targeted Demand Reduction Level by MISO and the time the DRR-Type I can again reduce consumption equal to the Targeted Demand Reduction Level. MPs should include the Restore TDRL Time (as illustrated in
 - Exhibit 4-18) and the Shut-Down Time in the Minimum Non-interruption Interval to ensure the software recognizes the constraints described by all of the DRR-Type I parameters on cycling the Resource in the commitment process. DRRs-Type I clearing in the Day-Ahead Energy and Operating Reserve Market or committed in the RAC will have schedules that do not violate the Minimum Non-Interruption Interval.

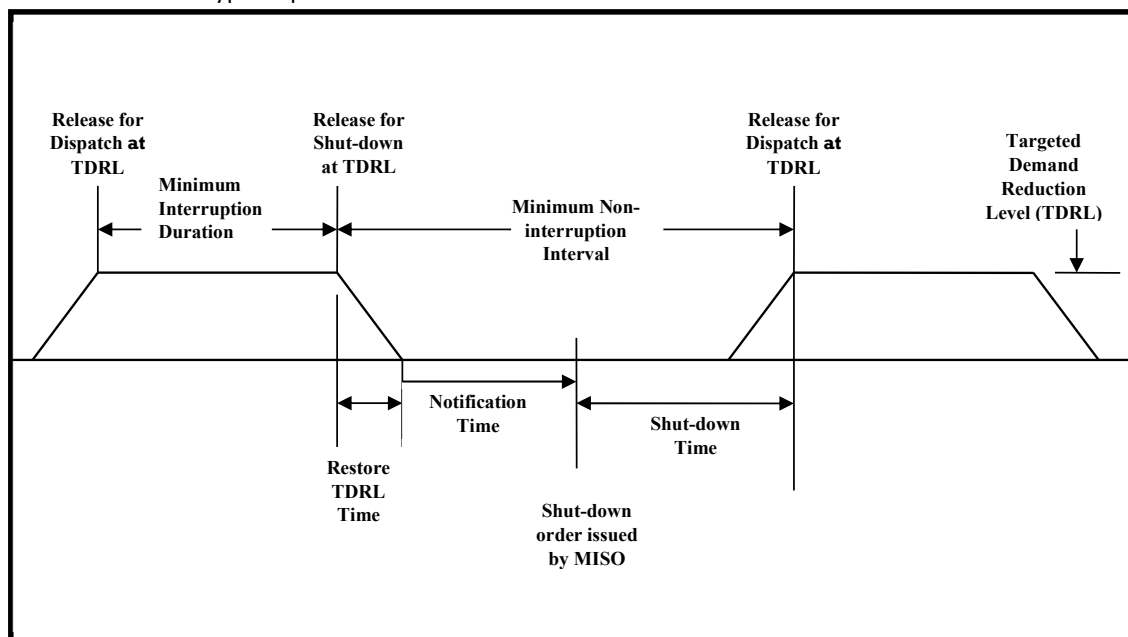


Energy and Operating Reserve Markets
Business Practices Manual

BPM-002-r23

Effective Date: SEP-30-2022

Exhibit 4-18: DRR-Type I Operation Timeline



4.2.4.3.1 DRR-Type I Commitment Status

Both a Day-Ahead Schedule Offer and Real-Time Schedule Offer have an associated DRR-Type I commitment status. The commitment status impacts the considerations made in unit commitment. The three commitment statuses 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. For a DRR – Type I that is designated as a Capacity Resource for Module E purposes, the Not Participating Commitment Status may only be selected if such Resource is unavailable due to a forced or planned outage or other physical operating restrictions.
- **Emergency** – Designates the DRR-Type I is available for commitment for Energy in Emergency situations only.



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

- **Economic** – Designates the DRR-Type I is available for commitment for Energy by MISO.

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.

4.2.4.3.2 DRR-Type I Offer Dispatch Status

Dispatch Status for a DRR-Type I can be selected on an hourly basis for Spinning Reserve, if the DRR-Type I is a Spin Qualified Resource and Supplemental Reserve if the DRR-Type I is a Supplemental 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 or not they are committed for Energy only or dispatched for Spinning Reserve or Supplemental Reserve only, as applicable, under both normal and Emergency conditions. Valid Dispatch Status selections for a DRR-Type I are: Economic, Self-Schedule, Emergency, Not Qualified or Not Participating.

Dispatch Status for a DRR-Type I can be selected on an hourly basis for Short-Term Reserve, if the DRR-Type I is an Off-Line Short-Term Reserve Qualified Resource. Valid Dispatch Status selections for a DRR-Type I are: Economic and Not Participating.

For a DRR – Type I that is designated as a Capacity Resource for Module E purposes, the Not Participating Spinning Reserve Dispatch Status, Supplemental Reserve Dispatch Status, or off-line Short-Term Reserve Dispatch Status may only be selected if such Resource is unavailable due to a forced or planned outage or other physical operating restrictions. Exhibit 4-19 shows the valid Dispatch Status and Commit Status selection combinations to achieve the desired results. 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.



**Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022**

Exhibit 4-20: Valid DRR-Type I Commit and Dispatch Status Combinations

Commit Status	Spin or Supp Dispatch Status	Normal Operations				Emergency Operations ²⁸			
		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		√ ²⁹					√	
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)

²⁸ 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.

²⁹ If not committed for Energy during an Emergency.



**Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022**

Valid DRR-Type I Commit and Offline Short-Term Reserve Dispatch Status Combinations (Continued)

Commit Status	Offline Short-Term Reserve Dispatch Status	Normal Operations				Emergency Operations ³⁰			
		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		√ ³¹					√	
Emergency	Not Participating				√	√			

4.2.4.3.3 DRR-Type I Contingency Reserve Status

The DRR – Type I Contingency Reserve Status is used to determine whether the Resource will be cleared and deployed in the same manner as on-line Spinning or Supplemental Reserves, or in the same manner as Off-Line Supplemental Reserves, when clearing and deploying Contingency Reserves. It is also called “Deploy Status” on the Market User Interface.

If a Spin-Qualified DRR – Type I Resource selects “online” as its Contingency Reserve Status, its Spinning Reserve Offer will be considered against all other Resources offering Spinning Reserves, and any Reserves cleared on the Resource will be cleared as Spinning Reserves. If deployed, Resource commitment periods will not be considered SCUC-Instructed Hours of Operation, as defined in the Tariff.

³⁰ 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.

³¹ If not committed for Energy during an Emergency.



**Energy and Operating Reserve Markets
Business Practices Manual**

BPM-002-r23

Effective Date: SEP-30-2022

If a DRR – Type I Resource that is Supplemental-Qualified, but not Spin-Qualified selects “online”, its Supplemental Reserve Offer will be considered against all other Resources offering Supplemental Reserves, and any Reserves cleared on the Resource will be cleared as Supplemental Reserves. If deployed, Resource commitment periods will not be considered SCUC-Instructed Hours of Operation, as defined in the Tariff.

If a DRR – Type I Resource selects “offline” as its Contingency Reserve Status, its Supplemental Reserve Offer will be considered against all other Resources offering Supplemental Reserves, and any Reserves cleared on the Resource will be cleared as Supplemental Reserves. If deployed, Resource commitment periods will not be considered SCUC-Instructed Hours of Operation, as defined in the Tariff.

Section 8.2.9 contains details on the Contingency Reserve Deployment methodology with respect to a DRR – Type I Resource’s choice of Contingency Reserve Status.

4.2.4.3.4 DRR-Type I Self-Schedule

DRRs-Type I can only submit Self-Schedules for Spinning Reserve or Supplemental Reserve in amounts less than or equal to the Targeted Demand Reduction Level. Submitting a Self-Schedule for Spinning Reserve or Supplemental Reserve will guarantee that the DRR-Type I clears for Contingency Reserve provided that the DRR-Type I has not been committed for Energy, and the Contingency Reserve Status matches the Self-Schedule. 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. Any amounts cleared above Self-Scheduled amounts are eligible to set price.

Submitted Self-Schedules will be reduced by MISO if such submitted schedules cannot be physically implemented based upon submitted Targeted Demand Reduction Level. Additionally, MISO may reduce accepted Self-Schedules as necessary to manage transmission constraints, the Sub-Regional Power Balance constraint, maintain Operating Reserve requirements, satisfy Energy demand and/or maintain reliable operating conditions. In no case will the Transmission Provider violate the DRR-Type I Targeted Demand Reduction Level.



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

4.2.5 External Asynchronous Resources (“EAR”) Offer Requirements

The following Subsection describes the economic and operational Offer data for EARs and how these data are used in commitment and dispatch decisions.

4.2.5.1 Offer Information Summary

EAR Offers consist of data submitted by MPs for consideration in dispatch activities. Such Offer data may be submitted for the Day-Ahead and Real-Time Energy and Operating Reserve Markets.



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Exhibit 4-21 identifies the data that may be included in an EAR Offer and the markets in which they apply.



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Exhibit 4-21: External Asynchronous Resource Offer Data Summary

EAR Offer Data	Units	Day-Ahead Schedule Offer	Real-Time Schedule Offer	Notes
Economic Offer Data				
Energy Offer Curve	MW, \$/MWh	Hourly	Hourly	9
Regulating Reserve Offer	\$/MW	Hourly	Hourly	1
Spinning Reserve Offer	\$/MW	Hourly	Hourly	1
Supplemental Reserve Offer	\$/MW	Hourly	Hourly	1,6
Self-Scheduled Regulating Reserve	MW	Hourly	Hourly	1
Self-Scheduled Spinning Reserve	MW	Hourly	Hourly	1
Self-Scheduled Supplemental Reserve	MW	Hourly	Hourly	1,6
Self-Scheduled Energy	MW	Hourly	Hourly	
Dispatch Operating Parameter Offer Data				
Hourly Economic Minimum Limit (Export)	MW	Hourly	Hourly	2,8
Hourly Economic Maximum Limit (Import)	MW	Hourly	Hourly	2,8
Hourly Regulation Minimum Limit	MW	Hourly	Hourly	2
Hourly Regulation Maximum Limit	MW	Hourly	Hourly	2, 8
Hourly Emergency Minimum Limit (Export)	MW	Hourly	Hourly	2
Hourly Emergency Maximum Limit (Import)	MW	Hourly	Hourly	2, 8
Availability Status	Select	Hourly	Hourly	2, 7
Energy Dispatch Status	Select	Hourly	Hourly	2
Regulating Reserve Dispatch Status	Select	Hourly	Hourly	2
Spinning Reserve Dispatch Status	Select	Hourly	Hourly	2
Supplemental Reserve Dispatch Status	Select	Hourly	Hourly	2,6
Hourly Single-Directional-Down Ramp Rate	MW/min	Hourly	Hourly	2,4
Hourly Single-Directional-Up Ramp Rate	MW/min	Hourly	Hourly	2,4
Hourly Bi-Directional Ramp Rate	MW/min	Hourly	Hourly	2,4
Hourly Ramp Rate	MW/min	Hourly	Hourly	2,3,4
Ramp Capability Dispatch Status	Select	Hourly	Hourly	2
On-line Short-Term Reserve Dispatch Status	Select	Hourly	Hourly	2
<p>Note 1: If qualified.</p> <p>Note 2: Default Offers are used if no values are submitted for Energy and Operating Reserve Markets.</p> <p>Note 3: Hourly Ramp Rate is used in Day-Ahead and RAC only.</p> <p>Note 4: Ramp rates may be submitted by MPs at any time and remain fixed until changed by MPs.</p> <p>Note 6: Only applies if EAR is a Supplemental Qualified Resource and not a Spin Qualified Resource.</p> <p>Note 7: If the EAR is available, a Tag identifying the associated Fixed Dynamic Interchange Schedule must be entered in webTrans in order for the EAR to be considered for clearing by DART.</p> <p>Note 8: Clearing limited to lesser of this value or "schedulemax" specified on Import/Export Tag.</p> <p>Note 9: EAR Energy Offer Curve may include negative MW and/or negative price pairs</p>				

MISO maintains a Day-Ahead Energy and Operating Reserve Market Offer and a Real-Time Energy and Operating Reserve Market Resource Offer for each EAR. These Offers are standing Offers and maintained for each market independently of the other. Updates to EAR Offers may be designated as updating the Day-Ahead Energy and Operating Reserve Market Offer only, the Real-Time Energy and Operating Reserve Market Offer only, or both. If a submittal update is not received prior to the applicable Offer submittal timelines, the previous Offer data is in place and used unless otherwise removed or set to "Unavailable".



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Offers for EARS may be removed from either Energy and Operating Reserve Market by setting the Offer to “Unavailable”.

The following two Subsections describe the Economic Offer Data and the Dispatch Operating Data Offer Parameters specified in



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Exhibit 4-21 in more detail.

4.2.5.2 Economic Offer Data

The economic Offer data parameters for EARs as identified in



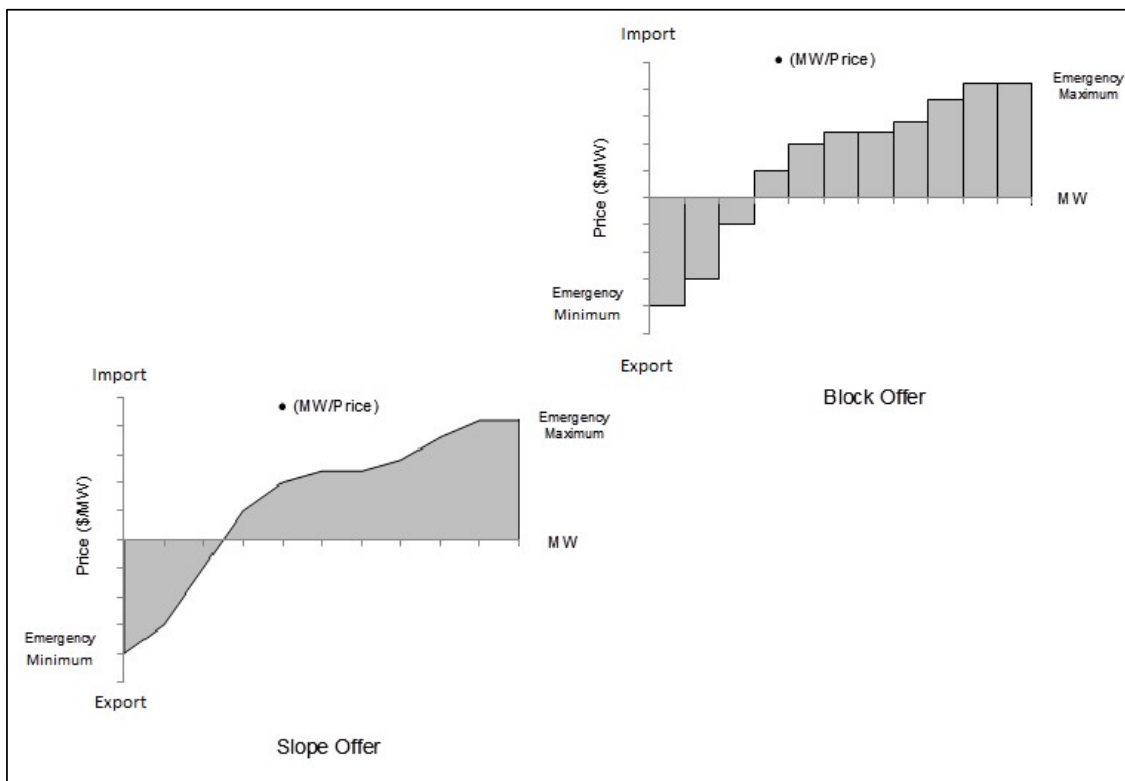
**Energy and Operating Reserve Markets
 Business Practices Manual
 BPM-002-r23
 Effective Date: SEP-30-2022**

Exhibit 4-21 are described in more detail below.

4.2.5.2.1 Energy Offer Curves (MW/Price Pairs)

Energy Offer MW/Price pairs are submitted as part of the Day-Ahead Schedule Offer, Real-Time Schedule Offer, or both. Up to ten MW/Price pairs may be submitted for each hour of the day for the Day-Ahead Energy and Operating Reserve Market and for the Real-Time Energy and Operating Reserve Market. Exhibit 4-22 illustrates the Energy Offer options.

Exhibit 4-22: Types of EAR Energy Offers



The MP may designate whether the MW/Price pairs are considered as a slope or block Offer. The MW values are accepted to the 10th of a MW and the Offer values from -\$500 to \$1,000. The MW/Price pairs must be monotonically increasing for price and strictly increasing for MW (e.g., 40 MW @ \$2.00, 50 MW



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

@ \$2.00 is accepted; 40 MW @ \$2.00 and 40 MW at \$2.50 is not accepted due to the non-increasing MW values; and 40 MW @ \$2.00, 50 MW @ \$1.50 is not accepted due to the decreasing prices).

There is no connection between the MW/Price pairs for the Day-Ahead and Real-Time Energy and Operating Reserve Markets (i.e., Day-Ahead Schedule Offers only roll over to the next Day-Ahead Energy and Operating Reserve Market. Day-Ahead Schedule Offers do not roll over into the Real-Time Energy and Operating Reserve Market and vice-versa.). A data submission to one hour of the Day-Ahead Energy and Operating Reserve Market does not affect the same hour for the Real-Time Energy and Operating Reserve Market and vice-versa. Designating the Offer MW/Price pairs as “slope” designates to the dispatch and commitment tools to interpolate a curve from the first MW point to the last MW point submitted. MPs must submit Offer MW/Price pairs for the entire operating range of the EAR up to and including the Hourly Emergency Maximum Limit for importing into MISO, and down to and including Hourly Emergency Minimum Limit for exporting out of MISO. If Offer MW/Price pairs are not submitted for any hour for either market, then the values are treated as the quantity zero (0). EAR Offer MW/Price pairs are not cumulative, meaning if an MP submits an Offer MW/Price pair of 100 MW at \$30 and 200 MW at \$40 and the market clears at \$40, the Resource clears 200 total MW. The Energy Offer Curve for EAR may include negative MW and/or negative price pairs.

4.2.5.2.2 Operating Reserve Offers

EARs that are Regulation Qualified Resources may submit Regulating Reserve Offers for use in the Energy and Operating Reserve Markets. The allowed range for Regulating Reserve Offers is currently \$0 to \$500.00. EARs that are Spin Qualified Resources may submit Spinning Reserve Offers for use in the Energy and Operating Reserve Markets. The allowed range for Spinning Reserve Offers is currently \$0 to \$100.00. EARs that are Supplemental Qualified Resources but are not Spin Qualified Resources may submit Supplemental Reserve Offers for use in the Energy and Operating Reserve Markets. The allowed range for Supplemental Reserve Offers is currently \$0 to \$100.00. If Operating Reserve Offer prices are not submitted for any hour for either market, then the values are treated as the quantity zero (0).



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

4.2.5.3 Dispatch Operating Parameter Offer Data

The Resource Offer parameters associated with the External Asynchronous Resource dispatch used in Day-Ahead Energy and Operating Reserve Market and within the Operating Hour in the Real-Time Energy and Operating Reserve Market are described in the following Subsections.

4.2.5.3.1 Dispatch Limits and Ramp Rates

There are six operating limits that can be submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer data: Hourly Economic Minimum and Maximum Limit, Hourly Regulation Minimum and Maximum Limits and Hourly Emergency Minimum and Maximum Limit. The Hourly Emergency Maximum Limit must be greater than or equal to the Hourly Economic Maximum Limit, which must be greater than or equal to the Hourly Regulation Maximum Limit, which must be greater than or equal to Hourly Economic Minimum Limit, which must be greater than or equal to Hourly Emergency Minimum Limit. Hourly Economic Minimum Limit and Hourly Emergency Minimum Limit must be equal to or less than zero. Maximum and Regulation Minimum Limits may be positive or negative. Ramp rate curves are not applicable to EARs. EARs are dispatched using the Hourly Ramp Rate in the Day-Ahead Energy and Operating Reserve Market and any RAC process. EARs are dispatched using the Hourly Bi-Directional Ramp Rate, Hourly Single-Directional Up Ramp Rate or Hourly Single-Directional Down Ramp Rate within the Operating Hour in the Real Time Energy and Operating Reserve Market.



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Exhibit 4-23 portrays the relationship between the EAR dispatch limits.

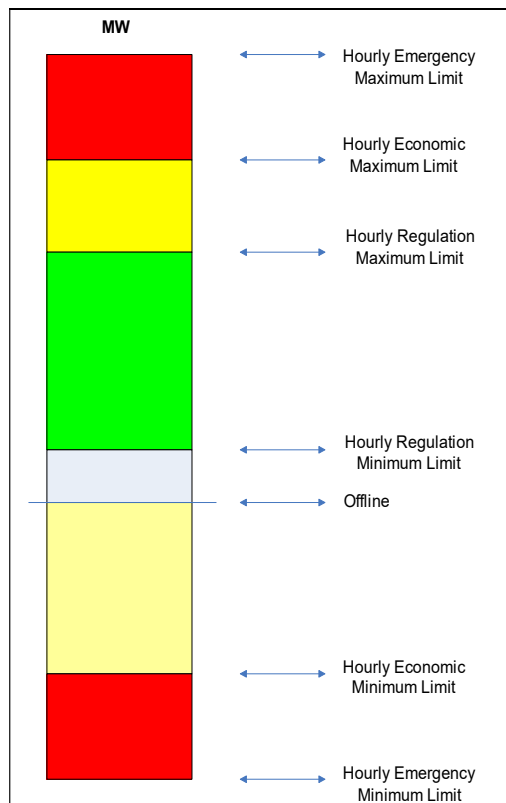


Energy and Operating Reserve Markets
Business Practices Manual

BPM-002-r23

Effective Date: SEP-30-2022

Exhibit 4-23: EAR Dispatch Limits





Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Exhibit 4-24 describes the use and validation of each of the limits and ramp rates.

Exhibit 4-24: EAR Overall Limit and Ramp Rate Use

Limit	Validation	Use
<i>Hourly Bi-Directional Ramp Rate</i>	The Hourly Bi-Directional Ramp Rate may be submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer that will override the default offer.	The Hourly Bi-Directional Ramp Rate is only applicable for use in real-time and will apply to EARs scheduled to potentially provide Regulating Reserve to limit the change in Energy Dispatch Target and/or limit the total amount of Operating Reserve that can be cleared on the Resource.
<i>Hourly Single-Directional-Up Ramp Rate</i>	The Single-Directional-Up Ramp Rate may be submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer that will override the default Offer.	The Single-Directional-Up Ramp-Up Rate is only applicable for use in Real-Time and will apply only to EARs not scheduled to potentially provide Regulating Reserves to limit the change in Energy Dispatch Target in the current Dispatch Interval in the up direction, and/or limit the total amount of Operating Reserve that can be cleared on the Resource. Values submitted for The Hourly Single-Directional-Up Ramp Rate must be greater than or equal to the values submitted for the Hourly Bi-Directional Ramp Rate.
<i>Hourly Single-Directional-Down Ramp Rate</i>	The Single-Directional-Down Ramp Rate may be submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer that will override the default Offer.	The Single-Directional-Down Ramp Rate is only applicable for use in Real-Time and will apply only to EARs not scheduled to potentially provide Regulating Reserves to limit the change in Energy Dispatch Target in the current Dispatch Interval in the down direction. Values submitted for The Hourly Single-Directional-Down Ramp Rate must be greater than or equal to the values submitted for the Hourly Single-Directional-Up Ramp Rate.
<i>Hourly Ramp Rate (single value)</i>	The Hourly Ramp Rate may be submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer that will override the default Offer.	The Hourly Ramp Rate for EARs is used in the Day-Ahead Energy and Operating Reserve Market and all RAC processes.
<i>Hourly Economic Minimum Limit</i>	The Hourly Economic Minimum Limit may be submitted as part of the Day-Ahead Schedule Offer or Real-Time Schedule Offer that will override the default Offer. The data value accepted may be to the tenth of a MW.	The Hourly Economic Minimum Limit designates the highest MW level available from the EAR under non-Emergency conditions while exporting out of MISO. This value may vary from hour to hour through submitting the Hourly Economic Minimum Limit in the Real-Time Schedule Offer. The Hourly Economic



**Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022**

Limit	Validation	Use
		Minimum Limit may be limited by the Schedule Max ³² value associated with the required Fixed Dynamic Interchange Export Schedules if the absolute value of Schedule Max is less than the submitted Hourly Economic Minimum Limit. The export limit will be indicated by negative polarity in the EAR Schedule Offer.
<i>Hourly Economic Maximum Limit</i>	The Hourly Economic Maximum Limit may be submitted as part of the Day-Ahead Schedule Offer or Real-Time Schedule Offer that will override the default Offer. The data value accepted may be to the tenth of a MW.	The Hourly Economic Maximum Limit designates the highest MW level available from the EAR under non-Emergency conditions while importing into MISO. This value may vary from hour to hour through submitting the Hourly Economic Maximum Limit in the Real-Time Schedule Offer. The Hourly Economic Maximum Limit may be limited by the Schedule Max ³³ value associated with the required Fixed Dynamic Interchange Import Schedules if the Schedule Max is less than the submitted Hourly Economic Maximum Limit.
<i>Hourly Regulation Minimum Limit</i>	The Hourly Regulation Minimum Limit may be submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer that will override the default Offer. The data value accepted may be to the tenth of a MW.	The Hourly Regulation Minimum Limit designates the minimum operating level, in MW, at which the EAR can operate while scheduled to potentially <u>provide</u> Regulating Reserves while importing into MISO or exporting out of MISO. This value may vary from hour to hour through submission in the Real-Time Schedule Offer. The Hourly Regulation Minimum Limit may affect Energy dispatch in both the Day-Ahead and Real-Time Energy and Operating Reserve Market. The Hourly Regulation Minimum Limit may be limited by the Schedule Max ³⁴ value associated with the required Fixed Dynamic when exporting.
<i>Hourly Regulation Maximum Limit</i>	The Hourly Regulation Maximum Limit may be submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer that will override the default Offer. The data value accepted may be to the tenth of a MW.	The Hourly Regulation Maximum Limit designates the maximum operating level, in MW, at which the EAR can operate while scheduled to potentially <u>provide</u> Regulating Reserves while importing into MISO or exporting out of MISO. This value may vary from hour to hour through submission in the Real-Time Schedule Offer. The Hourly Regulation Minimum Limit may affect Energy dispatch in both the Day-Ahead and Real-Time Energy and Operating Reserve Markets. The

³² The Schedule Max value represents the schedule value from webTrans.

³³ The Schedule Max value represents the schedule value from webTrans.

³⁴ The Schedule Max value represents the schedule value from webTrans.



Energy and Operating Reserve Markets
Business Practices Manual
 BPM-002-r23
 Effective Date: SEP-30-2022

Limit	Validation	Use
		Hourly Regulation Maximum Limit may be limited by the Schedule Max ³⁵ value associated with the required Fixed Dynamic
<i>Hourly Emergency Maximum Limit</i>	The Hourly Emergency Maximum Limit may be submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer that will override the default Offer. The data value accepted may be to the tenth of a MW.	The Hourly Emergency Maximum Limit designates the highest level of Energy, in MW, the EAR can produce and maintain a stable level of operation under Emergency conditions while importing into MISO or exporting out of MISO. This value may vary from hour to hour through submission in the Real-Time Schedule Offer. The Hourly Regulation Maximum Limit may affect Energy dispatch in both the Day-Ahead and Real-Time Energy and Operating Reserve Markets. The Hourly Emergency Maximum Limit may be limited by the Schedule Max value associated with the required Fixed Dynamic Interchange Import Schedules if the Schedule Max is less than the submitted Hourly Emergency Maximum Limit.
<i>Hourly Emergency Minimum Limit</i>	The Hourly Emergency Minimum Limit may be submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer that will override the default Offer. The data value accepted may be to the tenth of a MW.	The Hourly Emergency Minimum Limit designates the highest level of Energy, in MW, the EAR can consume and maintain a stable level of operation under Emergency conditions while exporting out of MISO. The Hourly Emergency Minimum Limit may be limited by the Schedule Max value associated with the required Fixed Dynamic Interchange Export Schedules if the absolute value of Schedule Max is less than the submitted Hourly Emergency Minimum Limit. The export limit will be indicated by negative polarity in the EAR Schedule Offer.

4.2.5.3.2 EAR Offer Availability Status

The EAR Availability Status is submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer and will override the default value. Valid Availability Status selections are: Available and Unavailable. If the Available Status is selected, the EAR is available to provide Energy and Operating Reserve. If the Unavailable Status is selected, the EAR is not available to provide Energy or Operating Reserve. The default value is set during asset registration.

³⁵ The Schedule Max value represents the schedule value from webTrans.



**Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022**

4.2.5.3.3 EAR Offer Dispatch Status

Dispatch Status can be selected on an hourly basis for Energy, Regulating Reserve, Spinning Reserve and Supplemental Reserve on a Resource by Resource basis as part of the Day-Ahead and Real-Time Schedule Offer that will override the default values. EAR Dispatch Status is only applicable if EAR Availability Status is set to “Available”.

Exhibit 4-25 shows the valid Dispatch Status selections.

Exhibit 4-25: Valid EAR Dispatch Status Selections

Status	Product						
	Energy	Regulating Reserve	Spinning Reserve	Supplemental Reserve	Online Short-Term Reserve	Up Ramp Capability	Down Ramp Capability
Economic	√	√	√	√ ³⁶	√	√	√
Self-Schedule	√	√	√	√ ²²			
Not Qualified		√	√	√			
Not Participating		√			√	√	√

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

The four valid Dispatch Status selections and rules associated with each are as follows. The default values are set during asset registration.

- **Economic** – Designates that EAR is available for dispatch by MISO and Dispatch Targets for Energy, Regulating Reserve, Spinning Reserve and Supplemental Reserve may be calculated for the EAR.
- **Self-Schedule** – Indicates that the product is Self-Scheduled. The MW amounts of the Self-Schedules for Energy, Regulating Reserve, Spinning Reserve or

³⁶ Only if not a Spin Qualified Resource or “Not Qualified” Spinning Reserve Dispatch Status has been selected.



Energy and Operating Reserve Markets Business Practices Manual

BPM-002-r23

Effective Date: SEP-30-2022

Supplemental Reserve will be indicated as part of the Day-Ahead Schedule Offer or Real-Time Schedule Offer.

- **Not Participating** – This option is only available for Regulating Reserve and indicates that the EAR is otherwise qualified and available to provide Regulating Reserve but has elected not to provide the service in that Hour.
- **Not Qualified** – Indicates that the EAR cannot physically provide Regulating Reserve, Spinning Reserve or Supplemental Reserve in that Hour.

4.2.5.3.4 EAR Offer Self-Schedule

MPs may submit Self-Schedules, which consist of a fixed quantity (in MW) of Energy, Regulating Reserve, Spinning Reserve and/or Supplemental Reserve³⁷ per hour that may be dispatched from the EAR.

- To submit a Self-Schedule for Energy, the MP submits a Resource Self-Schedule MW value for Energy and sets Energy Dispatch Status to Self-Schedule. If the Self-Schedule MW value is less than the EAR's Hourly Economic Maximum Limit, the EAR may be dispatched above the Self-Schedule MW amount, based upon the EAR's Energy Offer, on an economic basis as part of the Energy and Operating Reserve Markets clearing and dispatch process.
- To submit a Self-Schedule for Regulating Reserve, the MP submits a Resource Self-Schedule MW value for Regulating Reserve and sets the Regulating Reserve Dispatch Status to Self-Schedule. If the Self-Schedule MW value is less than the EAR's Regulating Reserve capability, as determined by the submitted Hourly Bi-Directional Ramp Rate and Regulation Response Time, the EAR may clear Regulating Reserve above the Self-Schedule MW amount, based upon the EAR's Regulating Reserve Offer, on an economic basis as part of the Energy and Operating Reserve Markets clearing process.
- To submit a Self-Schedule for Spinning Reserve, the MP submits a Resource Self-Schedule MW value for Spinning Reserve and sets the Spinning Reserve Dispatch Status to Self-Schedule. If the Self-Schedule MW value is less than the EAR's Spinning Reserve capability, as determined by the applicable ramp rate and the Contingency Reserve Deployment Period, the EAR may clear Spinning Reserve above the Self-Schedule MW amount, based upon the EAR's Spinning Reserve Offer,

³⁷ If not a Spin Qualified Resource or "Not Qualified" Spinning Reserve Dispatch Status has been selected.



Energy and Operating Reserve Markets Business Practices Manual

BPM-002-r23

Effective Date: SEP-30-2022

on an economic basis as part of the Energy and Operating Reserve Markets clearing process.

- Self-Schedules for Supplemental Reserve can only be submitted for an EAR that is not a Spin Qualified Resource or the “Not Qualified” Spinning Reserve Dispatch Status has been selected. To submit a Self-Schedule for Supplemental Reserve, the MP submits a Self-Schedule MW value for Supplemental Reserve and sets the Supplemental Reserve Dispatch Status to Self-Schedule. If the Self-Schedule MW value is less than the EAR’s Supplemental Reserve capability, as determined by the applicable ramp rate and the Contingency Reserve Deployment Period, the EAR may clear Supplemental Reserve above the Self-Schedule MW amount, based upon the EAR’s Supplemental Reserve Offer, on an economic basis as part of the Energy and Operating Reserve Markets clearing process.

In all cases, the minimum amount of Self-Schedule MW for Energy, Regulating Reserve, Spinning Reserve or Supplemental Reserve is equal to 1 MW. A Self-Schedule is a price taker up to Self-Schedule MW level. Any amounts cleared above Self-Scheduled amounts are eligible to set price.

Submitted Self-Schedules will be reduced by MISO if such schedules cannot be physically implemented based upon submitted Resource limit and ramp rates. Additionally, MISO may reduce accepted Self-Schedules as necessary to manage transmission constraints, the Sub-Regional Power Balance Constraint, maintain Operating Reserve requirements, satisfy Energy demand and/or maintain reliable operating conditions. In no case will the Transmission Provider violate the Resource limits or ramping capabilities.

4.2.5.3.5 EAR Ramp Capability Dispatch Status

Ramp Capability Dispatch Status can be selected on an hourly basis on a Resource by Resource basis as part of the Day-Ahead and Real-Time Schedule Offer and such selections will override the default dispatch status values. The default dispatch status values are set during asset registration. The two valid Ramp Capability Dispatch Status selections and rules associated with each are as follows. The default value is set during asset registration.

- **Economic** – Designates that EARs that have been committed are available for ramp capability by MISO.
- **Not Participating** – Designates that EARs are not participating for ramp capability and won’t be committed or dispatched to meet ramp needs.



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

4.2.5.3.6 EAR On-line Short-Term Reserve Dispatch Status

On-line Short-Term Reserve Dispatch Status can be selected on an hourly basis on a Resource by Resource basis as part of the Day-Ahead and Real-Time Schedule Offer and such selections will override the default dispatch status values. The default dispatch status values are set during asset registration. The two valid On-line Short-Term Reserve Dispatch Status selections and rules associated with each are as follows. The default value is set during asset registration.

- **Economic** – Designates that EARs that have been committed are available for Short-Term Reserve by MISO.
- **Not Participating** – Designates that EARs are not participating for Short-Term Reserve and will not provide Short-Term Reserve

4.2.6 Stored Energy Resource Offer

The following Subsection describes the economic and operational Offer data for SERs and how these data are used in commitment and dispatch decisions.

4.2.6.1 Offer Information Summary

Stored Energy Resource Offers consist of data submitted by MPs for consideration in commitment and dispatch activities. Such Offer data may be submitted for the Day-Ahead and Real-Time Energy and Operating Reserve Markets. Exhibit 4-26 and



**Energy and Operating Reserve Markets
 Business Practices Manual
 BPM-002-r23
 Effective Date: SEP-30-2022**

Exhibit 4-27 identify the data that may be included in a Stored Energy Resource Offer and the markets in which they apply.

Exhibit 4-26: Stored Energy Resource Economic Data Summary

Stored Energy Resource Offer Data	Units	Day-Ahead Schedule Offer	Real-Time Schedule Offer	Notes
Economic Offer Data				
Regulating Reserve Offer	\$/MWh	Hourly	Hourly	
Self-Scheduled Regulation	MW	Hourly	N/A	1
Note 1: Real-Time Schedule Offer Regulation Self-Schedule is Not Available, as Stored Energy Resources are not eligible to submit Self-Schedule Regulation Offers to the Real-Time Market				



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Exhibit 4-27: Stored Energy Resource Operating Parameter Data Summary

Stored Energy Resource Offer Data	Units	Day-Ahead Schedule Offer	Real-Time Schedule Offer	Notes
Commitment Operating Parameter Offer Data				
Commitment Status	Select	Hourly	Hourly	1
Dispatch Operating Parameter Offer Data				
Regulating Reserve Dispatch Status	Select	Hourly	Hourly	1
Hourly Regulation Minimum Limit	MW	Hourly	Hourly	1
Hourly Regulation Maximum Limit	MW	Hourly	Hourly	1
Hourly Maximum Energy Storage Level	MWh	Hourly	Hourly	1
Hourly Maximum Energy Charge Rate	MWh/min	Hourly	Hourly	1
Hourly Maximum Energy Discharge Rate	MWh/min	Hourly	Hourly	1
Hourly Bi-Directional Ramp Rate	MW/min	N/A	Hourly	1,3
Hourly Ramp Rate	MW/min	Hourly	Hourly	1,2,3
Hourly Energy Storage Loss Rate	MWh/min	Hourly	Hourly	1
Hourly Full Charge Energy Withdrawal Rate	MWh/min	Hourly	Hourly	1
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 Day-Ahead and RAC Note 3: Ramp Rates may be submitted by MPs at any time and remain fixed until changed by MPs				

MISO maintains a Day-Ahead Schedule Offer³⁸ and a Real-Time Schedule Offer³⁹ for each Stored Energy Resource. These Offers are standing Offers and maintained for each market independently of the other. Updates to Stored Energy Resource Offers may be designated as updating the Day-Ahead Schedule Offer only, the Real-Time Schedule Offer only, or both.

The following subsections describe the Economic Offer Data and the Commitment and Dispatch Operating Data Offer Parameters specified in Exhibit 4-26 in more detail.

4.2.6.2 Economic Offer Data

The economic Offer data parameters for Stored Energy Resources as identified in

³⁸ An Offer submitted for use in the Day-Ahead Energy and Operating Reserve Market clearing.

³⁹ An Offer submitted for use in any RAC process and for use in the Real-Time Energy Operating Reserve Market clearing within the Operating Hour.



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Exhibit 4-27 are described in more detail below.

4.2.6.2.1 Regulating Reserve Offers

All Stored Energy Resources are registered as Regulation Qualified Resources, and may submit Regulating Reserve Offers in \$/MW for use in the Energy and Operating Reserve Markets. The allowed range for Regulating Reserve Offers is currently \$0 to \$500.00/MW. There is no connection between the Regulating Reserve Offers for the Day-Ahead and Real-Time Energy and Operating Reserve Markets (i.e., Day-Ahead Schedule Offers only roll over to the next Day-Ahead Energy and Operating Reserve Market. Day-Ahead Schedule Offers do not roll over into the Real-Time Energy and Operating Reserve Market and vice-versa.). A data submission to one hour of the Day-Ahead Energy and Operating Reserve Market does not affect the same hour for the Real-Time Energy and Operating Reserve Market and vice-versa. If Regulating Reserve Offer prices are not submitted for any hour for either market, the values are treated as the quantity zero (0).

4.2.6.3 Dispatch Operating Parameter Offer Data

The Stored Energy Resource Offer parameters shown in



**Energy and Operating Reserve Markets
Business Practices Manual**

BPM-002-r23

Effective Date: SEP-30-2022

Exhibit 4-27 associated with the Stored Energy Resource dispatch used in Day-Ahead Energy and Operating Reserve Market and within the Operating Hour in the Real-Time Energy and Operating Reserve Market are described in the following Subsections.

4.2.6.3.1 Dispatch Limits and Ramp Rates

One set of operating limits can be submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer data: Hourly Regulation Minimum and Maximum Limits. The Hourly Regulation Maximum Limit must be greater than or equal to the Hourly Regulation Minimum Limit. Stored Energy Resources utilize the Hourly Ramp Rate for use in the Day-Ahead Market, and the Bi-Directional Ramp Rate for use in the Real-Time Market.

Exhibit 4-28 describes the use and validation of each of the ramp rates and limits.

Exhibit 4-28: SER Overall Ramp Rate and Limit Use

Limit	Validation	Use
<i>Hourly Bi-Directional Ramp Rate</i>	An Hourly Bi-Directional Ramp Rate may be submitted as part of the Real-Time Schedule Offer to override the default value.	The Hourly Bi-Directional Ramp Rate is only applicable for use in real-time and will apply to all Stored Energy Resources to limit the change in Energy Dispatch Target and/or limit the total amount of Regulating Reserve that can be cleared on the Resource.
<i>Hourly Ramp Rate</i>	The Hourly Ramp Rate may be submitted as part of the Day-Ahead and Real-Time Schedule Offer to override the default value.	The Hourly Ramp Rate is used in the Day-Ahead Energy and Operating Reserve Market and all RAC processes but not within the Operating Hour.
<i>Hourly Regulation Minimum Limit</i>	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.	The Hourly Regulation Minimum Limit designates the minimum operating level, in MW, at which the Resource can operate. 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.
<i>Hourly Regulation Maximum Limit</i>	The Hourly Regulation 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.	The Hourly Regulation Maximum Limit designates the maximum operating level, in MW, at which the Stored Energy Resource can operate. 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



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Limit	Validation	Use
		affect Energy dispatch in both the Day-Ahead and Real-Time Energy and Operating Reserve Market.
<i>Hourly Maximum Energy Charge Rate</i>	The Hourly Maximum Energy Charge Rate 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 MWh/min.	The Hourly Maximum Energy Charge Rate designates the maximum rate, in MWh/min (proportional to a MW quantity), at which the energy storage level of a Stored Energy Resource can increase. The Hourly Maximum Energy Charge Rate does not affect commitment but may affect Energy dispatch and/or Regulating Reserve dispatch in the Real-Time Energy and Operating Reserve Market, or the Regulating Reserve dispatch in the Day-Ahead Energy and Operating Reserve Market.
<i>Hourly Maximum Energy Discharge Rate</i>	The Hourly Maximum Energy Discharge Rate 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 MWh/min.	The Hourly Maximum Energy Discharge Rate designates the maximum rate, in MWh/min (proportional to a MW quantity), at which the energy storage level of a Stored Energy Resource can decrease. The Hourly Maximum Energy Discharge Rate does not affect commitment but may affect Energy dispatch and/or Regulating Reserve dispatch in the Real-Time Energy and Operating Reserve Market, or the Regulating Reserve dispatch in the Day-Ahead Energy and Operating Reserve Market.
<i>Hourly Maximum Energy Storage Level</i>	The Hourly Maximum Energy Storage Level 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 MWh.	The Hourly Maximum Energy Storage Level, in MWh, designates the maximum level to which a Stored Energy Resource can be charged. The Hourly Maximum Energy Storage Level does not affect commitment but may affect Energy dispatch and/or Regulating Reserve dispatch in the Real-Time Energy and Operating Reserve Market.
<i>Hourly Energy Storage Loss Rate</i>	The Hourly Energy Storage Loss Rate 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 MWh/min.	The Hourly Energy Storage Loss Rate, in MWh/min (proportional to a MW quantity), designates the rate at which energy must be consumed to maintain a Stored Energy Resource at its Maximum Energy Storage Level.
<i>Hourly Full Charge Energy Withdrawal Rate</i>	The Hourly Full Charge Energy Withdrawal Rate 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 MWh/min.	The Hourly Full Charge Energy Withdrawal Rate, in MWh/min (proportional to a MW quantity), designates the rate at which a Stored Energy Resource can continue to absorb energy while the storage level is at the Resource's Maximum Energy Storage Level.



Energy and Operating Reserve Markets Business Practices Manual

BPM-002-r23

Effective Date: SEP-30-2022

Further explanation of specific Stored Energy Resource parameters used for dispatching purposes is provided below:

- **Maximum Energy Charge Rate** – The maximum rate at which the energy storage level of a Stored Energy Resource can increase. Expressed in MWh/min, this rate is proportional to a power level expressed using the units 'MW'. The Maximum Energy Charge Rate is respected in both the Day-Ahead and Real-Time Energy and Operating Reserve Markets; the more restrictive of the Maximum Energy Charge Rate and the Hourly Regulation Minimum Limit is used to establish a lower bound for the available power level (in MW) of the Resource.
- **Maximum Energy Discharge Rate** – The maximum rate at which the energy storage level of a Stored Energy Resource can decrease. Expressed in MWh/min, this rate is proportional to a power level expressed using the units 'MW'. The Maximum Energy Discharge Rate is respected in both the Day-Ahead and Real-Time Energy and Operating Reserve Markets; the more restrictive of the Maximum Energy Discharge Rate and the Hourly Regulation Maximum Limit is used to establish an upper bound for the available power level (in MW) of the Resource.
- **Maximum Energy Storage Level** – The maximum energy storage level of a Stored Energy Resource, expressed in MWh. When a Stored Energy Resource's storage level is at its Maximum Energy Storage Level, the Stored Energy Resource can no longer charge, and ignoring the Full Charge Energy Withdrawal Rate, can only have an output greater than 0MW. Similarly, when a Stored Energy Resource's storage level is at 0MWh storage, the Stored Energy Resource can no longer discharge, and can only have an output less than 0MW.
- **Energy Storage Loss Rate** – The rate at which energy must be consumed to maintain a Stored Energy Resource at its Maximum Energy Storage Level. Expressed in MWh/min, this rate is proportional to a power level expressed using the units 'MW'. The Energy Storage Loss Rate models the losses inherent in energy storage.
- **Full Charge Energy Withdrawal Rate** – The rate at which energy can be consumed by a Stored Energy Resource when its storage level is equal to its Maximum Energy Storage Level. Expressed in MWh/min, this rate is proportional to a power level expressed using the units 'MW'. The Full Charge Energy Withdrawal Rate models additional facilities, such as resistor banks, integrated into a Stored Energy Resource, that allow the Resource to continue consuming energy while its storage level is equal to its Maximum Energy Storage Level.



Energy and Operating Reserve Markets Business Practices Manual

BPM-002-r23

Effective Date: SEP-30-2022

4.2.6.3.2 Stored Energy Resource Offer Availability Status

The Stored Energy Resource Availability Status is submitted as part of the Day-Ahead Schedule Offer and Real-Time Schedule Offer and will override the default value. Valid Availability Status selections are: Available and Unavailable. If the Available Status is selected, the SER is available to provide Regulating Reserve. If the Unavailable Status is selected, the SER is not available to provide Regulating Reserve. The default value is set during asset registration.

4.2.6.3.3 Stored Energy Resource Self-Schedule

MPs may submit Self-Schedules to the Day-Ahead Market only, which consist of a fixed quantity (in MW) of Regulating Reserve per hour that may be dispatched from the Resource.

- To submit a Self-Schedule for Regulating Reserve, the MP submits a Resource Self-Schedule MW value for Regulating Reserve and sets the Regulating Reserve Dispatch Status to Self-Schedule. If the Self-Schedule MW value is less than the Resource's Regulating Reserve capability, the Resource may clear Regulating Reserve above the Self-Schedule MW amount, based upon the Resource's Regulating Reserve Offer, on an economic basis as part of the Energy and Operating Reserve Markets clearing process. The maximum amount of Regulating Reserve that can be self-scheduled on a Resource is equal to the lesser of i) the applicable bi-directional ramp rate multiplied by the Regulation Response Time or ii) the lesser of the absolute value of the regulation maximum limit, the regulation minimum limit, the maximum energy charge rate expressed in MW, and the maximum energy discharge rate expressed in MW. The Self-Schedule MW value shall be relaxed if necessary to enforce Resources limits or ramp rates.

In all cases, the minimum amount of Self-Schedule MW for Regulating Reserve is equal to 1 MW.

Submitting a Self-Schedule value does not guarantee the Resource is committed; the MP must designate the commitment status as "Available" to achieve this result. A Self-Schedule is a price taker up to Self-Schedule MW level. Any amounts cleared above Self-Scheduled amounts are eligible to set price.

4.2.7 Electric Storage Resource Offer Requirements

The following Subsection describes the economic and operational Offer data for Electric Storage Resources and how these data are used in commitment and dispatch decisions.



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

4.2.7.1 Offer Information Summary

Electric Storage Resource Offers consist of data submitted by MPs for commitment and consideration in dispatch activities. Such Offer data may be submitted for the Day-Ahead and Real-Time Energy and Operating Reserve Markets.



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Exhibit 4-29 and Exhibit 4-30 identify the data that may be included in an Electric Storage Resource Offer and the markets in which they apply.



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Exhibit 4-29: Electric Storage Resource Economic Data Summary

Electric Storage Resource Offer Data	Units	Day-Ahead Schedule Offer	Real-Time Schedule Offer	Notes
Economic Offer Data				
Energy Offer Curve	MW, \$/MWh	Hourly	Hourly	
No-Load Offer	\$/hr	Hourly	Hourly	4
Regulating Reserve Capacity Offer	\$/MWh	Hourly	Hourly	1,5
Regulating Reserve Mileage Offer	\$/MW	Hourly	Hourly	1
Spinning Reserve Offer	\$/MWh	Hourly	Hourly	1,5
On-Line Supplemental Reserve Offer	\$/MWh	Hourly	Hourly	1,2,5
Off-Line Supplemental Reserve Offer	\$/MWh	Hourly	Hourly	1,2,5
Hot Start-Up Offer	\$	Daily	Daily	4
Intermediate Start-Up Offer	\$	Daily	Daily	4
Cold Start-Up Offer	\$	Daily	Daily	4
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*	
<p>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: Electric Storage Resources may submit up to three MW/Price pairs for reserve offers Note *: Offer parameters can be overwritten in Real-Time Market using Real-Time Offer Override (RTOE). Override is effective next dispatch interval</p>				



**Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022**

Exhibit 4-30: Electric Storage Resource Operating Parameter Data Summary

Electric Storage Resource Offer Data	Units	Day-Ahead Schedule Offer	Real-Time Schedule Offer	Notes
Commitment Operating Parameter Offer Data				
Hot Notification Time	hh:mm	Hourly	Hourly*	
Hot Start-Up Time	hh:mm	Hourly	Hourly	
Hot to Intermediate Time	hh:mm	Daily	Daily	
Intermediate Notification Time	hh:mm	Hourly	Hourly	
Intermediate Start-Up Time	hh:mm	Hourly	Hourly	
Hot to Cold Time	hh:mm	Daily	Daily	
Cold Notification Time	hh:mm	Hourly	Hourly	
Cold Start-Up Time	hh:mm	Hourly	Hourly	
Maximum Daily Starts	Integer	Daily	Daily	
Maximum Daily Energy	MWh	Daily	Daily	
Maximum Weekly Starts	Integer	Daily	Daily	
Maximum Weekly Energy	MWh	Daily	Daily	
Commitment Status	Select	Hourly	Hourly	1,6
Minimum Charge Time	Hours	Hourly	Hourly	1
Maximum Charge Time	Hours	Hourly	Hourly	1
Minimum Discharge Time	Hours	Hourly	Hourly	1
Maximum Discharge Time	Hours	Hourly	Hourly	1
Fast Ramp Participation	Yes/No	Hourly	Hourly	



Energy and Operating Reserve Markets
Business Practices Manual
BPM-002-r23
Effective Date: SEP-30-2022

Dispatch Operating Parameter Offer Data				
Initial Energy Storage Level	MWh	NA	Daily	7
Electric Storage Efficiency Factor (0-1) [Discharge Energy] / [Charge Energy]	(percentage)	Hourly	Hourly*	1
Maximum Energy Storage Level	MWh	Hourly	Hourly*	1
Minimum Energy Storage Level	MWh	Hourly	Hourly*	1
Emergency Maximum Energy Storage Level	MWh	Hourly	Hourly*	1
Emergency Minimum Energy Storage Level	MWh	Hourly	Hourly*	1
Economic Maximum Charge Limit	MW	Hourly	Hourly*	1
Economic Minimum Charge Limit	MW	Hourly	Hourly*	1
Regulation Maximum Charge Limit	MW	Hourly	Hourly*	1
Regulation Minimum Charge Limit	MW	Hourly	Hourly*	1
Emergency Minimum Charge Limit	MW	Hourly	Hourly*	1
Emergency Maximum Charge Limit	MW	Hourly	Hourly*	1
Economic Maximum Discharge Limit	MW	Hourly	Hourly*	1
Economic Minimum Discharge Limit	MW	Hourly	Hourly*	1
Regulation Maximum Discharge Limit	MW	Hourly	Hourly*	1
Regulation Minimum Discharge Limit	MW	Hourly	Hourly*	1
Emergency Minimum Discharge Limit	MW	Hourly	Hourly*	1
Emergency Maximum Discharge Limit	MW	Hourly	Hourly*	1
Off-Line Contingency Reserve Maximum Limit	MW	Hourly	Hourly*	1,4,5
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
Discharge Ramp Rate	MW/min	N/A	Hourly*	1,3
Charge Ramp Rate	MW/min	N/A	Hourly*	1,3
Ramp Capability Dispatch Status	Select	Hourly	Hourly*	
On-line Short-Term Reserve Dispatch Status	Select	Hourly	Hourly*	
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 Day-Ahead 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: Electric Storage Resource are required to select a Commitment Status for every Market interval Note 7: Initial Energy Storage level can be submitted for both Day-Ahead and Real-Time, but only Day-Ahead will use this parameter. Note *: Offer parameters can be overwritten in Real-Time Market using Real-Time Offer Override (RTOE). Override is effective next dispatch interval.				

MISO maintains a Day-Ahead Schedule Offer⁴⁰ and a Real-Time Schedule Offer⁴¹ for each Electric Storage Resource. These Offers are standing Offers and maintained for each market independently of the other. Updates to Electric Storage Resource Offers may be designated as updating the Day-Ahead Schedule Offer only, the Real-Time Schedule Offer only, or both.

⁴⁰ An Offer submitted for use in the Day-Ahead Energy and Operating Reserve Market clearing.

⁴¹ An Offer submitted for use in any RAC process and for use in the Real-Time Energy and Operating Reserve Market clearing within the Operating Hour.



**Energy and Operating Reserve Markets
 Business Practices Manual
 BPM-002-r23
 Effective Date: SEP-30-2022**

The following two Subsections describe the Economic Offer Data and the Commitment and Dispatch Operating Data Offer Parameters in more detail.

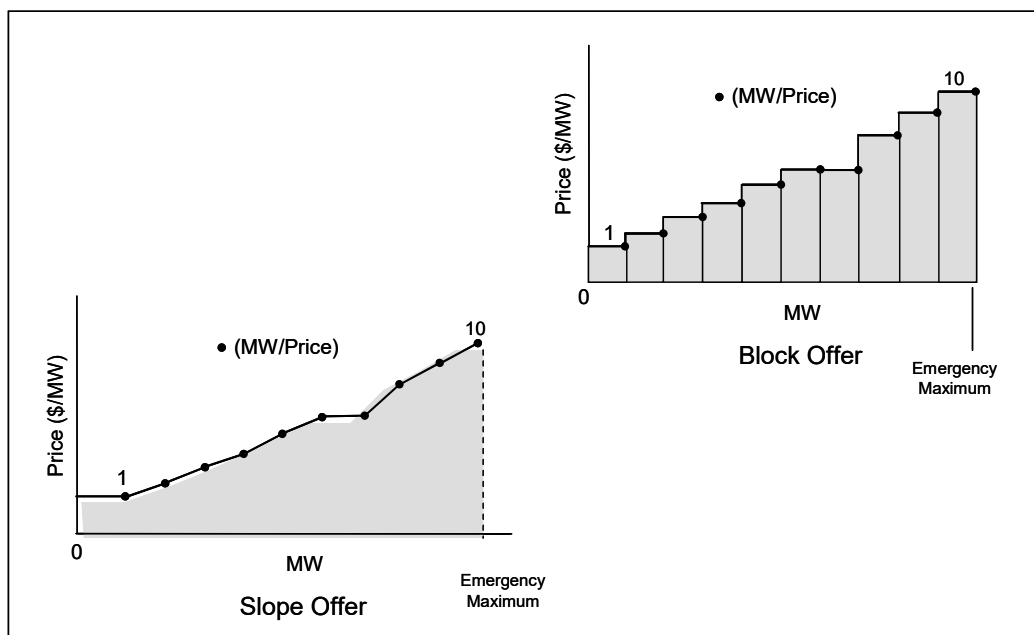
4.2.7.2 Economic Offer Data

The economic Offer data parameters for Electric Storage Resources are described in in more detail below.

4.2.7.2.1 Energy Offer Curves (MW/Price Pairs)

Energy Offer MW/Price pairs are submitted as part of the Day-Ahead Schedule Offer, Real-Time Schedule Offer, or both. Up to ten MW/Price pairs may be submitted for each hour of the day for the Day-Ahead Energy and Operating Reserve Market and for the Real-Time Energy and Operating Reserve Market. Exhibit 4-31 illustrates the Energy Offer options.

Exhibit 4-31: Types of Energy Offers





**Energy and Operating Reserve Markets
Business Practices Manual**

BPM-002-r23

Effective Date: SEP-30-2022

The MP may designate whether the MW/Price pairs are considered as a slope or block Offer. The MW values are accepted to the 10th of a MW and the Offer values from -\$500 to \$2,000 ⁴². The MW/Price pairs must be monotonically increasing for price and strictly increasing for MW (e.g., 40 MW @ \$2.00, 50 MW @ \$2.00 are accepted; 40 MW @ \$2.00 and 40 MW at \$2.50 are not accepted due to the non-increasing MW values; and 40 MW @ \$2.00, 50 MW @ \$1.50 is not accepted due to the decreasing prices).

There is no connection between the MW/Price pairs for the Day-Ahead and Real-Time Energy and Operating Reserve Markets (i.e., Day-Ahead Schedule Offers only roll over to the next Day-Ahead Energy and Operating Reserve Market. Day-Ahead Schedule Offers do not roll over into the Real-Time Energy and Operating Reserve Market and vice-versa.). A data submission to one hour of the Day-Ahead Energy and Operating Reserve Market does not affect the same hour for the Real-Time Energy and Operating Reserve Market and vice-versa. Designating the Offer MW/Price pairs as a “slope” designates to the dispatch and commitment tools to interpolate a curve from the first MW point to the last MW point submitted. MPs must submit Offer MW/Price pairs for the entire operating range of the Resource up to and including the applicable Hourly Emergency Maximum Limit. If Offer MW/Price pairs are not submitted for any hour for either market, then the values are treated as the quantity zero (0). Electric Storage Resource Offer MW/Price pairs are not cumulative, meaning if an MP submits an Offer MW/Price pair of 100 MW at \$30 and 200 MW at \$40 and the market clears at \$40, the Resource clears 200 total MW.

4.2.7.2.2 Regulating Reserve Offers

Electric Storage Resources that are Regulation Qualified Resources may submit Regulating Reserve Offers in two parts: a Regulating Capacity Offer in \$/MWh, and a Regulating Mileage Offer, in \$/MW (of mileage), for use in the Energy and Operating Reserve Markets. A Regulating Reserve Offer consists of the summation of a Resource’s Regulating Capacity Offer and the Resource’s Regulating Mileage Offer multiplied by a deployment factor (i.e., Regulating Reserve Offer = Capacity Offer + factor*Mileage Offer). The Regulation Deployment Factor is updated for each calendar Operating Month, based on analysis performed for a one-month period ending on the fifteenth of the month prior to the Operating Month. The factor is determined by first calculating the average ratio of deployed Regulating Mileage to cleared Regulating Capacity, averaged across all Resources providing Regulation, for each Dispatch Interval. This average is then

⁴² Non-verified offer limit of \$1,000/MW, Verified offer limit of \$2,000/MW.