for reliability purposes. Load served by generation that MISO has not explicitly modeled in the Network Model is excluded.

In addition, note that it is the telemetered boundary of the LBA, as determined by the real-time values included in the LBA's Actual Net Interchange that determines the LBA forecast Load.
For market Settlement purposes, MISO market Load is similar to MISO forecast load with the exception that Load served by Behind-the-Meter Generation Resources but explicitly modeled in the Network Model is excluded (i.e. Load is settled on a net metered basis) and the output of DRRs-Type I and DRRs-Type II is included as part of market Load. The definition of MISO market Load is as follows:

- ***MISO Market Load:*** The Load (including actual losses) within the telemetered boundary of the MISO LBA members. Load served by Generation Resources that MISO has not explicitly modeled in the Network Model or is explicitly modeled for reliability but commercially considered as Behind-the-Meter is not included in this Load. MISO market Load is the sum of the LBA market Load values at any point in time.

Hence, the definition for the LBA market Load is as follows:

- ***Local Balancing Authority Market Load:*** The Load (including actual losses) within the telemetered boundary of a MISO LBA member. Load served by Generation Resources that MISO has not explicitly modeled in the Network Model, or is explicitly modeled for reliability but commercially considered as Behind-the-Meter, is not included in this Load

3.6.2 Use of Load Forecast

3.6.2.1 Reliability Assessment Commitment

The goal of the RAC processes is to ensure that enough generation capacity is scheduled on-line to meet the Load, Operating Reserve and other reserve requirements in the MISO BA. It is very important that this Load Forecast is as accurate as possible. A low Load Forecast has the potential of resulting in a capacity insufficiency, resulting in the need for Emergency procedures. On the other hand, a high Load Forecast could result in too much generation being committed by MISO, with the potential for uplift of commitment costs.

3.6.2.2 MP Estimation of Operating Reserve Obligations

The hourly mid-term MISO Balancing Authority Area Load Forecast developed for use in RAC is available to MPs through the MUI. Additionally, MISO provides percent of Load values for each Reserve Zone that represent the percentage of the MISO Balancing Authority Area Load Forecast that resides within each Reserve Zone (the sum of all Reserve Zone percentages will be 100%). MPs can use this Load Forecast and Reserve Zone percentage data to estimate their Operating Reserve and other reserve obligations on both a market-wide and zonal basis. A Market Participant will only need to estimate obligations on a zonal basis if the MP believes that a particular minimum Reserve Zone requirement will bind as illustrated in the following example.

Assume MISO posts the MISO BA Spinning Reserve requirement and Supplemental Reserve requirement, which is equal to 640 MW and 960 MW respectively, and a MISO Balancing Authority Load Forecast for Hour 15 of 70,000 MWh, 48 hours prior to the Operating Day to which the Contingency Reserve requirement applies. There are three Reserve Zones defined and Reserve Zone 4 is the remaining system Zone and Reserve Zone assumptions are defined in Exhibit 3-2 as follows:

Exhibit 3-2: Contingency Reserve Obligation Example

Reserve Zone	Minimum Contingency Reserve Requirement[5]	Minimum Spinning Reserve Requirement[6]	Minimum Supplemental Reserve Requirement[7]	Reserve Zone System Load Percentage	Reserve Zone Load[8] (Hour 15)
Zone 1	150	15	135	15%	10,500
Zone 2	250	25	225	10%	7,000
Zone 3	200	20	180	10%	7,000

[5] Determined by the Reserve Zone Requirements Study.

[6] The Spinning Reserve minimum requirement is equal to 25% of the minimum Contingency Reserve requirement multiplied by (640 / (640 +960)).

[7] The minimum Supplemental Reserve requirement is equal to the minimum Contingency Reserve requirement minus the minimum Spinning Reserve requirement.

[8] Reserve Zone Load Forecast equals Reserve Zone percentage multiplied by MISO BA Load Forecast of 70000 MWh.

Zone 4 (Remaining system)	0	0	0	65%	45,500

Further assume that MP1 has 2,500 MWh of Load located within Reserve Zone 1. If no Reserve Zones are binding (i.e., the amount of Contingency Reserve cleared within each Reserve Zone exceeds the minimum requirement, thus causing no MCP separation), then MP1's Spinning Reserve and Supplemental Reserve obligations could be estimated as follows:

- MP1 Spinning Reserve obligation estimate = 640 MW * (2,500 MWh / 70,000 MWh) = 23 MW
- MP1 Supplemental Reserve obligation estimate = 960 MW * (2,500 MWh / 70,000 MWh) = 34 MW

MP1 would then have the option of Self-Scheduling 23 MW of Spinning Reserve and 34 MW of Supplemental Reserve from qualified Resources located anywhere within the MISO Balancing Authority Area to meet these obligations, as opposed to purchasing these obligations directly from the Energy and Operating Reserve Markets. In this case, if MP1 Self-Scheduled its entire obligation, a perfect hedge would be created since there is no MCP separation between Reserve Zones, assuming that the actual Load consumption in real-time was exactly equal to the forecast amounts in Hour 15.

If Reserve Zone 1 is binding (i.e., the amount of Contingency Reserve cleared in Reserve Zone 1 is exactly equal to minimum Contingency Reserve requirement and the Spinning Reserve and Supplemental Reserve MCP is greater than the minimum of remaining Reserve Zone MCPs), then MP1's Spinning Reserve and Supplemental Reserve obligations could be estimated as follows:

- MP1 Spinning Reserve obligation estimate = 15 MW * (2,500 MWh / 10,500 MWh) = 4 MW
- MP1 Supplemental Reserve obligation estimate = 135 MW * (2500 MWh / 10,500 MWh) = 32 MW

Again, MP1 would then have the option of Self-Scheduling 4 MW of Spinning Reserve and 32 MW of Supplemental Reserve from qualified Resources located anywhere within the MISO Balancing Authority Area to meet these obligations, as opposed to purchasing these obligations

directly from the Energy and Operating Reserve Markets. In this case, however, if MP1 Self-Scheduled its entire obligation, a perfect hedge would not be created since there will be MCP separation between Reserve Zone 1 and the remaining Reserve Zone. MP1 will need to consider that if these obligations are Self-Scheduled on qualified Resources located outside of Reserve Zone 1, that these Self-Schedules may receive an MCP that is less than the MCP that Load located within Reserve Zone 1 will pay and adjust its Self-Schedules accordingly. MP1 would also have the option of purchasing these obligations directly from the Energy and Operating Reserve Markets.

3.6.2.3 Real-Time 5-Minute Dispatch

During the Real-Time 5-minute dispatch process, a MISO developed Load Forecast is developed and used on a 5-minute basis. The SCED will have as inputs this forecast Load for a 5-minute target period and all Interchange Schedules into or out of MISO at that same point in time[9].

To the extent that the actual MISO BA Load in Real-Time is different than the MISO BA 5-minute Load Forecast target, Regulation Capability in the MISO BA will make up for the difference, in response to AGC.

3.6.3 Source of Load Forecast

3.6.3.1 Reliability Assessment Commitment

For the RAC process, MISO requests that the LBA(s) provide a Load Forecast consistent with the above LBA Load Forecast definition at an hourly granularity for the next 7 days to MISO by the Day-Ahead Energy and Operating Reserve Market Offer deadline. MISO also produces a 7-day hourly forecast for the MISO BA. MISO requires MPs serving Load in an LBA to supply a forecast of their Load values to the LBA for the Load served by the MP if the LBA needs the data to develop the LBA forecast.

MISO will continuously evaluate which of these two sources of input produce the most accurate result and will utilize the most accurate source of this data for its RAC processes.

[9] For schedules that have been tagged as Dynamic Schedules, the estimated value submitted is used in the dispatch algorithm.

3.6.3.2 Look-Ahead Commitment and Real-Time 5-Minute Dispatch

MISO produces a Short Term Load Forecast ("STLF") for the MISO BA at a 5-minute granularity for multiple hours into the future, on a rolling basis. LBAs do not provide a forecast for this Real-Time dispatch process. The SCED, as well as the Look-Ahead Commitment ("LAC") process, utilize these 5-minute forecast Load targets during the dispatch process.[10] The STLF algorithm utilizes the real-time ICCP Load submitted by MISO LBAs and regression modeling.
See the *BPM-025 for Operational Forecasting* for a detailed description of STLF.

3.6.3.3 Pumped Storage Load

Load at a pumped storage facility when operating in pumping mode should be included in the Load Forecast supplied by the LBA for the RAC processes. ICCP values for the load and Generator should be sent to MISO. The Load measurement would be a positive value and the Generator measurement would be "zero" when pumping and vice versa when generating. During Real-Time, Load served by the pumped storage facility can be handled in the same manner as described below under non-conforming Loads. Although not required, it may provide more accuracy for submitting demand Bids in the Day-Ahead Energy and Operating Reserve Market if the pumped storage "Loads" are separated from larger Load Zones of conforming Loads. That will provide more control to Bid in zero Load at that location for expected generating times and specific Load amounts at expected pumping times. Load at pumping facilities may also qualify as a DRR-Type I or a DRR-Type II.

[10] The one exception to this is for non-conforming Loads, which is discussed in more detail below.

4. Energy and Operating Reserve Markets Participation

MPs may use all or any combination of the following options to participate in the Energy and Operating Reserve Markets:

- ***Bilateral Transactions*** – For both physical and financial agreements.
- ***Resource Offers*** – For the sale of Energy, Operating Reserve and other reserves from Generation Resources[11], Demand Response Resources-Type I ("DRRs-Type I"), Demand Response Resources-Type II ("DRRs-Type II")[12] and External Asynchronous Resources ("EAR"), or for the sale of Regulating Reserve from Stored Energy Resources, as price takers (via Self-Schedules, up to Self-Schedule MW level) or at variable prices.
- ***Demand Bids*** – For the purchase of Energy in the Day-Ahead Energy Market only, at market prices or at "not-to-exceed" prices at Load Zone Commercial Pricing Nodes ("CPNodes").
- ***Virtual Transactions*** – Offers to supply Energy or Bids to purchase Energy at any CPNode in the Day-Ahead Energy and Operating Market only and that are not related to any physical Resource or Load asset.

Exhibit 4-1 provides an overall summary of these options, which market they are applicable to and which software tools are used by MPs to initiate Offer and Bid submittal.

[11] References to Generation Resource(s) and/or Generator(s) are inclusive of Electric Storage Resources unless otherwise indicated.

[12] Throughout this BPM, all rules and requirements for DRR Type II Resources are applicable to SER Type II resources on an equivalent basis, to the extent that SER – Type IIs are modeled as DRR – Type IIs for operational purposes (although they differ in how they are settled).

Exhibit 4-1: Market Participation Options

Options	Day-Ahead Energy and Operating Reserve Market Interface	Real-Time Energy and Operating Reserve Market Interface
Interchange Schedules ▪ Fixed (Normal / Dynamic) ▪ Up to TUC (Normal) (Day-Ahead Energy and Operating Reserve Market Only) ▪ Dispatchable (Normal) (Day-Ahead Energy and Operating Reserve Market Only)	/ E-Tag	/ E-Tag
Financial Schedules ▪ Fixed ▪ Pseudo-Tie ▪ Grandfathered Agreement	Market Portal ▪ finSched ▪ N/A ▪ finSched	Market Portal ▪ finSched ▪ finSched ▪ N/A
Generation Resource Offer	Market Portal	Market Portal
External Asynchronous Resource Offer	Market Portal	Market Portal
Demand Response Resource Type I ("DRR-Type I") Offer	Market Portal	Market Portal
Demand Response Resource Type II ("DRR-Type II") Offer	Market Portal	Market Portal
Stored Energy Resource Offer	Market Portal	Market Portal
Demand Bid	Market Portal	N/A
Virtual Supply Offer	Market Portal	N/A
Virtual Demand Bid	Market Portal	N/A
TUC = Transmission Usage Charge N/A = Not allowed finSched = Financial Scheduling Software		

The following subsections describe each of these four options in more detail.

4.1 Bilateral Transactions

Bilateral Transactions are contracts between parties for the transfer of Energy and financial responsibility for Energy from suppliers to consumers.

See the *BPM-007 for Physical Scheduling* for a detailed description of Bilateral Transactions.

4.1.1 Interchange Schedules

4.1.1.1 Interchange Schedule

An Interchange Schedule is submitted via a NERC E-Tag by an MP representing withdrawals and injections at specified locations.

See the *BPM-007 for Physical Scheduling* for a detailed description of Interchange Schedules.

4.1.1.2 Import Schedule

If the Source Point is external to the MISO market footprint and the Sink Point is not, the Interchange Schedule is an Import Schedule.

See the *BPM-007 for Physical Scheduling* for a detailed description of Import Schedules.

4.1.1.3 Export Schedule

If the Sink Point is external to the MISO market footprint and the Source Point is not, the Interchange Schedule is an Export Schedule.

See the *BPM-007 for Physical Scheduling* for a detailed description of Export Schedules.

4.1.1.4 Through Schedule

If the Source Point and Sink Point are both external to the MISO Market Footprint, the Interchange Schedule is a Through Schedule.

See the *BPM-007 for Physical Scheduling* for a detailed description of the Spot In Market Product.

4.1.1.5 Within Schedule

If the Source Point and Sink Point are internal to the MISO Market Footprint, the Interchange Schedule is a Within Schedule.

See the *BPM-007 for Physical Scheduling* for a detailed description of Within Schedules.

4.1.1.6 GFA Schedule

If the Source Point and Sink Point are internal to the MISO Market Footprint, the schedule is a GFA Schedule. GFA Schedules do not require confirmed reservations of Network Integration Transmission Service because the Transmission Service is provided according to the terms of a

Grandfathered Agreement. Grandfathered Carve Outs will be physically scheduled within the Market Footprint GFA Schedule

4.1.2 Interchange Schedule Types

When creating an E-Tag for Interchange Schedules, each MP must select an Energy type, a transaction type, and a market type.

See the *BPM-007 for Physical Scheduling* for a detailed description of the Interchange Schedule Types.

4.1.2.1 Fixed Interchange Schedules

Fixed Interchange Schedules are physical transactions that do not specify a Bid or Offer ($/MWh).

See the *BPM-007 for Physical Scheduling* for a detailed description of the Interchange Schedule Types.

4.1.2.2 Dispatchable Interchange Schedules

Dispatchable Interchange Schedules are physical transactions that specify a Bid or Offer ($/MWh).

See the *BPM-007 for Physical Scheduling* for a detailed description of the Interchange Schedule Types.

4.1.2.3 Up-to-TUC Interchange Schedules

Up-to-TUC Interchange Schedules are physical transactions created via NERC E-Tag that specify a willingness to pay the TUC (in $/MWh) represented by a maximum amount beyond which the MP agrees to be curtailed.

See the *BPM-007 for Physical Scheduling* for a detailed description of the Interchange Schedule Types.

4.1.2.4 Dynamic Interchange Schedules Associated with External Asynchronous Resources ("EARs")

Fixed Dynamic Interchange Schedules associated with External Asynchronous Resources (EAR) are special types of schedules that are submitted at an EAR Resource CPNode (the Source Point).

See the *BPM-007 for Physical Scheduling* for a detailed description of the Interchange Schedule Types.

4.1.2.5 Grandfathered Carve Out Transactions

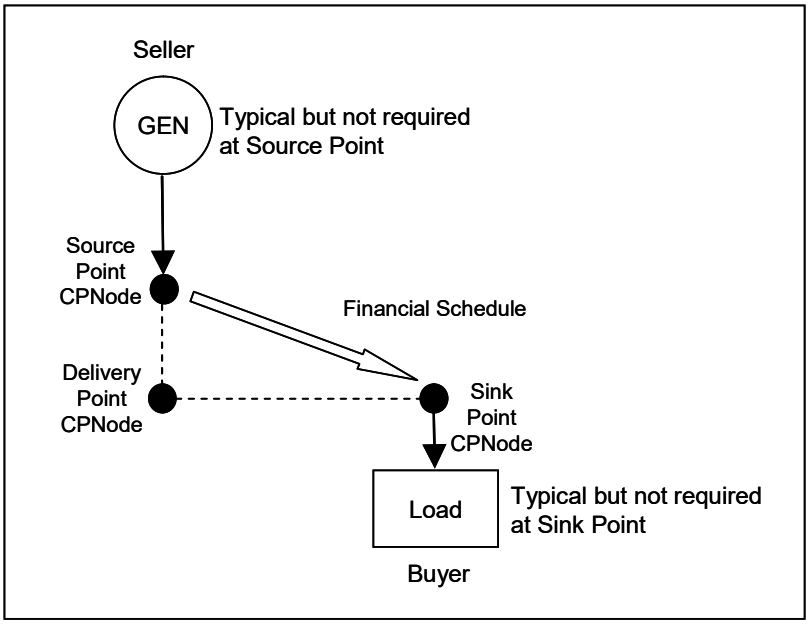
The Federal Energy Regulatory Commission determined that certain Grandfathered transactions would be carved out of the MISO market.

See the *BPM-007 for Physical Scheduling* for a detailed description of the Interchange Schedule Types.

4.1.3 Financial Schedules

Financial Schedules, also known as Financial Bilateral Transactions ("FBTs"), provide MPs with the ability to transfer the financial responsibility for Energy (not the physical flow of Energy) between buyers and sellers for the transfer of Energy within and across the Market Footprint. OASIS reservations are not required for Financial Schedules. Financial Schedules are defined in terms of three points in the Commercial Model as illustrated in Exhibit 4-2.

Exhibit 4-2: Financial Schedule – Definition



4.1.3.1 Rules for Financial Schedules

A Financial Schedule is a financial transaction in which the Source Point, the Sink Point, and the Delivery Point are any CPNodes within the Commercial Model, including Hubs and External Interfaces. Financial Schedules must be submitted through the finSched and may be submitted up to seven days prior to the Operating Day (OD-7), and must be submitted and approved prior to 1200 EST of the sixth day after the Operating Day (OD+6). FBTs must include the following information:

- The Contract Name for the Financial Schedule.
- Identification of the AOs included in the Financial Schedule.
- The CPNodes identified as the Source Point, the Sink Point, and the Delivery Point.

- The Day-Ahead or Real-Time Energy and Operating Reserve Market for which the Financial Schedule is to be settled, using either the Day-Ahead Ex Post LMPs or Ex Post Real-Time LMPs.

- The scheduled volume in MWh for each hour of the Financial Schedule, using a granularity of tenths of MWh.
- Whether the Financial Schedule is a Financial Schedule for Deviations (by use of the "RSG Deviations Contract" checkbox) Financial Schedules for Deviations must be submitted at least four hours prior to a given Market Hour (OH-4); submittals made less than four hours prior to a market hour will be rejected.

4.1.3.2 Types of Financial Bilateral Transactions

There are three types of Financial Schedules:

- ***Fixed*** – Fixed Financial Schedules are for a fixed number of MW and may be submitted in either the Day-Ahead or Real-Time Energy and Operating Reserve Markets. These transactions do not roll over from the Day-Ahead to the Real-Time Energy and Operating Reserve Markets.
- ***Pseudo-Tie*** – These Financial Schedules apply to the Real-Time Energy and Operating Reserve Market only as described by Exhibit 4-3.
- ***Grandfathered Agreement*** – These Financial Schedules apply to the Day-Ahead Energy Market only as described by Exhibit 4-4.

Exhibit 4-3: Pseudo-Ties (Real-Time Financial Schedules)

Attaining BA/LBA →	External BA	MISO LBA	MISO LBA
Native BA/LBA →	**MISO LBA**	**External BA**	**MISO LBA**
Load Pseudo-Tie	**Load in Native LBA:** Attaining BA is registered only for Congestion and Loss charges in MISO.	**Load in Native BA:** Pseudo-tie is assigned to Load Zone in Attaining LBA. Attaining LBA must have appropriate transmission service arrangements with Native BA.	**Load in Native LBA:** Pseudo-tie is assigned to Load Zone in Attaining LBA.
Generation[13] Pseudo Tie: (Note: Resource partial Pseudo Tie is represented as two units in the Network Model)	**Generation in Native LBA:** All pseudo-tie units inside MISO must be registered and claimed by AOs. Pseudo-tie units transferred out of MISO are responsible for Congestion and Loss charges in MISO.	**Generation in Native BA:** Pseudo-tie unit transferred into MISO must be claimed by an AO. Pseudo-tie units not transferred into MISO do not need to be registered.	**Generation in Native LBA:** Both pseudo-tie units must be claimed by AOs.
Default AO	Attaining BA/LBA	Attaining BA/LBA	Attaining BA/LBA
Commercial Pricing Node for Pseudo Tie	External Interface CPNode and Pseudo Gen/Load CPNode for Congestion and Loss Charges	Internal Gen/Load CPNode	Attaining LBA's designated CPNode
Financial Schedule: via finSched	Financially Responsible AO is Buyer and Seller.	Financially Responsible AO is Buyer and Seller.	Financially Responsible AO is Buyer and Seller.

Note 1: Native BA means the BA within which the "pseudo" Load or generation is physically located.

Note 2: Attaining BA means the BA that is "sending" MW to the "pseudo" Load or is "receiving" MW from the "pseudo" generation.

Note 3: Pseudo-Tie MW values are calculated by the State Estimator and can be updated up until 1200 EST (OD+1).

Note 4: See Attachments A, B, and C of the *BPM for Network and Commercial Models* for further information.

[13] Electric Storage Resources must be physically located in the MISO footprint and may not be Pseudo Tied.

Exhibit 4-4: Grandfathered Agreements (Day-Ahead Financial Schedules)

GFA Options →	Tariff Option A	Tariff Option B	Tariff Option C
Financial Transmission Right ("FTR")	FTR is held by GFA Responsible Entity	No FTR	No FTR
Cost of Congestion	GFA Responsible Entity is charged	GFA Responsible Entity is credited/charged	GFA Responsible Entity is charged
Cost of Losses	GFA Responsible Entity is charged	GFA Responsible Entity is credited/charged based on difference between Marginal Losses and System Losses	GFA Responsible Entity is charged
Excess Marginal Losses Pool Revenue	GFA Responsible Entity receives share	No share	GFA Responsible Entity receives share
FTR Administrative Costs	GFA Responsible Entity is charged	GFA Responsible Entity is charged	No Charge
Source Point	Any CPNode	Any CPNode	Any CPNode
Delivery Point	Any CPNode	Any CPNode	Any CPNode
Sink Point	Any CPNode	Any CPNode	Any CPNode
Note 1: DRRs are not valid CPNodes for GFA finScheds.			

4.1.3.3 Day-Ahead Transmission Usage Charges for Financial Schedules

MISO collects a Transmission Usage Charge ("TUC") (separated into congestion and loss components for surplus distribution) for all Day-Ahead Financial Schedules. The TUCs for the seller are calculated as the product of (i) the amount of Energy scheduled, in MWh, and (ii) the Day-Ahead Ex Post LMP at the Delivery Point CPNode minus the Day-Ahead Ex Post LMP at the Source Point CPNode. The TUCs for the buyer on the Day-Ahead FBT are calculated as the product of: (i) the amount of Energy scheduled, in MWh, and (ii) the Ex Post Day-Ahead LMP at the Sink Point CPNode minus the Day-Ahead Ex Post LMP at the CPNode for the specified Delivery Point.

4.1.3.4 Real-Time Transmission Usage Charges for Financial Schedules

MISO collects a TUC (separated into congestion and loss components for surplus distribution) for all Financial Schedules designated to be settled in the Real-Time Energy and Operating Reserve Market. The TUCs for the seller are calculated as the product of: (i) the amount of Energy scheduled, in MWh, and (ii) the Real-Time Ex Post LMP at the Delivery Point CPNode minus the Real-Time Ex Post LMP at the Source Point CPNode. The TUCs for the buyer are calculated as

the product of: (i) the amount of Energy scheduled, in MWh, and (ii) the Real-Time Ex Post LMP at the Sink Point minus the Real-Time Ex Post LMP at the specified Delivery Point.

4.2 Resource Offer Requirements

Resource Offers are submitted by MPs at Resource CPNodes for the purpose of selling Energy, Operating Reserve and other reserves into the Day-Ahead and Real-Time Energy and Operating Reserve Markets and can be submitted for all types of Resources. The following are the types of Resources for which MPs may submit Offers: Generation Resources (including Jointly-Owned Generation Resources, Combined Cycle Resources, Cross Compound Resources, External Pseudo-Tied Generation Resources, Energy Limited Resources and Intermittent Resources), DRRs-Type I, DRRs-Type II, External Asynchronous Resources, and Stored Energy Resources. DRR-Type II Offer requirements are identical to Generation Resource Offer requirements and thus are combined under Section 4.2.3. Resource qualifications to provide Operating Reserve and Offer parameters are discussed for each Resource category (with Generation Resource and DRR-Type II combined) in the following Subsections.

4.2.1 Resource Qualifications and Eligibility to Provide Operating Reserve or Other Reserves

The following subsections describe the requirements that must be met by any Resource in order to be qualified to submit Operating Reserve Offers or other reserve offers for use in the Energy and Operating Reserve Markets. Exhibit 4-5 provides an eligibility summary for Resources that are qualified to provide Operating Reserve, Ramp Capability, and Short-Term Reserve.

Exhibit 4-5: Resource Eligibility Summary for Provision of Operating Reserve, Ramp Capability, and Short-Term Reserve

Resource	Day-Ahead and Real-Time				
	Regulating Reserve	Spinning Reserve	Supplemental Reserve	Ramp Capability	Short-Term Reserve
Committed or on-line Generation Resources	✓	✓	✓	✓	✓
Committed or on-line Generation Resources with Fixed Dynamic Schedule	✓*	✓*	✓*	✓*	✓*
Committed or on-line Demand Response Resources - Type II	✓	✓	✓	✓	✓
Available External Asynchronous Resources	✓	✓	✓	✓	✓
Available Stored Energy Resources	✓				
Available off-line or uncommitted Quick-Start Resources			✓		
Uncommitted Demand Response Resources - Type I		✓	✓		✓
Available off-line or uncommitted Off-line Short-Term Reserve Qualified Resources					✓

* For a synchronized Generation Resource associated with a Fixed Dynamic Schedule to remain eligible, it must maintain an Hourly Economic Minimum Limit equal to or greater than the Dynamic Interchange Schedule cap limit associated with the resource and an Hourly Economic Maximum Limit greater than the Hourly Economic Minimum Limit.

4.2.1.1 Regulation Qualified Resource Requirements

Any Resource that meets the following criteria will be considered a Regulation Qualified Resource and may submit Offers for Regulating Reserve for use in the Energy and Operating Reserve Markets. All Regulation Qualified Resources must:

- be registered as a Regulation Qualified Resource asset in MISO Energy and Operating Reserve Markets;

- have the appropriate control equipment installed to be capable of providing Regulation Service;
- be capable of supplying Regulation Service in either the up or down direction within the Regulation Response Time;
- be capable of supplying Regulation Service for a continuous duration of 60 minutes;
- be capable of automatically responding to and mitigating frequency deviations via a speed governor or similar device;
- be capable of receiving and responding to automatic control signals on a 4 second periodicity, and providing telemetered output data that can be scanned every 2 seconds;
- if an External Asynchronous Resource, maintain firm point to point transmission service external to MISO in an amount equal to the Hourly Emergency Maximum limit of the External Asynchronous Resource for Imports into MISO, and an amount equal to the Hourly Emergency Minimum limit of the External Asynchronous Resource for Exports out of MISO;
- if an External Asynchronous Resource, use a Fixed Dynamic Interchange Schedule to transfer Energy into or out of the MISO Balancing Authority Area;
- if an external Resource, the entire Generation Resource or Stored Energy Resource must be Pseudo-tied into the MISO Balancing Authority Area, and must remain Pseudo-tied into the MISO Balancing Authority Area until the next Network Model update; and
- if a DRR-Type II, be physically located within the Market Footprint.

4.2.1.1.1 Day-Ahead Resource Eligibility

Regulation Qualified Resources that are eligible to provide Regulation Service in the Day-Ahead Energy and Operating Reserve Market are:

- Committed Generation Resources;
- Committed DRRs-Type II; and
- Available External Asynchronous Resources and Stored Energy Resources;

that have their hourly Regulation Qualified Resource availability flags set to “True”.

4.2.1.1.2 Real-Time Resource Eligibility

Regulation Qualified Resources that are eligible to provide Regulation Service in the Real-Time Energy and Operating Reserve Market are:

- synchronized Generation Resources;
- synchronized DRRs-Type II; and
  available External Asynchronous Resources and Stored Energy Resources;

that have their hourly Regulation Qualified Resource availability flags set to "True".

4.2.1.2 Spin Qualified Resource Requirements

Any Regulation Qualified Resource, other than a Stored Energy Resource, is also to be registered as a Spin Qualified Resource. Regulating Reserves may be cleared and substituted for Spinning Reserves on any Regulation Qualified and committed resource if it is economically efficient to do so. Resources that meet the following criteria are considered Spin Qualified Resources and may submit Offers for Spinning Reserve for use in the Energy and Operating Reserve Markets. All Spin Qualified Resources must:

- be registered as a Spin Qualified Resource asset in the MISO Energy and Operating Reserve Markets;
- be capable of automatically responding to and mitigating frequency deviations if required by Applicable Reliability Standards[14];
- be capable of deploying 100% of their cleared Spinning Reserve (including any Spinning Reserve cleared to meet Supplemental Reserve Requirements) within the Contingency Reserve Deployment Period;
- be capable of deploying 100% of their cleared Spinning Reserve for a continuous duration of 60 minutes or the maximum duration specified by Applicable Reliability Standards;
- be capable of providing telemetered output data that can be scanned every 10 seconds (except for DRRs-Type I, which must be capable of providing meter-before/meter-after data as described in the *BPM-026* for *Demand Response*);
- if an External Asynchronous Resource, maintain firm point to point transmission service external to MISO in an amount equal to the Hourly Emergency Maximum limit of the External Asynchronous Resource for Imports into MISO, and an amount equal

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

to the Hourly Emergency Minimum limit of the External Asynchronous Resource for Exports out of MISO;

- if an External Asynchronous Resource, use a Fixed Dynamic Interchange Schedule to transfer Energy into or out of the MISO Balancing Authority Area;
- if an External Resource, the entire Generation Resource must be pseudo-tied into the MISO Balancing Authority Area, and must remain pseudo-tied into the MISO Balancing Authority Area until the next Network Model update; and
- if a DRR-Type I or DRR-Type II, be physically located within the Market Footprint.

4.2.1.2.1 Day-Ahead Resource Eligibility

Spin Qualified Resources that are eligible to provide Spinning Reserve in the Day-Ahead Energy and Operating Reserve Market are:

- Committed Generation Resources;
- Uncommitted DRRs-Type I with a Contingency Reserve Status of “online”;
- Committed DRRs-Type II; and
- Available External Asynchronous Resources;

that have their hourly Spin Qualified Resources availability flags set to “True”.

4.2.1.2.2 Real-Time Resource Eligibility

Spin Qualified Resources that are eligible to provide Spinning Reserve in the Real-Time Energy and Operating Reserve Market are:

- Synchronized Generation Resources;
- Uncommitted DRRs-Type I with a Contingency Reserve Status of “online";
- Synchronized DRRs-Type II; and
- Available External Asynchronous Resources;

that have their hourly Spin Qualified Resources availability flags set to “True”.

4.2.1.3 Supplemental Qualified Resource Requirements

Any Regulation or Spin Qualified Resource is also to be registered as a Supplemental Qualified Resource. MISO may clear Regulating Reserves to substitute for Spinning or on-line Supplemental Reserves when it is economically efficient to do so. Only Resources registered as Quick Start will be eligible to clear as off-line Supplemental. The following requirements apply specifically to Resources that do not qualify as Spin Qualified Resources but are capable of providing Supplemental Reserve, with the exception that Demand Response Resources – Type I can offer Supplemental Reserves if qualified as Spin Qualified Resources. All Supplemental Qualified Resources must:

- be registered as an Supplemental Qualified Resource asset in the MISO Energy and Operating Reserve Markets;

- have a Minimum Run Time (or Minimum Interruption Time for DRRs-Type I) less than or equal to three hours if a Quick-Start Resource[15];
- be capable of deploying 100% of their cleared Supplemental Reserve within the Contingency Reserve Deployment Period;
- be capable of deploying 100% of their cleared Supplemental Reserve for a continuous duration of 60 minutes or the maximum duration specified by Applicable Reliability Standards;
- be capable of providing telemetered output data that can be scanned every 10 seconds (except for DRRs-Type I which must be capable of providing meter-before/meter-after data as described in the *BPM-026* for *Demand Response*);
- if an External Asynchronous Resource, maintain firm point to point Transmission Service external to MISO in an amount equal to the Hourly Emergency Maximum limit of the External Asynchronous Resource for Imports into MISO and an amount equal to the Hourly Emergency Minimum limit of the External Asynchronous Resource for Exports out of MISO;
- if an External Asynchronous Resource, use a Fixed Dynamic Interchange Schedule to transfer Energy into or out of the MISO Balancing Authority Area;
- if an external Resource, the entire Generation Resource must be pseudo-tied into the MISO Balancing Authority Area, and must remain pseudo-tied into the MISO Balancing Authority Area until the next Network Model update; and
- if a DRR-Type I or DRR-Type II, be physically located within the Market Footprint.

Note: Offers for offline Quick Start Supplemental Qualified Resources should reflect what the Resource is expected to obtain within the Contingency Reserve Deployment Period, barring any mechanical problems or other extenuating circumstances encountered during the start up of the resource, while recognizing that these issues do occur.

4.2.1.3.1 Day-Ahead Resource Eligibility

Supplemental Qualified Resources that are not Spin Qualified Resources that are eligible to provide Supplemental Reserve in the Day-Ahead Energy and Operating Reserve Market are:

- uncommitted Quick-Start Resources (Only for offline Supplemental);
- committed Generation Resources;

[15] The Quick-Start Resource designation is made and can be modified during the Asset Registration process.

- uncommitted DRRs-Type I with a Contingency Reserve Status of “offline";
- committed DRRs-Type II; and
- available External Asynchronous Resources;
- Electric Storage Resources with a Commitment Status of Available (for Off-line Supplemental)

that have their hourly Supplemental Qualified Resource availability flags set to “True”.

4.2.1.3.2 Real-Time Resource Eligibility

Supplemental Qualified Resources that are not Spin Qualified Resources that are eligible to provide Supplemental Reserve in the Real-Time Energy and Operating Reserve Market are:

- uncommitted Quick-Start Resources (Only for offline Supplemental);
- synchronized Generation Resources;
- uncommitted DRRs-Type I with a Contingency Reserve Status of “offline";
- synchronized DRRs-Type II; and
- available External Asynchronous Resources;
- Electric Storage Resources with a Commitment Status of Available (for Off-line Supplemental)

that have their hourly Supplemental Qualified Resource availability flags set to “True”.

4.2.1.4 Ramp Capability Resource Requirements

Resources that are qualified for energy offer will have the Ramp Capability Dispatch Status offer parameter. Valid options for ramp capability dispatch status are “Economic” or “Not Participating” with the default status of “Economic.” For DRR-Type I and Stored Energy Resources (“SERs”), the default dispatch status will be “Not Participating”.

4.2.1.4.1 Day-Ahead Resource Eligibility

Resources that are eligible to provide Ramp Capability in the Day-Ahead Energy and Operating Reserve Market are:

- committed Generation Resources;
- committed DRRs-Type II; and
- available External Asynchronous Resources

4.2.1.4.2 Real-Time Resource Eligibility

Resources that are eligible to provide Ramp Capability in the Real-Time Energy and Operating Reserve Market are:

- synchronized Generation Resources;
- synchronized DRRs-Type II; and
- available External Asynchronous Resources

4.2.1.5 Short-Term Reserve Resource Requirements

Resources that are eligible to provide on-line and off-line Short-Term Reserve have to meet different qualification requirements.

On-line Short-Term Reserve Resource Requirements

On-line Resources that are qualified for On-Line Short-Term Reserve will have the On-line Short-Term Reserve Dispatch Status offer parameter. Valid options for On-line Short-Term Reserve dispatch status are “Economic” or “NotParticipating,” with the default status of “Economic.” DRR-Type I, Intermittent and Dispatchable Intermittent Resources cannot provide online Short-Term Reserve.

All On-Line Short-Term Reserve Qualified Resources must:

- be capable of deploying 100% of their cleared Short-Term Reserve for a continuous duration of 60 minutes;
- be capable of providing telemetered output data that can be scanned every 10 seconds;
- if an External Asynchronous Resource:
  - Maintain firm point to point Transmission Service external to MISO in an amount equal to the Hourly Emergency Maximum limit of the External Asynchronous Resource for Imports into MISO and an amount equal to the Hourly Emergency Minimum limit of the External Asynchronous Resource for Exports out of MISO;
  - Use a Fixed Dynamic Interchange Schedule to transfer Energy into or out of the MISO Balancing Authority Area;
- if an external Resource, the entire Generation Resource must be pseudo-tied into the MISO Balancing Authority Area, and must remain pseudo-tied into the MISO Balancing Authority Area until the next Network Model update; and
- if DRR-Type II, be physically located within the Market Footprint.

Off-line Short-Term Reserve Resource Requirements

Any off-line Resource that meets the following criteria qualifies as an Off-Line Short-Term Reserve Qualified Resource and may submit Offers for Short-Term Reserve for use in the Energy and Operating Reserve Markets. All Off-Line Short-Term Reserve Qualified Resources must:

- be registered as an Off-Line Short-Term Reserve Qualified Resource asset in MISO Energy and Operating Reserve Markets;
- have a Minimum Run Time (or Minimum Interruption Time for DRRs-Type I) less than or equal to four hours;
- be capable of deploying 100% of their cleared Short-Term Reserve within the Short-Term Reserve Deployment Period;
- be capable of deploying 100% of their cleared Short-Term Reserve for a continuous duration of 60 minutes;
- be capable of providing telemetered output data that can be scanned every 10 seconds (except for DRRs-Type I, which must be capable of providing meter-before/meter-after data as described in the *BPM-026* for *Demand Response*);
- if an external Resource, the entire Generation Resource must be pseudo-tied into the MISO Balancing Authority Area, and must remain pseudo-tied into the MISO Balancing Authority Area until the next Network Model update; and
- if a DRR-Type I or DRR-Type II, be physically located within the Market Footprint.
- An Electric Storage Resource is not eligible to provide Off-line Short-Term Reserve.

4.2.1.5.1 Day-Ahead Resource Eligibility

On-line resources that are eligible to provide Short-Term Reserve in the Day-Ahead Energy and Operating Reserve Market are:

- Committed Generation Resources (that are not Dispatchable Intermittent Resources and Intermittent Resources);
- Committed DRRs-Type II;
- Available External Asynchronous Resources

that are dispatchable for Energy and have their hourly on-line Short-Term Reserve Dispatch Status set to “Economic”.

Off-line resources that are eligible to provide Short-Term Reserve in the Day-Ahead Energy and Operating Reserve Market are:

- uncommitted Generation Resources (that are not Dispatchable Intermittent Resources, Intermittent Resources, or Electric Storage Resources);
- uncommitted DRRs-Type I;
- uncommitted DRRs-Type II;

that are Off-Line Short-Term Reserve Qualified Resources and have their hourly off-line Short-Term Reserve Dispatch Status set to “Economic”.

4.2.1.5.2 Real-Time Resource Eligibility

On-line resources that are eligible to provide Short-Term Reserve in the Real-Time Energy and Operating Reserve Market are:

- synchronized Generation Resources (that are not Dispatchable Intermittent Resources and Intermittent Resources);
- synchronized DRRs-Type II; and
- available External Asynchronous Resources

that are dispatchable for Energy and have their hourly on-line Short-Term Reserve Dispatch Status set to “Economic”.

Off-line resources that are eligible to provide Short-Term Reserve in the Real-Time Energy and Operating Reserve Market are:

- uncommitted Generation Resources (that are not Dispatchable Intermittent Resources, Intermittent Resources, or Electric Storage Resources);
- uncommitted DRRs-Type I;
- uncommitted DRRs-Type II;

that are Off-Line Short-Term Reserve Qualified Resources and have their hourly off-line Short-Term Reserve Dispatch Status set to “Economic”.

4.2.2 Scheduling Resource Outages

The Outage Scheduler status of Generation Resources, DRRs – Type II, and Stored Energy Resources is used, along with applicable offer information, to determine market availability in both

the Day Ahead and Real Time Markets. In normal operating conditions, if a Generation Resource or Stored Energy Resource is listed in Outage Scheduler with an outage type of ”Out of Service”, the resource will be considered unavailable. Generation Resources or Stored Energy Resources listed in Outage Scheduler with an outage type of “Economy” or “Deration” are considered as available. Further detailed Outage Scheduler information can be found in Section 6.1.6 below, as well as the *BPM-008* for *Outage Operations*.

4.2.3 Generation Resources and DRRs-Type II Offer Requirements

The following Subsection describes the economic and operational Offer data for Generation Resources and DRRs-Type II and how these data are used in commitment and dispatch decisions.[16]

4.2.3.1 Offer Information Summary

Generation Resource and DRR-Type II 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 4-6 and Exhibit 4-7 identify the data that may be included in a Generation Resource or DRR-Type II Offer and the markets in which they apply.

[16] Electric Storage Resources are covered separately in Section 4.2.11.

Exhibit 4-6: Generation Resource and DRR-Type II Economic Data Summary

Generation and DRR-Type II 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	3,5
Off-Line Short-Term Reserve Offer	$/MWh	Hourly	Hourly	1,5
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*	

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: DRRs-Type II 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

Exhibit 4-7: Generation Resource and DRR-Type II Operating Parameter Data Summary

Generation and DRR-Type II 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	
Minimum Run Time	hh:mm	Daily	Daily	
Maximum Run Time	hh:mm	Daily	Daily	
Minimum Down Time	hh:mm	Daily	Daily	
Commitment Status	Select	Hourly	Hourly	1
Maximum Daily Regulation Up Deployment	MWh	NA	Daily	9
Maximum Daily Regulation Down Deployment	MWh	NA	Daily	9
Maximum Daily Contingency Reserve Deployment	MWh	NA	Daily	9
Dispatch Operating Parameter Offer Data				
Hourly Economic Minimum Limit	MW	Hourly	Hourly*	1
Hourly Economic Maximum Limit	MW	Hourly	Hourly*	1,5
Hourly Regulation Minimum Limit	MW	Hourly	Hourly*	1,6
Hourly Regulation Maximum Limit	MW	Hourly	Hourly*	1,6
Hourly Emergency Minimum Limit	MW	Hourly	Hourly*	1
Hourly Emergency Maximum Limit	MW	Hourly	Hourly*	1,5
Maximum Off-Line Response Limit	MW	Hourly	Hourly*	1,4,6,8
Maximum Off-Line Short-Term Reserve Response Limit	MW	Hourly	Hourly*	1,6,10
Energy Dispatch Status	Select	Hourly	Hourly*	1
Regulating Reserve Dispatch Status	Select	Hourly	Hourly*	1,6
Spinning Reserve Dispatch Status	Select	Hourly	Hourly*	1,6
On-line Supplemental Reserve Dispatch Status	Select	Hourly	Hourly*	1,6
Off-line Supplemental Reserve Dispatch Status	Select	Hourly	Hourly*	1,4,6
Hourly Single-Directional-Down Ramp Rate	MW/min	N/A	Hourly*	1,3
Hourly Single-Directional-Up 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-Down Ramp Rate Curve	MW/min	N/A	Hourly	3
Single-Directional-Up Ramp Rate Curve	MW/min	N/A	Hourly	3
Bi-Directional Ramp Rate Curve	MW/min	N/A	Hourly	3
Combined Cycle Status	Select	Daily	Daily	
Forecast Maximum Limit	MW	N/A	Rolling 5-Min	7
Ramp Capability Dispatch Status	Select	Hourly	Hourly*	
On-line Short-Term Reserve Dispatch Status	Select	Hourly	Hourly*	6
Off-line Short-Term Reserve Dispatch Status	Select	Hourly	Hourly*	6, 10

Generation and DRR-Type II Offer Data	Units	Day-Ahead Schedule Offer	Real-Time Schedule Offer	Notes
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: Not applicable to Dispatchable Intermittent Resources in the Real-Time Market Note 6: Not applicable to Dispatchable Intermittent Resources Note 7: Only applicable to Dispatchable Intermittent Resources Note 8: Participant-limited to the level achieved during last deployment or test of Offline Supplemental Reserves issued by MISO Note 9: Only applicable to DRR-Type II Resources in Real-Time Market Note 10: 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.				

MISO maintains a Day-Ahead Schedule Offer[17] and a Real-Time Schedule Offer[18] for each Generation Resource and DRR-Type II. These Offers are standing Offers and maintained for each market independently of the other. Updates to Generation Resource and DRR-Type II Offers may be designated as updating the Day-Ahead Schedule Offer only, the Real-Time Schedule Offer only, or both.

The following two Subsections describe the Economic Offer Data and the Commitment and Dispatch Operating Data Offer Parameters specified in Exhibit 4-6 and Exhibit 4-7 in more detail.

4.2.3.2 Economic Offer Data

The economic Offer data parameters for Generation Resources and DRRs-Type II as identified in Exhibit 4-6 in more detail below.

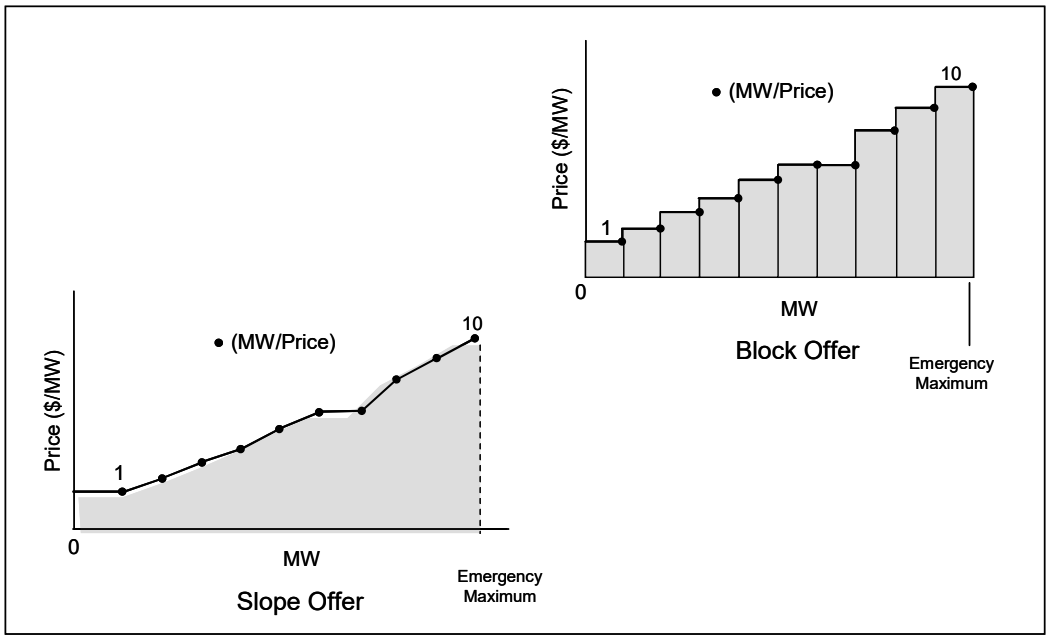
4.2.3.2.1 Energy Offer Curves (MW/Price Pairs)

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 4-8 illustrates the Energy Offer options.

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

[18] 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.

Exhibit 4-8: Types of 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 @ $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 “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 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). Generation Resource and DRR-Type II 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.

4.2.3.2.2 Regulating Reserve Offers

Generation Resources and DRRs-Type II 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 multiplied by 12 to convert from average deployments per interval to average deployments per hour. The allowed range for Regulating Reserve Offers is currently $0 to $500.00/MW. As with the Energy Offer Curves, 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 Capacity or Mileage prices are not submitted for any hour for either market, then the values are treated as the quantity zero (0).

DRRs-Type II may submit up to three MW/Price pairs for its Regulating Capacity Offer. Similar to Energy Offer Curves, the MP may designate whether the Regulation Offer 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 $0 to $500. The MW/Price pairs must be monotonically increasing for price and strictly increasing for MW.

4.2.3.2.3 Contingency Reserve Offers

Generation Resources and DRRs-Type II that are Spin Qualified Resources may submit Contingency Reserve Offers in $/MW for use in the Energy and Operating Reserve Markets. The allowed range for Contingency Reserve Offers is currently $0 to $100.00/MW. Generation Resources and DRRs-Type II that are Supplemental Qualified Resources but are not Spin Qualified Resources may submit Supplemental Reserve Offers in $/MW for use in the Energy and Operating Reserve Markets. The allowed range for Supplemental Reserve Offers is currently $0 to $100.00/MW. As with the Energy Offer Curves, there is no connection between the Regulating Reserve, Spinning Reserve or Supplemental 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 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 II may submit up to three MW/Price pairs for its Contingency Reserve Offers. 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 values are accepted to the 10th of a MW and the Offer values from $0 to $100. The MW/Price pairs must be monotonically increasing for price and strictly increasing for MW.

4.2.3.2.4 Off-Line Short-Term Reserve Offers

Generation Resources and DRRs-Type II that are Off-Line Short-Term Reserve Qualified Resources may submit Off-Line Short-Term Reserve Offers in $/MW for use in the Energy and Operating Reserve Markets. The allowed range for Off-Line Short-Term Reserve Offers is currently $0 to $100.00/MW. As with the Energy Offer Curves, there is no connection between the Off-Line Short-Term Reserve Offers for the Day-Ahead and Real-Time Energy and Operating Reserve Markets. (That is, Day-Ahead Schedule Offers only roll over to the next Day-Ahead Energy and Operating Reserve Market; they do not roll over into the Real-Time Energy and Operating Reserve Market, nor do real-time offers roll into the ensuing Day-Ahead Market.) 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

Off-Line Short-Term Reserve Offer prices are not submitted for any hour for either market, then the values are treated as the quantity zero (0).

DRRs-Type II may submit up to three MW/Price pairs for its Off-Line Short-Term Reserve Offers. 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 values are accepted to the 10th of a MW and the Offer values from $0 to $100. The MW/Price pairs must be monotonically increasing for price and strictly increasing for MW.

4.2.3.2.5 Start-Up Offers and No-Load Offers

The Cold Start-Up Offer, Intermediate Start-Up Offer and Hot Start-Up Offer may be submitted as part of the default Offer and then overridden on a daily basis for both Day-Ahead and Real-Time Schedule Offers. The No-Load Offer may be submitted as part of the default Offer and then overridden on an hourly basis for both Day-Ahead and Real-Time Schedule Offers. The Start-Up Offer and No-Load Offer are used in conjunction with Energy Offer Curves, Operating Reserve Offers, Off-Line Short-Term Reserve Offers and the Commitment and Dispatch Operating Parameters Offer data in the commitment and dispatch tools to determine the optimum commitment for the Day-Ahead Energy and Operating Reserve Market and the Real-Time Energy and Operating Reserve Market to meet the Energy and Operating Reserve requirements. The Real-Time Energy and Operating Reserve Market Start-Up Offers and No-Load Offers may be modified at any time prior to 1430 EPT (OD-1) for consideration in the pre Day-Ahead RAC. The Start-Up Offers may be only one value for each type of Start-Up for the day whereas the No-Load Offers may vary for each hour of the day. If a Resource was started more than once per day during the commitment, each start would be considered separately.

4.2.3.3 Commitment Operating Parameter Offer Data

The Resource Offer parameters shown in Exhibit 4-7 associated with the starts, run time, and down time used in Day-Ahead Energy and Operating Reserve Market and RAC commitment and dispatch decisions are described in Exhibit 4-9.

Exhibit 4-9: Generation Resource and DRR-Type II Commitment Offer Parameters

Parameter	Validation	Use
Condition Times	The Hot to Cold Time and the Hot to Intermediate Time can only be submitted as part	The Hot to Cold Time and the Hot to Intermediate time are used in evaluating commitment in the Day-Ahead

Parameter	Validation	Use
	of the Day-Ahead and Real-Time Schedule Offer. The times are submitted in hh:mm format. The time prior to the Hot to Intermediate Time is considered as Hot.	Energy and Operating Reserve Market commitment and the Real-Time Energy and Operating Reserve Market RAC. These parameters determine the Start-Up costs as a function of the unit state.
Start-Up Notification Times	The cold Start-Up Notification Time, intermediate Start-Up Notification Time and hot Start-Up Notification Time parameters are 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.	The notification times are used in evaluating the commitment in the Day-Ahead Energy and Operating Reserve Market and the Real-Time Energy and Operating Reserve Market. These parameters, in conjunction with the associated Start-Up Times establish the time required to start the unit from the applicable unit state of hot, intermediate, or cold.
Start Times	The cold Start-Up Time, intermediate Start-Up Time, and hot Start-Up Time parameters are submitted as part of the Day-Ahead and Real-Time Schedule Offer. These times are accepted in hh:mm format.	The cold Start-Up Time, intermediate Start-Up Time, and hot Start-Up Time are used in evaluating commitment in the Day-Ahead Energy and Operating Reserve Market and the Real-Time Energy and Operating Reserve Market. These parameters, in conjunction with the associated Notification Times establish the time required to start the unit from the applicable unit state of hot, intermediate, or cold.
Minimum Run Time	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.	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 Minimum Run Time. Commitment times may be for greater than the Minimum Run Time if a Resource is economic for additional hours.
Minimum Down Time	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.	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.
Maximum Run Time	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.	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.
Maximum Daily Starts	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.	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.
Maximum Daily Energy	The Maximum Daily Energy is submitted as part of the Day-Ahead and Real-Time Schedule Offer, in MWh.	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.

Parameter	Validation	Use
Maximum Daily Regulation Up Deployment	The Maximum Daily Regulation Up Deployment is submitted as part of the Real-Time Schedule Offer, in MWh, and is only applicable to DRR-Type II resources.	The Maximum Daily Regulation Up Deployment is the maximum MWh a Resource is able to deploy as Regulation Up over a 24 hour Operating Day in the Real-Time Energy and Operating Reserve Market.
Maximum Daily Regulation Down Deployment	The Maximum Daily Regulation Down Deployment is submitted as part of the Real-Time Schedule Offer, in MWh, and is only applicable to DRR-Type II resources.	The Maximum Daily Regulation Down Deployment is the maximum MWh a Resource is able to deploy as Regulation Down over a 24 hour Operating Day in the Real-Time Energy and Operating Reserve Market.
Maximum Daily Contingency Reserve Deployment	The Maximum Daily Contingency Reserve Deployment is submitted as part of the Real-Time Schedule Offer, in MWh, and is only applicable to DRR-Type II resources.	The Maximum Daily Contingency Reserve Deployment is the maximum MWh of Contingency Reserves 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 Resource parameters used for commitment purposes are provided below along with a graphical representation of how they tie together as depicted in Exhibit 4-10:

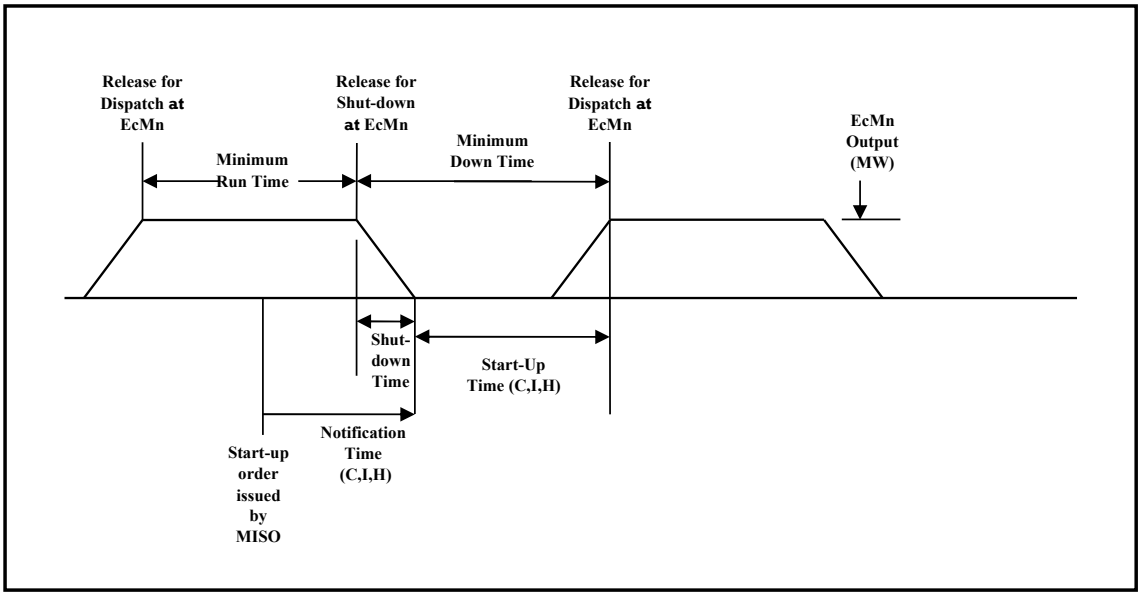
- ***Start-Up Notification Time*** – The amount of notification time required by a Generation Resource prior to the initiation of start-up procedures or the amount of notification time required for a DRR - Type II prior to the initiation of demand reduction procedures. The minimum time required prior to receiving an order from MISO to initiate start-up procedures. Three different Start-Up Notification Times (hot, intermediate, and cold) can be submitted to allow the MP to reflect the difference in the length of time for each condition. For an off-line Quick Start Resource with cleared Contingency Reserve, the Notification Time is assumed to be zero for Contingency Reserve deployment purposes. Submitted notification times cannot exceed 23 hours, 59 minutes.
- ***Start-Up Time*** – The number of hours required to start a Generating Resource or DRR Type - II and synchronize with the MISO Region to Hourly Economic Minimum Limit consistent with the Applicable Reliability Standards. Three different Start-Up Times (hot, intermediate, and cold) can be submitted to allow the MP to reflect the difference in the length of time for each condition. For an off-line Quick Start Resource with cleared Contingency Reserve, the Start-Up Time is assumed to be zero for Contingency Reserve deployment purposes.

  Minimum Run Time – The minimum number of hours of operation at or above Hourly Economic Minimum Limit that the Resource owner requires MISO to recognize when committing the Resource. The Minimum Run Time applies from the point where the

Resource is scheduled to be released for dispatch to MISO from Hourly Economic Minimum Limit to the point where MISO releases the Resource for shut down from Hourly Economic Minimum Limit. MPs should exclude the Start-Up Time and Shut-Down Time (as defined in Exhibit 4-10) from the Minimum Run Time to ensure the software recognizes the constraints described by all of the Resource parameters on cycling the Resource in the commitment process. Resources clearing in the DAM or committed in the RAC will have schedules for consecutive hours that are equal to or greater than the Minimum Run Time. For a Quick Start Resource with cleared Contingency Reserve, the Minimum Run Time must be 3 hours or less.

- ***Minimum Down Time*** – The minimum number of hours that the Resource owner requires between the time the Resource is released for shutdown by MISO and the time the Resource is scheduled to be released for dispatch to MISO. MPs should include the Shut-Down Time and the Start-Up Time (as defined in Exhibit 4-9) in the Minimum Down Time to ensure the software recognizes the constraints described by all of the Resource parameters on cycling the Resource in the commitment process. Resources clearing in the DAM or committed in the RAC will have schedules that do not violate the Minimum Down Time.

Exhibit 4-10: Generation Resource & DRR-Type II Operation Timeline



4.2.3.4 Dispatch Operating Parameter Offer Data

The Resource Offer parameters shown in Exhibit 4-7 associated with the Generation Resource and DRR-Type II 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.

4.2.3.4.1 Dispatch Limits and Ramp Rates

There are three sets of overall 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 Limits, Hourly Regulation Minimum and Maximum Limits and Hourly Emergency Minimum and Maximum Limits.[19] 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 the Hourly Regulation Minimum Limit, which must be greater than or equal to the Hourly Economic Minimum Limit which must be greater than or equal to the Hourly Emergency Minimum Limit. A DRR-Type II may submit dispatch limits less than zero and cover a negative operating range to reflect an associated load when not providing demand response. Additionally, there are three ramp rate options that can be submitted.

Exhibit 4-11 portrays the relationship between the normal and emergency dispatch limits and normal and Regulation limits.

[19] Dispatchable Intermittent Resources do not submit Hourly Economic, Regulation, or Emergency Maximum Limits as part of the Real-Time Schedule Offer data. See Section 4.2.3.4.2 for more information on DIR Forecast Maximum Limit.

Exhibit 4-11: Dispatch Limits

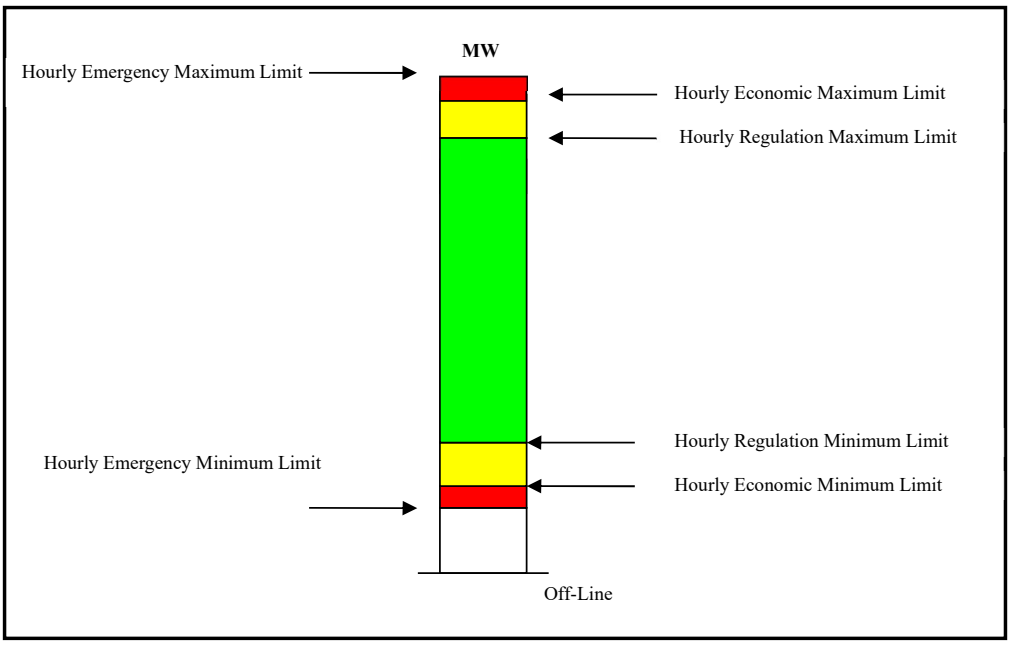


Exhibit 4-12 describes the use and validation of each of the ramp rates and limits.

Exhibit 4-12: Overall Ramp Rate and Limit Use

Limit	Validation	Use
Hourly Bi-Directional Ramp Rate or Bi-Directional Ramp Rate Curve	An Hourly Bi-Directional Ramp Rate may be submitted as part of the Real-Time Schedule Offer to override the default value. A Bi-Directional Ramp Rate Curve may also be submitted as part of the Real-Time Schedule Offer. If the Curve is submitted, it will always override the Hourly value.	The Hourly Bi-Directional Ramp Rate or the Bi-Directional Ramp Rate Curve is only applicable for use in real-time and will apply to Resources 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.
Hourly Single-Directional-Up Ramp-Up or Single-Directional-Up Ramp-Rate Curve	An Hourly Single-Directional-Up Ramp Rate may be submitted as part of the Real-Time Schedule Offer to override the default value. A Single-Directional-Up Ramp Rate Curve may also be submitted as part of the Real-Time Schedule Offer. If the Curve is submitted, it will always override the Hourly value.	The Hourly Single-Directional-Up Ramp Rate or the Single-Directional-Up Ramp Rate Curve is only applicable for use in Real-Time and will apply only to Resources not scheduled to potentially provide Regulating Reserve 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 and other reserves that can be cleared on the Resource. Values submitted for The Hourly Single-Directional-Up Ramp Rate or Single-Directional-Up Ramp Rate Curve must be greater than or equal to the values submitted for the Hourly Bi-Directional Ramp Rate or Bi-Directional Ramp Rate Curve.
Hourly Single-Directional-Down Ramp or Single-Directional-Down Ramp Rate Curve	An Hourly Single-Directional-Down Ramp Rate may be submitted as part of the Real-Time Schedule Offer to override the default value. A Single-Directional-Down Ramp Rate may also be submitted as part of the Real-Time Schedule Offer. If the Curve is submitted, it will always override the Hourly value.	The Hourly Single-Directional-Down Ramp Rate or Single-Directional-Down Ramp Rate Curve is only applicable for use in Real-Time and will apply only to Resources not scheduled to potentially provide Regulating Reserve 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 or Single-Directional-Down Ramp Rate Curve must be greater than or equal to the values submitted for the Hourly Single-Directional-Up Ramp Rate or Single-Directional-Up Ramp Rate Curve.
Hourly Ramp Rate	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.

Limit	Validation	Use
Hourly Economic Minimum Limit	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.	The Hourly Economic Minimum Limit designates the minimum 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 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.
Hourly Economic Maximum Limit	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.	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
Hourly Regulation Minimum Limit	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 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.
Hourly Regulation Maximum Limit	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 Resource can operate while scheduled to potentially provide Regulating 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.

Limit	Validation	Use
Hourly Emergency Minimum Limit	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.	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.
Hourly Emergency Maximum Limit	The Emergency Maximum 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 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.

4.2.3.4.2 DIR Forecast Maximum Limit

Since they are fuel-forecast dependent, Dispatchable Intermittent Resources ("DIRs") do not offer Hourly Regulation, Economic, or Emergency Maximum Limits to the Real-Time Energy and Operating Reserve Markets. Instead, each DIR submits a forecast of its maximum capability in Real-Time, via the MUI.

The participant-generated forecast is submitted on a rolling basis for a single DIR CPNode. The time-points of the data being submitted should align with each of the next twelve UDS interval times: (that is, they should end in 00, 05, 10, 15, 20, 25, 30, 35, 40, 45, 50, or 55). The earliest forecast point being submitted must be less than ten minutes beyond the time at which the data is submitted. For example, if a forecast is being submitted at time 11:27, then the earliest forecast point in the submittal must be either 11:30 or 11:35. If the earliest forecast point in the submittal is 11:40, then the submittal will not be accepted. Requiring the first forecast time to be less than ten minutes from the submittal time ensures that each UDS interval will have an updated forecast for that interval. The forecast submittal allows for submission of at least one and no more than twelve time-quantity pairs per submission. It is important to submit *more than two* data pairs with each forecast submittal. If only two forecast data points are provided with each submittal, it is possible for each submitted forecast to be received too late for MISO to utilize in the five-minute dispatch cycle. Each participant should make a determination of how frequently to submit twelve-part forecasts, given the nature of the fuel-forecast of their DIR. Forecast submissions should be made more frequently than every twenty minutes, since a forecast received more than 30 minutes

prior to the UDS interval end-time will not be used, as shown below in the hierarchy for determining the Forecast Maximum Limit[20]:

- Operator Override, as provided by the DIR Resource Asset Owner will be used as the Forecast Maximum Limit;
- If no override is in place, then the Real-Time capability forecast as provided by the DIR Asset Owner, will be used as the Forecast Maximum Limit;
- If the Real-Time capability forecast submitted by the DIR Asset Owner is not provided, or is submitted to the MUI more than 30 minutes prior to the UDS interval end-time, or the value submitted is larger than the Resource's DIR Feasibility limit times a technical margin, then the Real-Time capability forecast generated by MISO will be used as the Forecast Maximum Limit[21];
- If the Real-Time capability forecast generated by MISO is not provided, or is generated more than 30 minutes prior to the UDS interval end-time, or the value is larger than the Resource's DIR Feasibility limit times a technical margin, then the most recent State Estimated output for the DIR will be used as the Forecast Maximum Limit.

It is expected that a participant-forecast submittal frequency of two and a half to five minutes will be sufficient to adequately capture the changing fuel-forecast of a DIR.

The DIR Feasibility limit described above is submitted by each DIR Asset Owner during the quarterly model process, and is used to validate the quality of each submitted forecast. It is a measure of the maximum potential capability of the DIR at the CP-Node level, taking into account any incremental increases in Resource capability that may take place over the course of a quarterly model. By incorporating a check against this feasibility limit, a faulty submission larger than the feasible maximum will be discarded. MISO will increase each submitted feasibility limit by a small percentage, referred to as the technical margin in the description above, to ensure that only faulty data submissions are discarded in this way. For example: if a Resource with a DIR

[20] For more information regarding the submission of the participant-forecast, please see the latest Market User Interface API *Specification*

[21] An option exists, that, when enabled, causes the forecast generated by MISO to be influenced by the State Estimated resource output. That is, if the option is enabled, then the greater of state estimated output and MISO's forecast will be used. This option ONLY affects intervals if activated, and ONLY when the MISO forecast is to be used, and not intervals when the participant-provided forecast is to be used.

Feasibility Limit of 100MW submits a forecast of 102MW, the forecast will not be rejected. But if the Resource submits a forecast of 130MW, the forecast will be rejected.

MISO does not generate a Real-Time capability forecast for non-wind DIR Resources. For non-wind DIRs that do not submit a capability limit to be used as the Forecast Maximum Limit, the most recent State Estimated output for the DIR will be used as the Forecast Maximum Limit.

The Real-Time capability forecast generated by MISO is available to the Asset Owner of each wind-fueled DIR and/or Intermittent Resource, via the MUI. The capability forecast is provided to allow each DIR Asset Owner the information necessary to determine whether or not to submit a Real-Time capability forecast, and to allow owners of Intermittent Resources to gauge MISO's capability forecast when considering a transition to Dispatchable Intermittent Resource. For more information on accessing the MISO Real-Time forecast, please see the latest *Market User Interface – API Specification.*

4.2.3.4.3 Intermittent Resource and DIR Day-Ahead Forecast

For reliability purposes, and in accordance with the Tariff, each Intermittent Resource and Dispatchable Intermittent Resource must submit to the Transmission Provider a Day-Ahead Forecast of its intended output for the next day. The Day-Ahead forecast is not financially binding on the Resource.

MISO provides a non-financially binding DIR and Intermittent Resource Reliability Forecast submittal process through which Asset Owners can submit forecasts of the expected output of their Intermittent Resources and/or DIRs. Day-Ahead Forecasts are communicated to MISO via the MUI, by accessing the "Submit IR Forecast" submittal. Day-Ahead Forecast data must be submitted by 1700EST on the day prior to each Operating Day. For technical information regarding the Day-Ahead reliability forecast, please see the latest Market User Interface API Specification.

The following processes make use of the Day-Ahead Forecast:

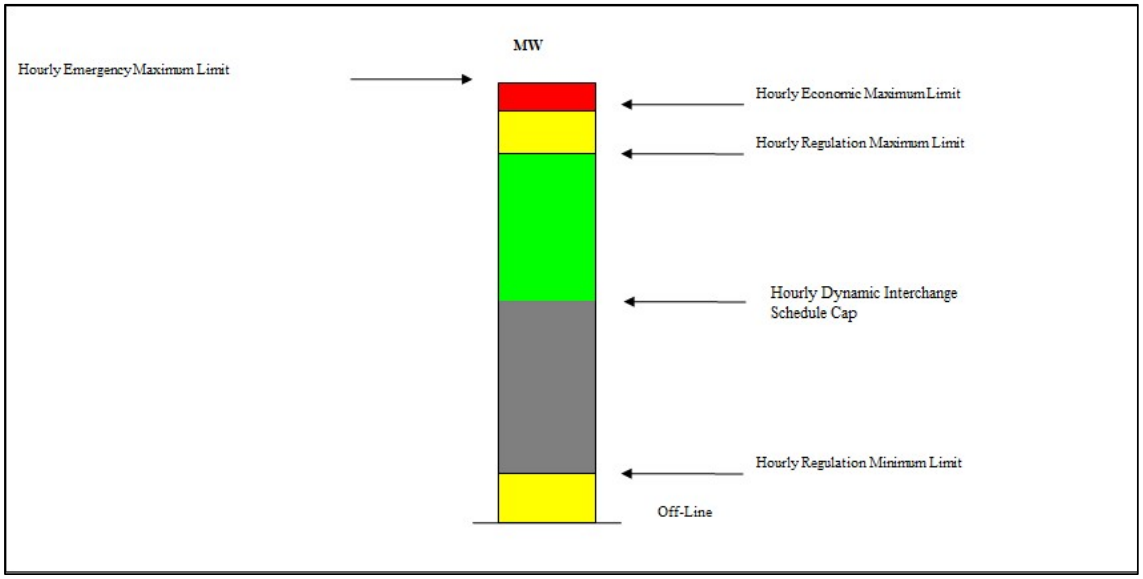
- At the discretion of MISO, the Day-Ahead Forecast may be included in part or in whole into the Next-Day RAC, Multi-Day RAC and Intra-Day RAC study processes.
- For Intermittent Resources and DIRs that are designated as Capacity Resources for Module E purposes, the Day-Ahead Forecast is used to measure the Resource's daily

capacity availability. For more information on this process, see the BPM for *Resource Adequacy*.

4.2.3.4.4 Partial Generation Resources associated with Fixed Dynamic Interchange Schedules

Partial Generation Resources associated with a Fixed Dynamic schedule to an external Balancing Authority ("BA") may maintain the remaining capacity associated with the Generation Resource within the MISO BA Area. Any portion of a Generation Resource dynamically scheduled to an external BA is not able to provide Ancillary Services to the external BA. Any capacity above the dynamically scheduled energy to an external BA Area is able to offer to provide Ancillary Services within the MISO BA Area.

Exhibit 4-13: Partial Generation Resources MISO Capacity



4.2.3.4.5 Temperature Sensitive Maximum Limits

Temperature sensitive maximum limits specify MW maximum limits for Combustion Turbines ("CTs") and Combined Cycle CTs as a function of temperature. Temperature sensitive limits are composed of both normal temperature sensitive maximum limits and Emergency temperature sensitive maximum limits. Both normal and Emergency temperature sensitive maximum limits are

comprised of a day-time temperature forecast (hour ending 0700 EST through hour ending 2200 EST)
and night-time temperature forecast (hour ending 2300 EST through hour ending 0600 EST) for an MP specified Weather Point and up to three maximum limit points:

- Temperature Sensitive Maximum Limit Low Point
- Temperature Sensitive Maximum Limit Middle Point
- Temperature Sensitive Maximum Limit High Point

An MP may have one or more Weather Points modeled for one or more units, with each unit pointing to only one Weather Point. Only units modeled through the registration process as CTs and Combined Cycle CTs may submit temperature sensitive maximum limits.

Exhibit 4-14 presents an example of the use of temperature sensitive limits.

Exhibit 4-14: Weather Curve Example