Market Redefinition: Demand Response and Emergency Resources Reforms

RASC-2019-9

January 30, 2025

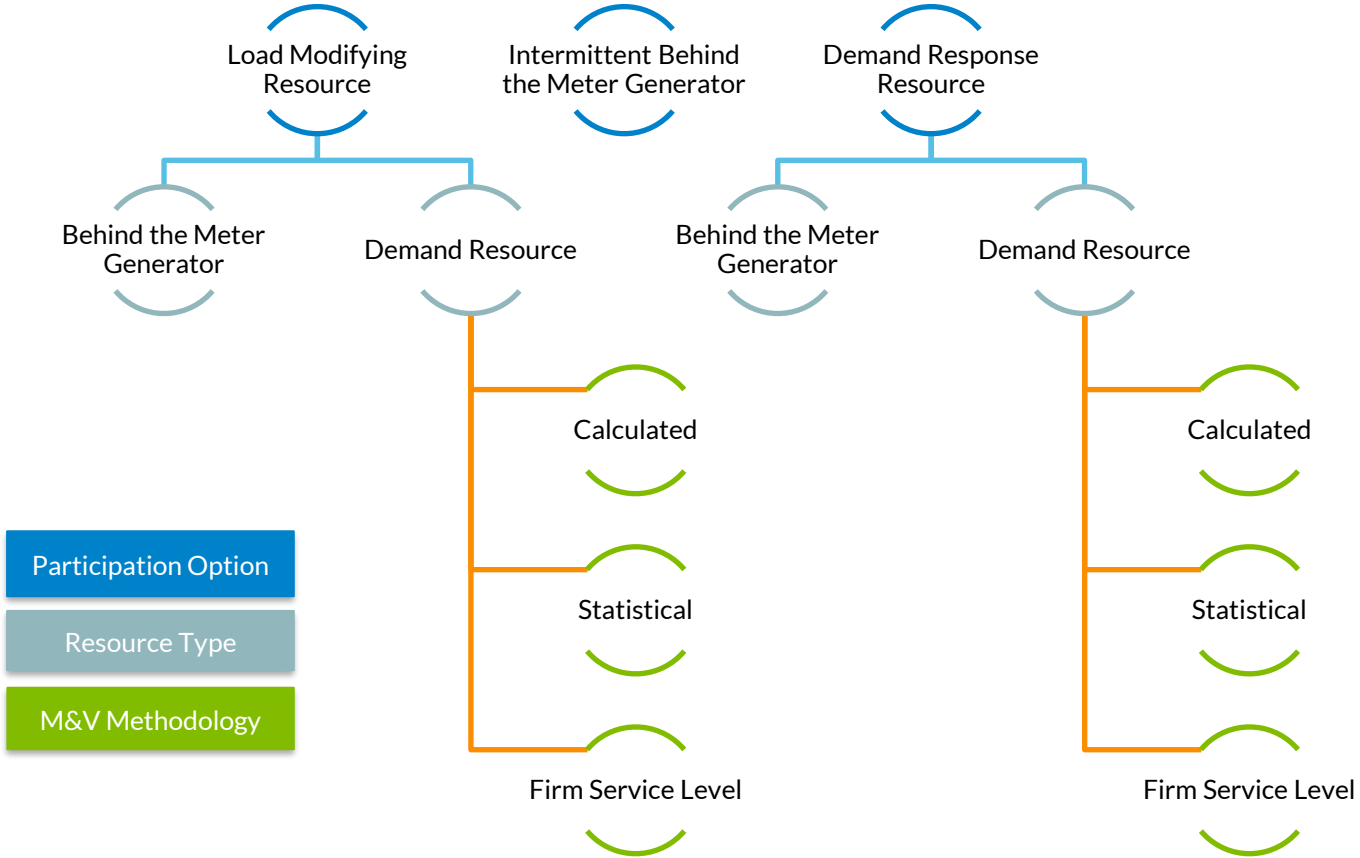
Purpose & Key Takeaways

Purpose: The goal of today's workshop is to provide a detailed walk-through of the proposed reforms and answer any remaining questions regarding the design.

Key Takeaways:

- MISO's proposed reforms are focused on improving the availability, accreditation, and operational effectiveness of Demand Response and Emergency Resources
- MISO has published a revised white paper to provide further clarification and/or rationale on the proposed design elements
- MISO has also extended the feedback deadline to Feb 6, 2025, to allow stakeholders additional time to respond based on the revised white paper and other information presented at today's workshop

Demand Response Overview



Availability

Capacity Availability

- **Definition:** The amount of Energy a DRR or LMR makes available for deployment to MISO in the Real Time horizon.

- **Obligation:** The Market Participant shall, at all times, notify MISO or LBA when the status or availability changes.

- Inaccurate Capacity Availability will negatively impact a resource's accreditation
  - This will be detailed in the Section discussing accreditation

Response Time

- Market Participants will submit a response time at registration
  - This value represents the notification time and shut-down/start-up time required by the resource to deploy

- Response time will be used to determine the order of deployment for LMR Resources
  - It also is what the resource will be tested for and used to determine performance

Capacity Availability is locked in based on the response time of the resource

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

- If a resource has a 3-hour response time, the Capacity Availability that was submitted closest to 3 hours prior to the Hour is used when determining accuracy of submitted Capacity Availability
- The example shows a resource that has had its information updated each hour from 0800 through 1700
- Information submitted after 1400 will not be considered because the deployment decision needs to have been made by 1400 to use this resource by 1700

Capacity Availability Tolerance Band

- In acknowledgement that perfect, accurate availability information may not be possible for some resources, a tolerance band will be used when determining if the submitted Capacity Availability is accurate
- This tolerance band is equal to the response capability as determined by Meter data ± 12%
- Availability below the tolerance band will be considered the true desired response capability of the resource
- Availability above the tolerance band will result in a reduction of capability
- Accurate availability is necessary for the reliable operation of the grid

Capacity Availability Example

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

- In this example, the submitted Capacity Availability is within the Capacity Availability Tolerance Band during all hours except Hour 17.
- In Hour 12, the Capacity Availability is 30 while the true Capability of this resource was ($39.4 - 10 = 29.4$ MW). Because 30 is within 12% of 29.4, this Hour has accurate Capacity Availability submitted.
- In Hour 17, the Capacity Availability is 60, which is outside of the Capacity Availability Tolerance Band, which is ($55.1 - 10 = 45.1$ MW). The consequence of this over reporting the availability is reduction in accreditation. More details are discussed in the accreditation section.

Measurement and Verification

Attachment TT

- Measurement and Verification (M&V) of resources is currently defined in Attachment TT and Module E
  - Moving forward, all M&V will be defined in Attachment TT

- 4 defined types of M&V for Demand Resources
  - Calculated Baseline
  - Direct Load Control
  - Statistical Interval Baseline
  - Firm Service Level

- BTMG is measured using the Metered Generation Baseline

- A Custom Baseline may be used when the above are inappropriate

Selecting an M&V

- Market Participants select an M&V methodology at registration
  - Documentation supporting the efficacy of this methodology is required
- Resources selecting the Calculated Baseline commit to being capable of reducing *by* the submitted Capacity Availability regardless of how much Demand is being consumed.
- Resources selecting the Firm Service Level Baseline commit to being capable of reducing *to* the specified amount regardless of how much Demand is being consumed.
- The Direct Load Control and Statistical Interval Baselines are used by large aggregations (> 100 assets)

Calculated Baseline

- Resources committing to reduce *by* a set amount when deploying
- Demand Resources that are not a large aggregation, and are not using Firm Service Level baseline, will use this methodology
- A resource using a Calculated Baseline must provide information regarding how the program achieves its demand reduction, the size of the asset, and other information

Firm Service Level Baseline

- Resources commit to reduce *to* a set amount when deploying
- **Definition:** The amount of customer Demand, in MW, that is not participating as a demand resource.
- Market Participants selecting the Firm Service Level Baseline have an obligation to reduce Demand *to* the Firm Service Level, regardless of how much Demand is being consumed
  - MPs using the FSL Baseline must provide contract information with the asset owner verifying that a FSL is appropriate for this resource

Statistical M&V Methodologies

- Resources comprised of an aggregation of at least 100 assets
- Two types of Statistical M&V
  - Direct Load Control – Used by aggregations who are not interval metered
  - Statistical Interval Baseline – Used by aggregations who are interval metered
- Documentation that must be submitted is oulined in Attachment TT

Metering Requirements

- MISO will require all demand resources to submit meter data for each Hour of the Season

- Resources registering with a response time of less than 1 hour will be required to submit 5-minute meter data around deployments to verify the resource deployed within the registered response time

- Data will be used to audit a resources registered values, measure performance of the resource, identify any problematic behaviors, and accredit resources

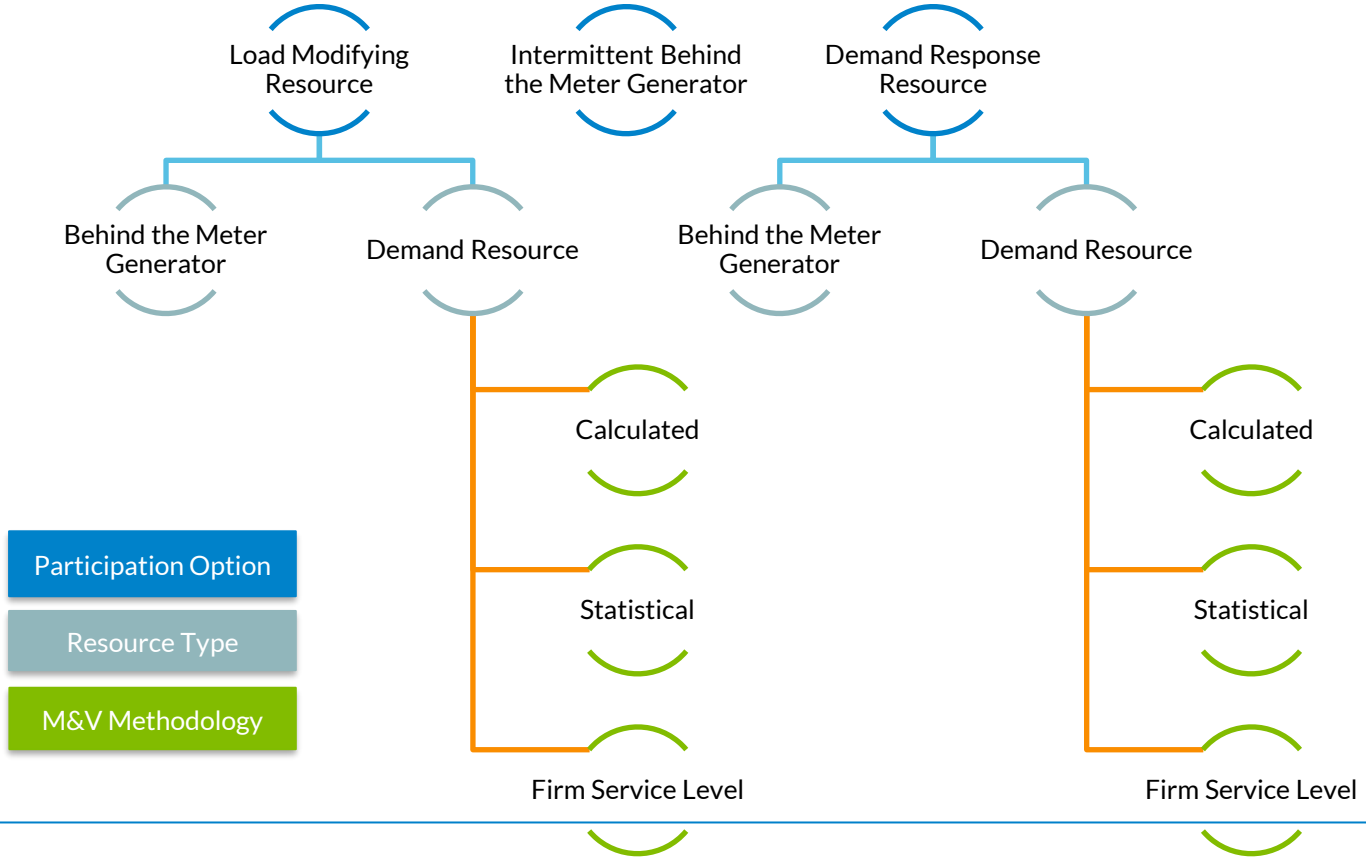
Coffee/Water Break

- Please take some time to grab a beverage and stretch your legs.
- Return in 10 minutes



Accreditation

Accreditation based on resource type



Capacity At Risk Hours

- Demand resources have an obligation to participate during Emergencies
- **Definition:** Capacity At Risk Hours are Hours during which a Capacity Advisory, Maximum Generation Alert, Maximum Generation Warning, Energy Emergency Alert Stage 1 (EEA1), EEA2, or EEA3 is declared.
- MISO provides public notification when these Hours are occurring by making the appropriate declaration
- These Hours represent when the system is at highest risk of requiring these resources to perform justifying accrediting these resources during these Hours

Resource Adequacy Hours

- Defined in Schedule 53/53A
- These Hours represent the Hours during which the system is at its lowest Operating Margin or is in an Emergency declaration
- Most Seasons experience 65 Resource Adequacy (RA) Hours
  - Only Seasons which have long duration Emergencies declared will have more
  - A Season may experience fewer than 65 RA Hours when there are few to no Emergency declarations and the Operating Margin remains high

Hours Used

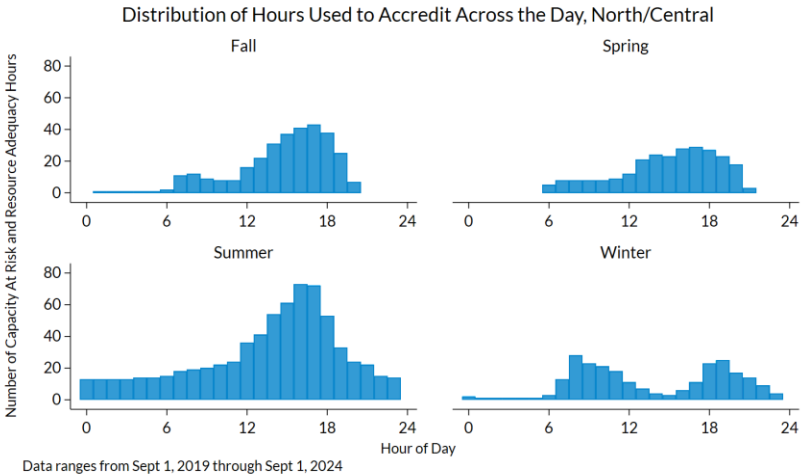
- Emergency Only Resources (AME Resources), BTMG, and DR will receive accreditation during all Hours that are either Capacity At Risk Hours or Resource Adequacy Hours

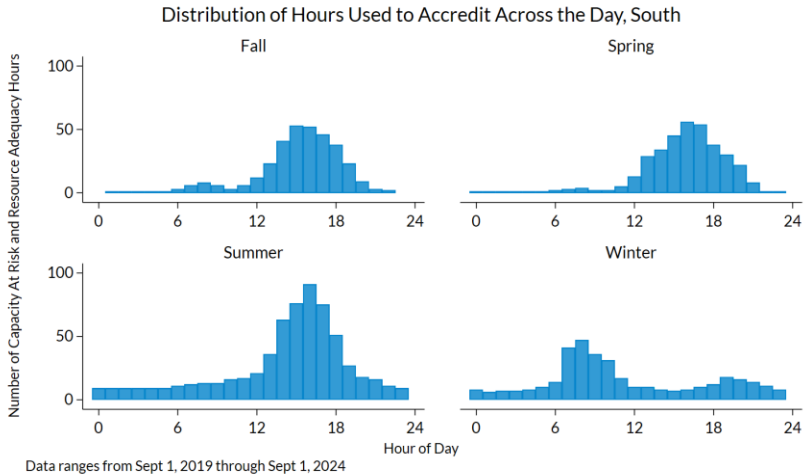
- Intermediate Behind the Meter Generation will receive accreditation during all Hours of a Season

- These Hours reflect when the resource will be used or are highly correlated with times when Emergencies are most likely to occur providing an accurate measure of what the resources expected performance will be when needed

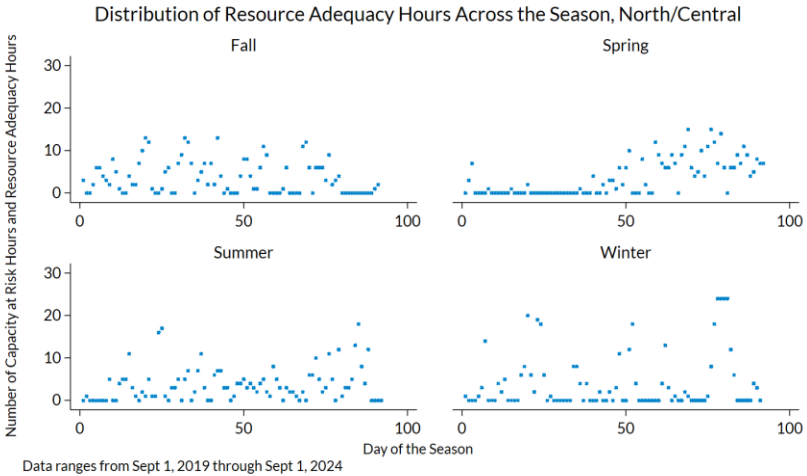
BTMG: Behind The Meter Generation DR: Demand Resource

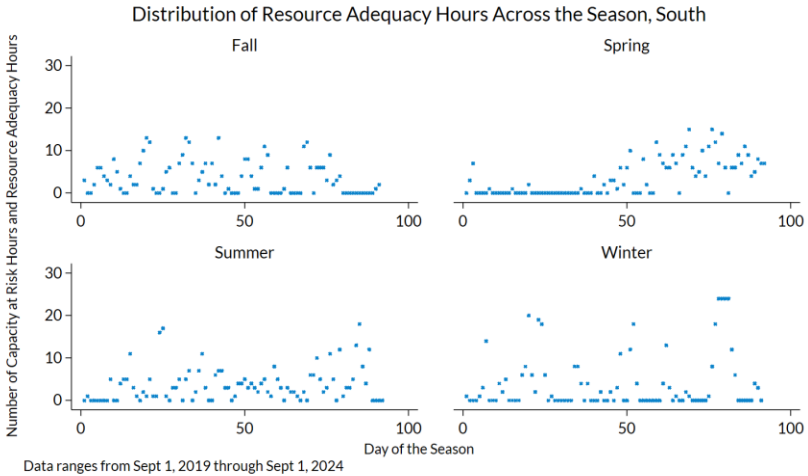
Distribution of Hours across a day





Distribution of Hours across a Season





Seasonal Emergency Hour Deficiency

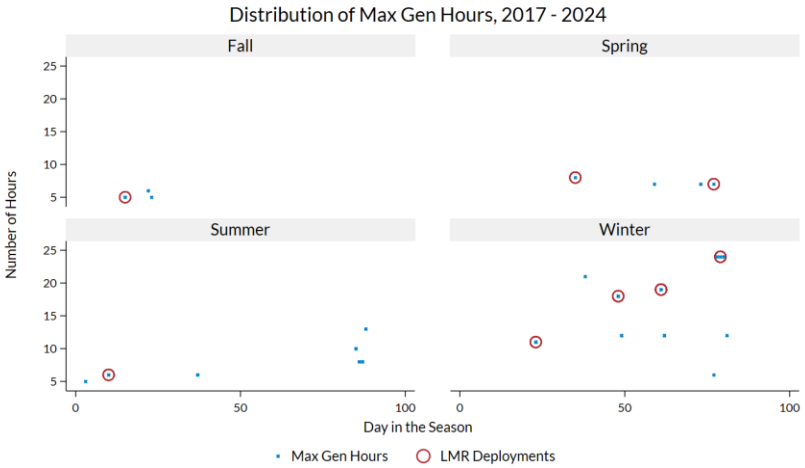
- Occurs when there are fewer than 65 total Hours that are Capacity At Risk hours or Resource Adequacy Hours within a Season
- The shortfall will be made up using a M&V specific methodology to ensure each Season is accredited using at least 65 Hours to accredit this resource
- Resources that are disqualified prior to there being 65 Hours will be treated as if a Seasonal Emergency Hour Deficiency existed

Lookback Period

- The most recent period from September 1st through August 31st will be used to accredit BTMG and Demand Resources

- The most recent three periods from September 1st through August 31st will be used to accredit AME Resources and Intermittent BTMG

Why a one-year lookback is preferred



- MISO uses a 1 day in 10 reliability standard, therefore:
  - Capacity Emergencies are rare events in MISO
  - LMR deployments are even more infrequent
  - Not all LMRs are issued Scheduling Instructions when LMR deployments are performed
- LMRs may go years between deployments, collecting Capacity payments in each year
- A one-year lookback sends very strong signals to these resources to perform
- Spreading accreditation over a three-year period significantly reduces this signal strength

AME Resources

- AME Resources are Generation Resources that have selected a commitment status of available during Emergencies only
- A Resource (Schedule 53A) becomes an AME Resource (Schedule 53B) when it takes Emergency Commitment status in 110 Hours in Day Ahead OR Real Time during a Season
- Resources may be Schedule 53A Resources in some Seasons and 53B in others and may switch from one Planning Year to the next
- To receive accreditation an AME Resource must have a response time (Start-Up Notification Time + Start-Up Time) of less than or equal to six hours

Generation Resources vs AME Resources Accreditation

- Because an AME Resource may switch back and forth between Schedule 53A and Schedule 53B, a three-year lookback will be used
- Instead of using all Hours of a Season in the ISAC portion of accreditation, only Hours that are Capacity At Risk Hours or Resource Adequacy Hours will be considered
- The Resource's submitted Offer is used to accredit these Resources
- An AME Resource is assigned a Resource Class, but is not eligible for Planned Outage Exemptions and so will not be included in the determination of the Resource Class values
- Other than these caveats, AME Resources are accredited identically as a Schedule 53A Resource

Capability Logic

- Capability answers the questions:
  - What could the resource have provided had it been deployed?
  - How to accredit a resource that has deployed?
- Generator analog to Capability is the Offer that these resources submit
  - Generators may or may not operate at full offer, but are accredited based on their offers
- Capability varies by M&V method
- Each hour has a Capability value

Capability of DRR and LMR backed by BTMG

- When operating, Capability is the amount of Energy that is Metered plus any amount of Capacity Availability submitted
  - This will be capped at the GVTC of the resource
- When not operating, Capability is the Capacity Availability submitted
- While a BTMG is operating, it may adjust its Capacity Availability in real-time to reflect its ability to reduce additional Demand

BTMG Resource Class

- All BTMG will be assigned to a Resource Class using the same criteria of Schedule 53A
  - Based on information submitted through GADS and to the EIA and as set forth in BPM-11
- Market Participants may dispute the assignment of a Resource Class as described in Schedule 53A
- BTMG will not be used to perform the Resource Class level calculations
  - Excluding these resources prevents under accrediting in front of the meter generation

BTMG Accreditation

- ISAC is calculated by averaging Capability over all Hours that are Capacity At Risk Hours and Resource Adequacy Hours

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

- ISAC is then scaled by the Resource Class level UCAP and ISAC values

- This value is grossed-up by line losses when appropriate to determine the final SAC value for a BTMG

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

BTMG Accreditation Example

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

- RA indicates a Resource Adequacy Hour that is not a Capacity At Risk Hour
- Assume: Resource Class UCAP of 8 MW; Resource Class Level ISAC of 9 MW; and line losses of 2%
- ISAC = $\frac{10+10+10+10+10+10+10+58*\left(\frac{8}{9}\right)*10}{65} = 9\ MW$
- SAC = $9 * \frac{8}{9} * 1.02 = 8.2\ MW$

Differences Between AME Resources and BTMG

- A BTMG uses a one-year lookback while an AME Resource uses a three-year lookback

- This is justifiable for the following reasons:
  1. AME Resources retain a Day Ahead must offer obligation
  2. MISO has significantly more visibility into an AME Resource than it does a BTMG
  3. To prevent an AME Resource's accreditation from experiencing significant shifts in accreditation caused by switching between a three-year and a one-year lookback period
  4. Most BTMG units do not qualify under NERC Reliability standards

Intermittent BTMG Accreditation

- Intermediate BTMG (IBTMG) uses all Hours of the Planning Year
- Hours are weighted using the same Tier 1 ISAC and Tier 2 ISAC as Schedule 53A Resources
- Resource Class UCAP and ISAC is handled identically as BTMG
- No outage exemptions provided
- Actual meter data is used for each hour

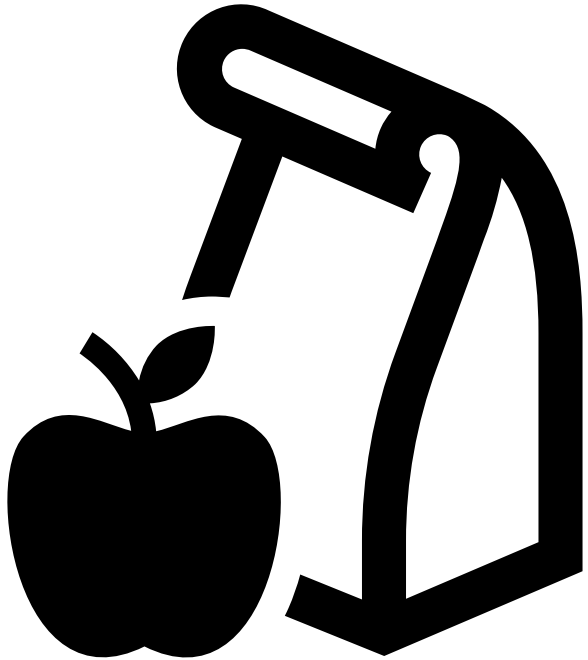
Intermittent BTMG ISAC/SAC

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

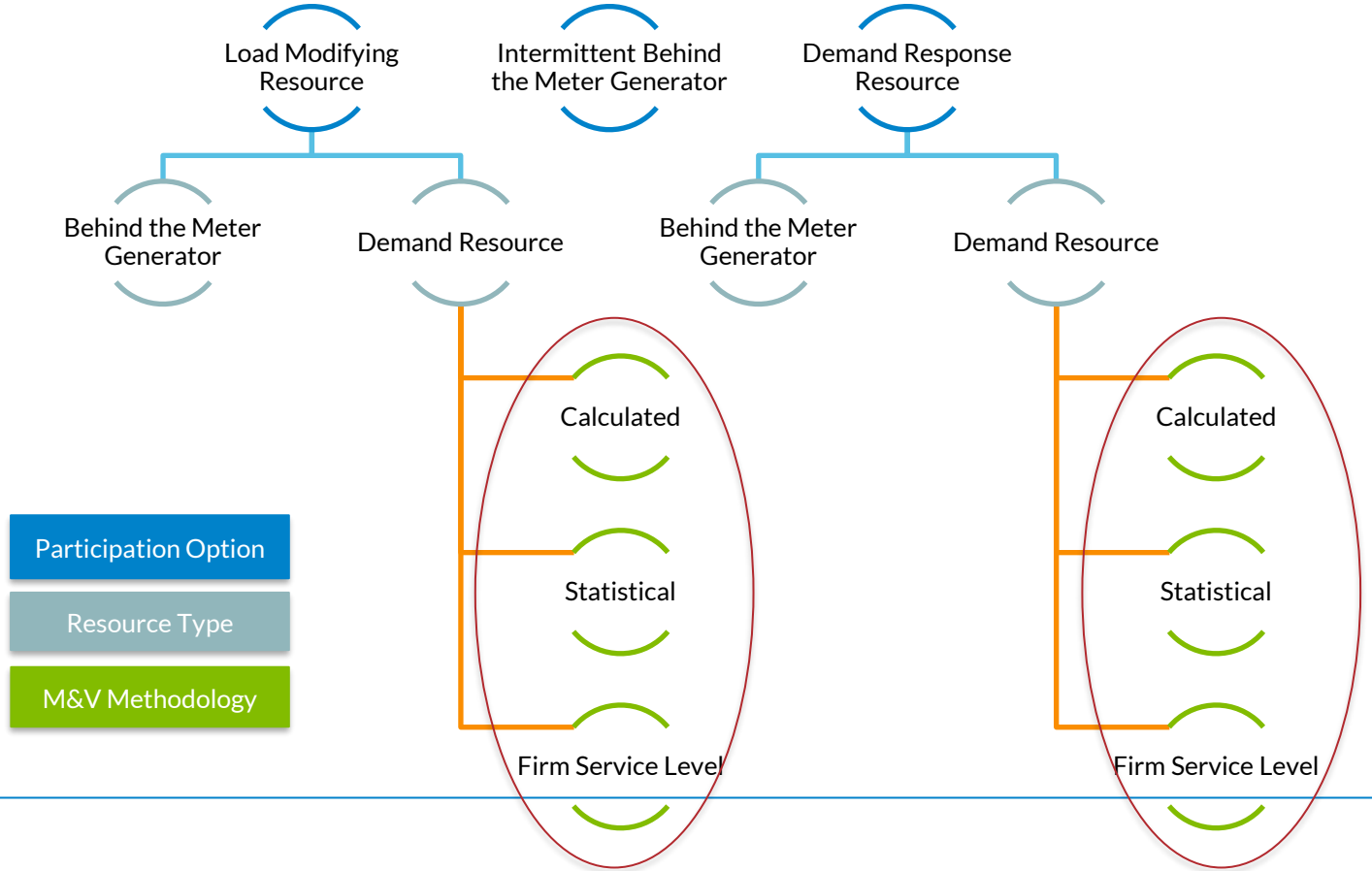
$$SAC = Resource\ Class{-}Level\ UCAP * \frac{Resource\ ISAC}{Resource\ Class{-}Level\ ISAC} * (1 + Line\ Losses)$$

Lunch Break

- Please take some time to grab lunch and move around.
- Return in 30 minutes



Accreditation based on resource type



Accreditation of Demand Resources

- Demand Resources may participate as a DRR or LMR

- The Measurement and Verification procedure used distinguishes these types of Demand Resources
  - Calculated Baseline
  - Firm Service Level Baseline
  - Statistical Demand Resource
    - These are either Direct Load Control or Statistical Interval methods

Capability of a Calculated M&V Demand Resource

- A Demand Resource using a Calculated Baseline methodology commits to providing a specific amount of demand reduction

- Capability of a Demand Resource using the Calculated Baseline methodology:
  - Capacity Availability if Demand is at least the stated Capacity Availability
  - Zero if Demand is below the Capacity Availability
  - When deployed, the Capability will be the Scheduling Instruction Capability for the Hours during the Scheduling Instruction, during Hours covered by the response time, and for one Hour after the Scheduling Instruction ends
    - This ensures a resource receives its fair accreditation while the resource is deploying, while deployed, and while coming back online
  - While Self Scheduled, Capability is the amount Self Scheduled
    - A calculated Demand Resource may not Self Schedule and make additional capacity available for the same hour
  - These figures are capped at the registered Capacity Rating

Capacity Rating: The maximum amount of Energy a DRR or LMR registers as available for deployment to MISO.

Calculated Baseline Capability Example 1

					RA			RA			Capacity At Risk Hours				
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Registered Capacity Availability	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Metered Output	6.0	6.6	9.7	6.2	9.8	5.8	2.2	1.2	2.1	1.6	10.3	10.3	9.5	6.4	2.4
Demand ≥ Input							NO	NO	NO	NO					NO
Capacity Availability	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.4	2.5	2.2	3.0
Capability	-	-	-	-	3.0	-	-	0.0	-	-	3.0	2.4	2.5	2.2	0.0

- During Hour 12, the Demand being consumed is greater than the registered Capacity Availability, so Capability is 3 MW
- During Hour 15, the Demand is less than the stated Capacity Availability, so Capability is 0
- During Hours 18 through 22 a Capacity At Risk period exists, Capability is equal to the submitted Capacity Availability unless Demand is below the Capacity Availability
  - Resources may be subject to performance penalties when submitting inaccurate Capacity Availability

Calculated Baseline Capability Example 2

3 MW Capacity Rating					Capacity At Risk Hours										
						SI Issued			For Hour 16						
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Metered Output	6.0	6.6	9.7	6.2	9.8	5.8	2.2	1.2	2.1	1.6	4.2	5.4	9.5	6.4	2.4
Capacity Availability	3.0	3.0	3.0	3.0	3.0	2.8	2.4	2.9	3.0	3.0	3.0	2.4	2.5	2.2	3.0
Final Capability	-	-	-	-	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.5	2.2	0.0

- In this example, a three-hour response time resource was issued Scheduling Instructions at Hour 13 for Hour 16
- The resource's M&V demonstrates it has achieved at least a 3 MW reduction in Hours 16 through 18; therefore, the resource receives the Capacity Availability for Hours 13 through 19, inclusive
- If a resource submits differing Capacity Availability amounts during the Scheduling Instruction, it will receive the first Scheduling Instruction Hours Capacity Availability for the Hours it is responding, and the last Scheduling Instruction Hours Capability for the Hour after the Scheduling Instruction ends
- If a resource ceases to respond to the Scheduling Instruction; i.e., if the Scheduling Instruction lasts 6 hours and the resource ceases to respond after 4 hours, then the extra Hour after responding will not receive a Capability

Capability of a DR using Firm Service Level

- When operating above the Firm Service Level, Capability is the Demand less Firm Service Level (FSL)
- When Self Scheduling and maintaining Capacity Availability, Capability is the Self Scheduled amount plus amount of Capacity Availability
- When Self Scheduling and not maintaining Capacity Availability, Capability is the Self Scheduled Amount
- When operating at or below the Firm Service Level, Capability is the Seasonal Capability

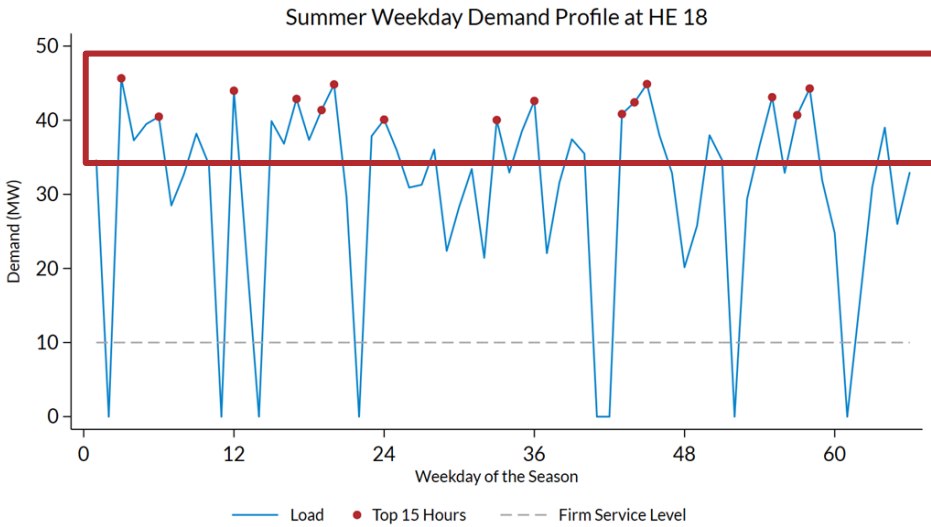
Requirements to Self Schedule

- A resource may receive Capability credit for the Self Schedule under the following circumstances:
  - It is a BTMG that is operating
  - It is a Demand Resource that meets the all of the following criteria:
    - The Self Schedule occurred during a Capacity At Risk Hour
    - The Self Schedule can be verified using the appropriate M&V methodology
    - The Self Schedule was not preceded by an increase in Load
    - The Self Schedule is maintained for at least 4-hours

Seasonal Capability

- Conceptually, a Demand Resource should be accredited based on how much Demand can be reduced at any given Hour
- These resources may be at a low point in their operations when a Capacity At Risk period is occurring
- Seasonal Capability provides an incentive to not bring a large load coming online at a time when the system is already at a low Operating Margin

Seasonal Capability

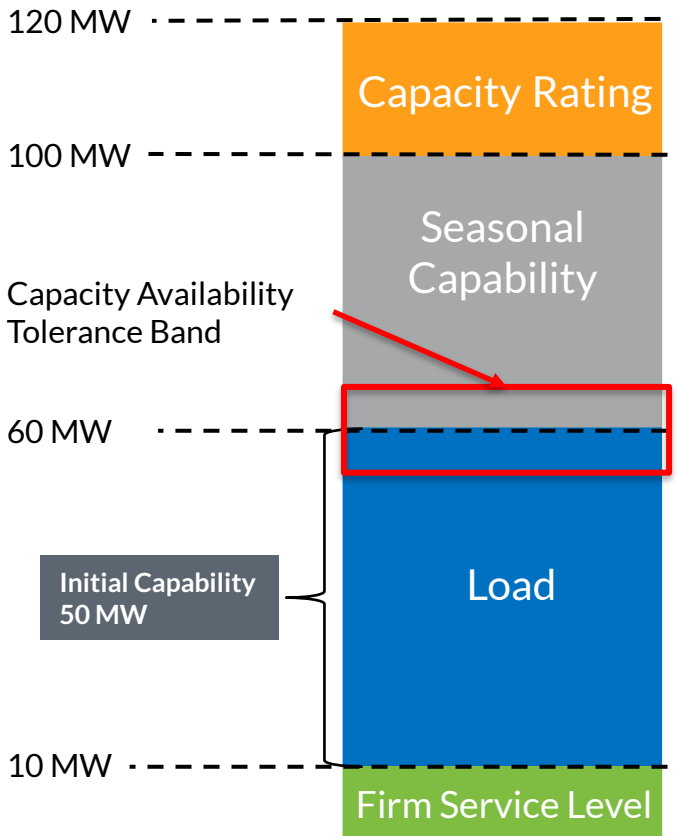


Of the 66 hours, the top 15 are chosen

- The average value becomes the Seasonal Capability for Hour Ending 18, in this case resulting in a Seasonal Capability of 42.5 MW

If there was a Firm Service Level of 10 MW, the Seasonal Capability of this resource for Hour Ending 18 would be 32.5

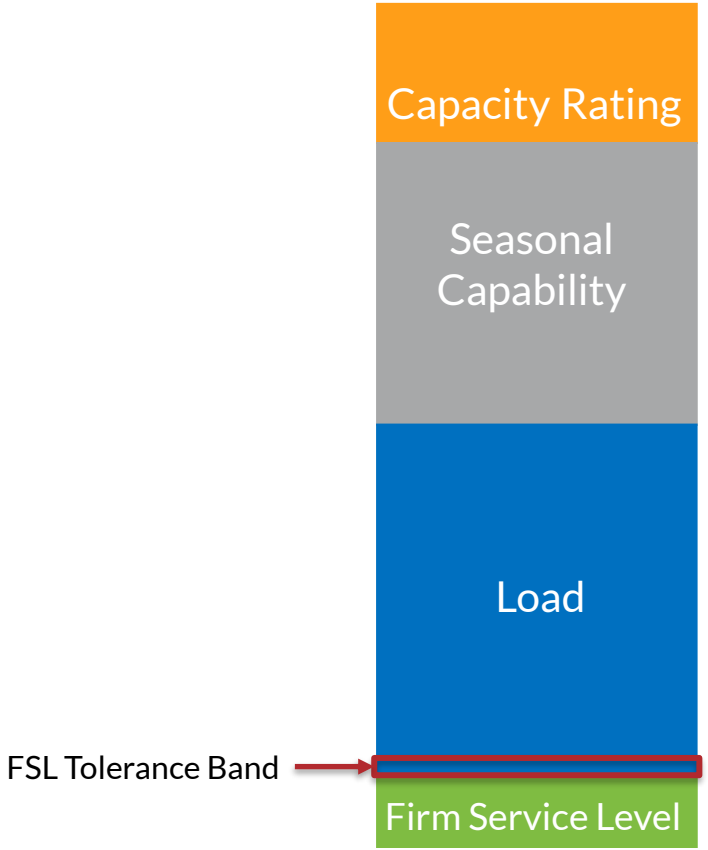
Visual representation of Capability for a FSL DR



- The Capacity Rating of this Resource is 120 MW
- The Seasonal Capability for this Hour is 100 MW
  - Seasonal Capability varies by Hour
- The Initial Capability is 50 MW. If the submitted Capacity Availability is within the Capacity Availability Tolerance Band, the Capability will be 50 MW.
- Seasonal Capability would be used when the resource's Demand is at or below the Firm Service Level

This example represents a single Hour.

Firm Service Level Tolerance Band



- A resource is operating at or below its Firm Service Level when it is within the Firm Service Level Tolerance Band
- This is defined to be within 10% of the Firm Service Level, not to exceed 1 MW.
- The Firm Service Level is used to determine if a resource using the Firm Service Level has achieved its Firm Service Level when determining whether it has met its performance obligation.

Firm Service Level Capability Example 1

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

- When operating above the Firm Service Level, Capability is the Demand less Firm Service Level (FSL)
- Hours 12 and 15 are Resource Adequacy Hours, so the Capability of these Hours contributes towards the resource's accreditation
- Hours 18 through 22 are Capacity At Risk hours, so the Capability of these Hours contributes towards the resource's accreditation

Firm Service Level Capability Example 2

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

- In this example the resource has Self Scheduled 20 MW beginning in Hour 19
- The Self Schedule satisfies the four criteria described above and the resource maintains Capacity Availability for the remaining Demand; therefore, the resource receives a Capability equal to the sum of the Demand less Firm Service Level and the Self Scheduled amount
- For most Firm Service Level, the M&V of a Self Schedule other than to the Firm Service Level is unlikely to provide verification of Self Scheduling per the Calculated Baseline

Firm Service Level Capability Example 3

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

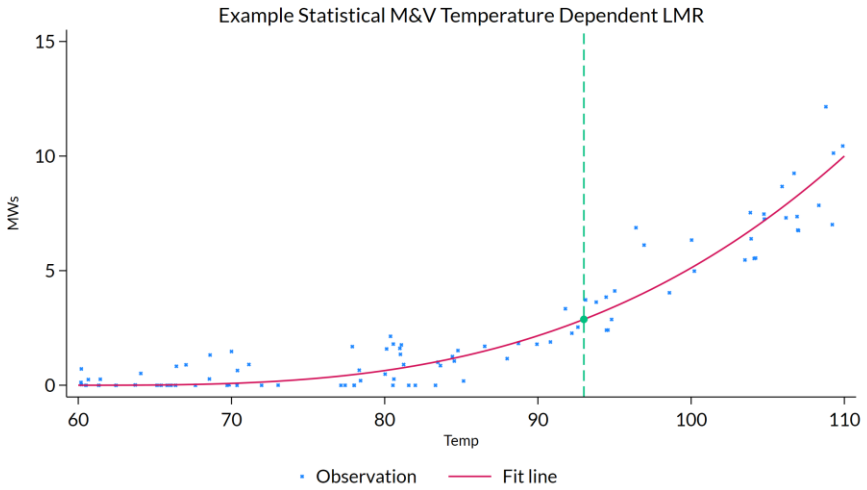
- This is the same example as the previous slide, but without any additional Capacity Availability
- The Self Schedule satisfies the four criteria described above and the resource does not maintain Capacity Availability for the remaining Demand; therefore, the resource receives a Capability equal to the Self Scheduled amount
- For most Firm Service Level, the M&V of a Self Schedule other than to the Firm Service Level is unlikely to provide verification of Self Scheduling per the Calculated Baseline

Firm Service Level Capability Example 4

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

- In this example, a three-hour response time resource was issued Scheduling Instructions at Hour 13 for Hour 16
- The resource achieved its Firm Service Level by Hour 16; therefore, it receives Seasonal Capability from Hour 13 through Hour 19, inclusive
- This ensures the resources Capability reflects what it would have provided had it not been issued Scheduling Instructions
- Each Hour during a Capacity At Risk Hour receives a Capability

Statistical M&V Demand Resource



- During registration, a Demand Resource using a Statistical Measurement and Verification methodology as defined in Attachment TT; i.e., a Direct Load Control or a Statistical Interval Baseline, will be required to submit an expected Demand curve
- In this example, there is a temperature-Demand relationship
- Capability will be determined based on this Demand curve using the parameters submitted by the Market Participant and values of the parameter during Hours that are either Capacity At Risk Hours or Resource Adequacy Hours

Statistical M&V DR Capability Example

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

- During each Hour that is a Capacity At Risk Hour or Resource Adequacy Hour, the temperature (or other relevant parameter) is used to determine from the Demand Curve what the Capability of the resource is
- The MP is responsible for submitting accurate Capacity Availability based on forecasted temperatures

Accreditation for a Demand Resource

- Regardless of the M&V method used, all Demand Resources are accredited using the same procedure
- The ISAC value is calculated by averaging Capability across all Hours that are either Capacity At Risk Hours or Resource Adequacy Hours
- If a Seasonal Emergency Hour Deficiency exists, the Seasonal Emergency Capability is:
  - For a Calculated or FSL DR, the average Load Factor multiplied by the number of deficient Hours is added to the total Capability
  - For a Statistical DR, the Capability from the Season in the prior Planning Year will be multiplied by the number of deficient Hours before being added to the total Capability
- Demand Resources will be grossed-up by Line Losses and the PRMR

Intermediate Seasonal Accredited Capacity of a DR

Number of deficient Hours

Capability

$$ISAC_t = \frac{\sum_h Capability_{t,h} + \max(0, 65 - H) * Seasonal\ Emergency\ Capability^*}{\max(65, H)}$$

Used to create the average

*The white paper ISAC wasn't general for all Demand Resources, this is the correct generalized form.

Example ISAC of a Demand Resource

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

Capability

Number of deficient Hours

$$ISAC = \frac{49.4+49.0+41.4+47.1+41.8+43.3+43.5+58*40}{65}$$

Load Factor * Capacity Rating

$$ISAC = \frac{49.4+49.0+41.4+47.1+41.8+43.3+43.5+58*40}{65} = \frac{2635.5}{65} = 40.5 \text{ MW}$$

Seasonal Accredited Capacity of a DR

$$SAC = ISAC(1 + Line\ Losses)(1 + PRMR)$$

Continuing the example from above:

$$SAC = 40.5(1 + 2\%)(1 + 7\%) = 44.3\ MW$$

Coffee/Water Break

- Please take some time to grab a beverage and stretch your legs.

- Return in 10 minutes



Capacity Availability and Capability

- If a resource submits Capacity Availability below the Capacity Availability Tolerance Band, the resource will receive a Capability equal to the Capacity Availability

- If a resource submits Capacity Availability above the Capacity Availability Tolerance Band, the resource will receive a Capability that is reduced by the difference of the submitted Capacity Availability and the upper bound of the Capacity Availability Tolerance Band

Example of Capacity Availability and Capability

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

- In this example, the MP submitted 40 MW during Hour 19 though its Demand less Firm Service Level was 49.2 MW; therefore, this is below the Capacity Availability Tolerance Band, so the resource receives a Capability of 40 MW
- In Hour 21, the Market Participant submitted 55 MW of Capacity Availability; therefore, the resource has overstated its Capacity Availability by $55 - 48.5\ MW = 6.5\ MW$ resulting in the Capability being reduced by 6.5 MW $(43.3\ - 6.5 = 36.8\ MW)$

Unavailability and Capability

- DRR and LMR may make themselves unavailable after responding to a Setpoint Instruction issued during a Capacity At Risk Hour or a Scheduling Instruction within the same Season

- When no LMR – Type I resource located in the same LBA is deployed, the Hours where the Resource was unavailable will be assigned a value of 0

- When an LMR – Type I resource is deployed, the resource receives 0 Capability for all Capacity At Risk Hours, bounded by a Scheduling Instruction in which the resource was deployed

Unavailability and Capability Example 1

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

- In this example, the resource was unavailable during Hours 14 through 17
- No LMR – Type I resource located within the same LBA was deployed
- Hours 14 through 17 receive a Capability of 0

Unavailability and Capability Example 2

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

- In this example, the resource was unavailable during Hours 14 through 17
- An LMR – Type I resource located within the same LBA was deployed
- The entire Capacity At Risk period receives 0 Capability

Unavailability and Capability Example 3

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

- In this example, the resource was available for the first Scheduling Instruction and was unavailable for the second
- An LMR – Type I resource located within the same LBA was deployed in both events
- The resource receives Capability from the start of the event until the end of the first Scheduling Instruction and 0 Capability for the remainder of the event
  - This occurs despite the resource being available for a few Hours after the initial Scheduling Instruction. All Hours, from the end of the first Scheduling Instruction onwards, receive 0 Capability under this scenario.

Unavailability and Capability Example 4

Firm Service Level = 10 MW	Capacity At Risk Hours														
				SI Issued								SI Issued			
Time	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Metered Output	57.8	58.9	57.9	56.9	59.4	50.9	54.9	59.0	60.6	55.1	51.4	57.1	51.8	53.3	53.5
Capacity Availability	50.0	50.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	45.0	40.0	45.0	40.0	45.0	45.0
Capability	0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.0	75.7	70.3	66.5	72.3	71.8	69.8	70.0

- In this example, the resource was unavailable for the first Scheduling Instruction and was available for the second
- An LMR – Type I resource located within the same LBA was deployed in both events
- The resource receives 0 Capability from the start of the event until the earliest Hour with non-zero Capacity Availability

Unavailability and Capability Example 3 and 4

- The previous two examples provide an example of an LMR deployed twice in a single day
- It is possible for LMRs to be deployed twice in a single day and again the following day
  - This scenario occurred January 17/18, 2018
- These rules extend when there are repeated deployments of LMRs during an extended Emergency
  - A resource may make itself available for the first day's morning deployment, unavailable in the evening, and available again the following morning

Response Time and Capability

- Resources are incentivized to deploy rapidly through two mechanisms:
  1. Order of deployment for LMRs is determined based on response time
  2. Resources that cannot be deployed in time to respond to a Scheduling Instruction receive 0 Capability based on the response time

- If a resource *can* be deployed, it will not receive reduced accreditation even if the Emergency escalates beyond the Maximum Generation Warning stage with little warning

- If a resource *cannot* be deployed because the Maximum Generation Warning was not declared with enough lead time prior to Scheduling Instructions being issued, the resource will receive 0 Capability for the number of Hours beginning with the Scheduling Instruction Hour equal to the difference between its response time and the Scheduling Instruction

Response Time and Capability Example 1

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

- In this example, the Maximum Generation Warning was declared during Hour 8
- A Scheduling Instruction was issued at Hour 12 for Hour 15
- The resource requires 6 hours to respond
- It was not issued a Scheduling Instruction, but the resource could have been deployed earlier; therefore, it receives no reduction to its Capability

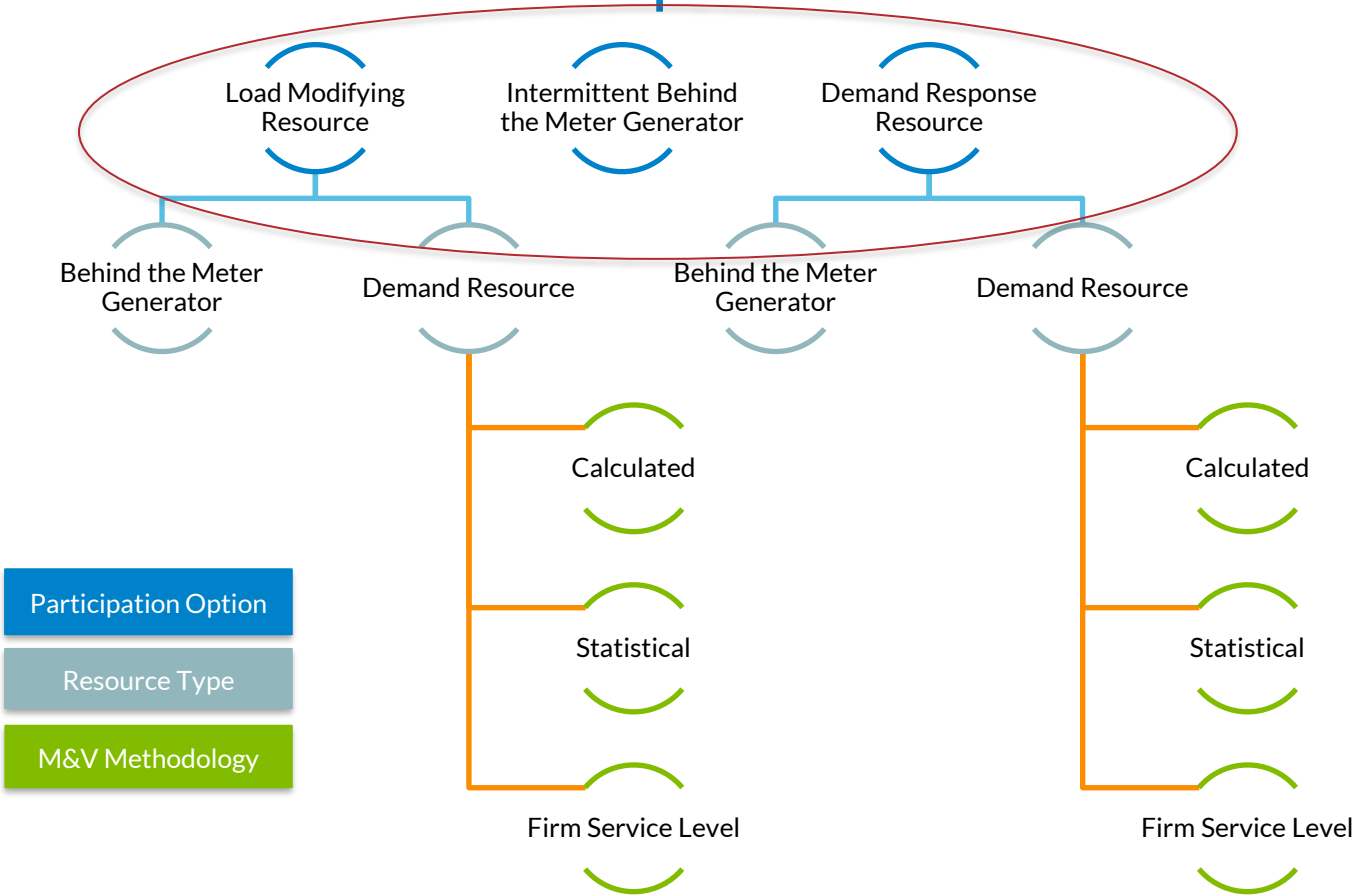
Response Time and Capability Example 1

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

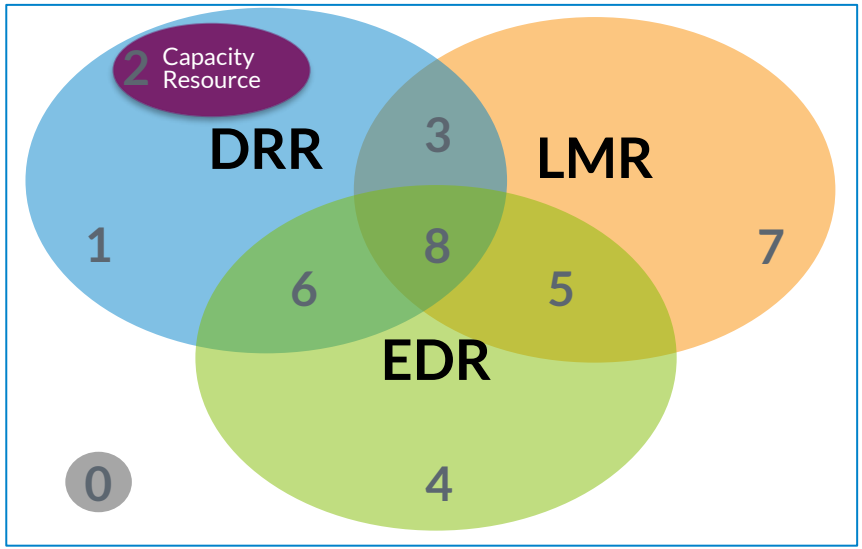
- In this example, the Maximum Generation Warning was declared during Hour 11
- A Scheduling Instruction was issued during Hour 12 for Hour 15
- The resource requires 6 hours to respond
- It was not issued a Scheduling Instruction, and the resource could not have been deployed earlier; therefore, it receives two values of 0 Capability for Hours 15 and 16 as Hour 15 was the first Hour for which the Scheduling Instruction was issued

Participation Options

Demand Response Overview

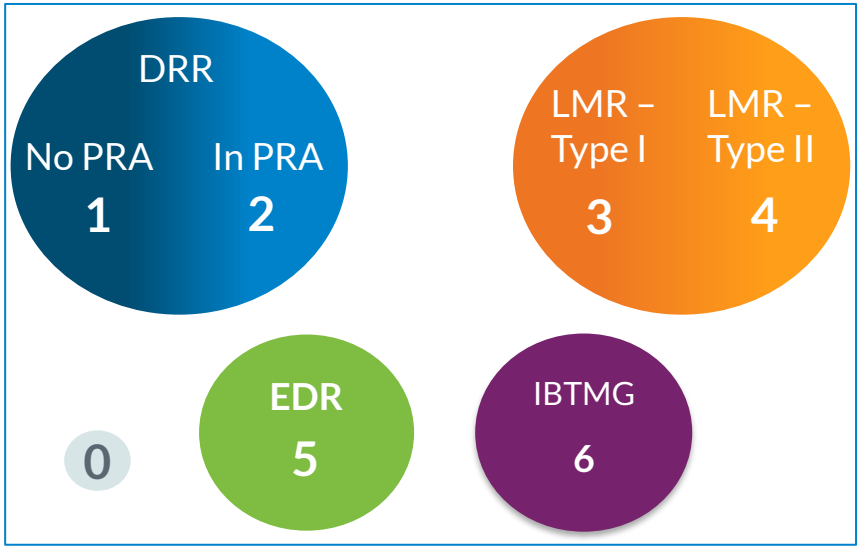


Current Participation Options



#	Comments/Notes
0	Not MISO registered
1	There is no DRR "must offer" requirement since there are no capacity credits
2	Uncommon approach for DRR; resource "must offer" in Energy & AS markets
3	LMR receives capacity credits and resource can optionally offer into the Energy & AS markets
4	EDR only; no capacity credits or "must offer" requirement
5	LMR that optionally provides an EDR offer for emergency energy
6	Similar to "1" but can optionally participate in emergencies
7	LMR only; not involved in Energy and AS markets
8	Similar to "5" but can optionally participate in Energy & AS markets

Proposed Participation Options



#	Comments/Notes
0	Not MISO registered
1	DRR that has chosen not to participate in the PRA, deployed economically, any lead-time, 100% voluntary
2	DRR that is participating in the PRA, deployed economically, 6 – hour lead time, deploy at least once
3	LMR – Type I deploy during Maximum Generation Warning Stage, 6-hour lead time, deploy at least once
4	LMR – Type II deploy during EEA 2 Stage, 30-minute lead time, deploy to all Scheduling Instructions
5	EDR only; no capacity credits or "must offer" requirement
6	Intermediate BTMG only

- The proposed design simplifies the participation options by eliminating dual registration
- LMR – Type I resources created to allow resources with a 6-hour response time to participate and be effectively used
- Removes accreditation incentive on the choice of which instrument to participate as

Participation requirements, obligations, and economic implications are tied to the four participation options

DRR

- Economic Deployment
- Receives Locational Marginal Price (LMP)
- May provide ancillary services
- 6-hour response
- Must deploy once
- May become unavailable at the cost of accreditation
- Test 1x/3yr

LMR – Type I

- Max Gen Warning
- No LMP
- 6-hour response
- Must deploy once
- May become unavailable at the cost of accreditation
- Test 1x/3yr

LMR – Type II

- EEA 2
- No LMP
- 30-minute response
- Must deploy for all events
- Test 1x/1yr
- Testing opt out available

Deployment ordering is based on participation type

1 — Demand Response Resources

- Economic deployment
- Least-cost dispatch

2a — LMR – Type I

- Max Gen Warning
- Longest lead time resources deployed first

2b — AME Resources

- Max Gen Warning
- Least-cost dispatch

3 — LMR - Type II

- May be deployed in anticipation of or beginning with EEA2 events
- Locational Dispatch

MISO is evaluating Emergency Operating Procedures, and this slides ordering reflects current operating practices.

Available Max Emergency Resources

"MISO plans a follow-up filing in the near future to further refine how MISO uses these Resources to increase reliability…and would consist of the following provisions:

- *Account for restricted availability in accreditation as suggested by stakeholders; and*
- *Allow Operators to call on AME Resources in anticipation of Emergency Declarations when their lead time is greater than 2 hours.*

The addition of different accreditation for AME Resources, based on Resource lead time and suggested by stakeholders, will help align the capacity value of these Resources with their availability."

Qualifications

1) The resource has offered using an Emergency Commitment Status at least 110 Hours in a Season in the Day Ahead Energy and Operating Reserve Market.

2) The resource has offered using an Emergency Commitment Status for at least 110 Hours in a Season in the Real Time Energy and Operating Reserve Market.

Obligations

Same as any other Capacity Resource with following modifications:

1) The resource may have a maximum response lead time of six hours. Longer lead times will receive NO accreditation

2) No outage exemptions permitted in Seasons operating as an AME Resource.

The 2023 AME Resource filing was accepted by delegated letter order in *Midcontinent Independent System Operator, Inc.*, FERC Docket No. ER23-1523-000 (May 31, 2023).

Testing

Testing Requirements

- At registration, all DRR and LMR resources need to perform a self-test
  - Demand Resources must demonstrate a Demand Reduction
  - BTMG participating as a DRR or LMR must provide a GVTC test
- All newly registered Demand Resources will be subject to a MISO-initiated test during the first Planning Year (PY) they are participating
- MISO-initiated tests will be performed at the following intervals:
  - DRR and LMR – Type I not using a statistical M&V methodology — 1 test every 3 PY
  - DRR and LMR – Type I using a statistical M&V methodology — 1 test every PY
  - LMR – Type II — 1 test every PY*
- A successful deployment in response to Scheduling Instructions satisfies this requirement

* LMR – Type II that opt-out will be required to test once every 3 PY

Testing Opt Out Provisions

- Resources will no longer be permitted to opt out of the self-test during registration
  - All resources have an obligation to demonstrate performance prior to registering in the PRA

- Resources participating as an LMR – Type II resource may opt out of the yearly MISO-initiated test protocols provided:
  - They have responded to all Scheduling Instructions perfectly
  - They have passed any MISO-initiated testing within the previous three Planning Years
  - They accept Real Time performance penalties of VOLL in lieu of LMP

Testing Procedure

Purpose: The MISO-initiated test ensures that all Demand Resources clearing the PRA can provide the demand reduction ratepayers are paying for.

- Tests may be performed in any season in which an LMR has cleared zonal resource credits (ZRCs)
- Resources will be informed of a test one day in advance
- A test may be rescheduled once without penalty
- Resources may not Self Schedule during tests
- A test is fully passed if all the criteria are met:
  - The resource achieves its stated Capacity Availability or reduces to or below its registered Firm Service Level;
  - The resource does so within the total enrolled response time;
  - The resource deploys for the full four-hour deployment period

Response time = Start-Up/Shut-Down Time + Start-Up/Shut-Down Notification Time

Test Failure Consequences

There are two types of test failures:

A. A test is completely failed if:
   1. The resource fails to achieve at least 50% of the required reduction* within the registered time
   2. The resource fails to maintain deployment for at least four hours

B. A test is partially failed if:
   1. The resource achieves at least 50% of the required reduction* within the response but fails to achieve its full required reduction*
      a. The appropriate performance Tolerance Band will apply for determining full performance.

C. A resource that fully responds to a Scheduling Instruction after experiencing any kind of test failure will have any charges stopped from the day of the Scheduling Instruction onwards

*The required reduction is the stated Capacity Availability or Firm Service Level, as applicable.

Test Consequences – Partial Failure

1. A Demand Resource experiencing a partial failure will be subject to penalties equal to the Auction Clearing Price ($/MW*Day) * short-fall amount for the remainder of the Season, and;

2. The registered response time will be adjusted to the minimum of the time it took the resource to provide a 100% reduction, measured by the applicable performance Tolerance Band, or six hours if it fails to achieve its required reduction

3. A Demand Resource experiencing a partial test failure may undergo MISO-initiated tests, at MISO's discretion, in the same or additional Seasons and will be tested during the next Planning Year

Response time = Start-Up/Shut-Down Time + Start-Up/Shut-Down Notification Time

Test Consequences – Full Failure

1. A Demand Resource experiencing a complete failure will be subject to penalties equal to the Auction Clearing Price ($/MW*Day) * cleared ZRCs for the entire Season the test was performed in

2. MISO will perform a second test for Demand Resources experiencing a complete test failure within the same Season or the following Season and in the following Planning Year
    1. The second test is treated as a new test for the purposes of testing, however;

3. If a Demand Resource experiences two complete test failures in a Planning Year it will be disqualified pursuant to the complete failure to perform provisions described in the next section.

Response time = Start-Up/Shut-Down Time + Start-Up/Shut-Down Notification Time

Penalties

Increased Penalties Logic

- Strengthening penalty provisions is necessary to ensure ratepayers are paying for resources that can truly reduce Demand
    - With increasing Auction Clearing Prices (ACP) and the infrequency of LMR deployments, Real Time performance penalties are not strong enough
- MISO is explicitly defining partial and complete failures to perform
- Accreditation penalties are now included for partial failures to perform and expanded for complete failures to perform

DRR vs LMR Performance Obligations

- A resource participating as a DRR is obligated to perform in accordance with its Offer parameters
  - Module C 40.3.4 governs the Real-Time provisions for Excessive and Deficient Energy
    - DRR may be penalized for over-performance

- A resource participating as an LMR is obligated to perform in accordance with its M&V type
  - LMR will never be penalized for over-performance

LMR Performance Tolerance Band

- An LMR participating as a BTMG, Calculated Baseline Demand Resource, or Statistical M&V Demand Resource will be subject to the same performance band as a DRR, summarized below:
  - The Performance Tolerance Band for an LMR is equal to the submitted Capacity Availability amount ± 12%, not to exceed the range of 1 MW to 30 MW.
  - An LMR will never be subject to penalties for over-performing; i.e., Excessive Energy.
- An LMR participating as a Firm Service Level Baseline Demand Resource will be subject to the Firm Service Level Tolerance Band

Other Performance Obligations

- A DRR or LMR must respond within its registered response time to have met its performance obligations

- Because resources are deployed in order of their registered response time, there is an incentive to respond as quickly as possible
  - This creates a reliability risk due to resources deploying slower than they've indicated they can
  - It also creates an inefficiency risk whereby other resources may experience more deployments than necessary

Partial Failure to Perform Definition – Demand Resource

1. For a Demand Resource participating as a DRR, a partial failure to perform is defined as achieving at least 50% of the submitted Offer within the enrolled response time but less than the Deficient Energy Threshold, which is defined in Module C 40.3.4.

2. For a Demand Resource participating as an LMR, a partial failure to perform is defined as achieving at least 50% of the required response within the enrolled response but less than the minimum Performance Tolerance Band.

A Demand Resource must achieve its Demand reduction by the stated time. These resources curtail Demand, so there is no provision for a late deployment.

Partial Failure Penalties – Demand Resource

- A resource experiencing a partial failure to perform is charged the Real-Time Ex Post LMP times the amount of shortall in each Hour plus any Revenue Sufficiency Guarantee (RSG).

- A Demand Resource experiencing a partial failure to perform will be charged the ACP times the MW shortfall in the first Hour of the shortfall until either; (i) the end of the Season; (ii) the resource has successfully responded to a Setpoint Instruction or Scheduling Instruction; (iii) or successfully passed a MISO initiated test.

Partial Failure to Perform Example – Demand Resource

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

- In this example, a resource requiring two hours to respond having a 10 MW of Firm Service Level fails to achieve its Firm Service Level within 2 hours
- The real-time penalty is $3,000 ($1,000 LMP * 1 hour) plus any RSG
- The accreditation penalty is ACP*3 MW until one of the three conditions stated in the previous slide are met

Partial Failure to Perform - BTMG

1. For Behind the Meter Generation participating as a DRR, a partial failure to perform is defined as achieving at least 50% of the total Energy, measured in MWh, issued by the Setpoint Instruction but less than the Deficient Energy Threshold during any Hour covered by the Setpoint Instructions.

2. For Behind the Meter Generation participating as an LMR, partial failure to perform is defined as achieving at least 50% of the total Energy, measured in MWh, issued by the Scheduling Instruction but less than the Performance Tolerance Band during any Hour covered by the Setpoint Instruction.

A Behind the Meter Generator achieves its Demand reduction by starting a generator. As generators have a non-zero probability of failure to start, but may start later, partial failure to perform is defined in terms of Energy, MWh, over the entire Scheduling Instruction as well as response time.

Partial Failure Penalties - BTMG

- A resource experiencing a partial failure to perform is charged the Real-Time Ex Post LMP times the amount of shortall in each Hour plus any Revenue Sufficiency Guarantee.

- A BTMG experiencing a partial failure to perform will be charged the ACP times one minus the ratio of the total Energy shortfall until either; (i) the end of the Season; (ii) the resource has successfully responded to a Setpoint Instruction or Scheduling Instruction; (iii) or successfully passed a MISO initiated test.

Partial Failure to Perform Example - BTMG

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

- The BTMG with a two-hour response time has failed to deploy within 2 hours
- The Real-Time penalties are $10,000 ($1,000 LMP * 1 hour) plus any RSG
- The accreditation penalty is: $ACP * ZRC * \left(1 - \frac{30\,MWh}{40\,MWh}\right) = ACP * 0.25 * ZRC$

Complete Failure to Perform – Demand Resource

1. For a Demand Resource participating as a DRR, a complete failure to perform is defined as achieving less than 50% of the submitted Offer.

2. For a Demand Resource participating as an LMR, a complete failure to perform is defined as achieving less than 50% of the required response.

    1. For a Demand Resource using the Firm Service Level methodology, this means achieving at least 50% of the difference from the Demand when the Scheduling Instruction was issued and the Firm Service Level by the required response time.

    2. For a Demand Resource not using the Firm Service Level methodology, this means achieving at least 50% of the submitted Capacity Availability.

Complete Failure to Perform – BTMG

- For a Behind the Meter Generation resource participating as a DRR, a complete failure to perform is defined as achieving less than 50% of the total Energy, measured in MWh, issued by the Setpoint Instruction.

- For a Behind the Meter Generation resource participating as an LMR, a complete failure to perform is defined as achieving less than 50% of the total Energy, measured in MWh, issued by the Scheduling Instruction.

Complete Failure Penalties

- A resource experiencing a complete failure to perform is charged the Real-Time Ex Post LMP, in dollars per MW, times the amount of shortall, in MW for each Hour of shortfall plus any Revenue Sufficiency Guarantee (RSG).

- A resource experiencing a complete failure to perform will be disqualified for the remainder of the Planning Year

- A Market Participant must replace the ZRCs of a disqualified resource with a similar resource; i.e., either a DRR or LMR for the remainder of the Season. Additional Seasons during which the original resource cleared ZRCs must have these ZRCs replaced as well, again with a like resource. The resource replacing these ZRCs do not need to be the same resource in each Season, but must be of the same type as the disqualified resource.
    - The replacement resource is subject to a MISO initiated test immediately to verify its performance abilities. If this resource fails the MISO-initiated test, the Market Participant will be charged the Non-Compliance Capacity Replacement Charge for the entire Season in which the disqualification occurred. This Charge applies to each Season during which the resource is unable to be replaced.

Complete Failure to Perform Example

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

- This example is a BTMG that only provides 7.5 MWh out of the 20 MWh needed to have partially failed to perform

- Penalties are $32,500 + RSG and disqualification

Disqualification and Accreditation

- A resource that is disqualified will cease receiving Capability for the remainder of the Season once the Capacity At Risk Hours contiguous with its disqualification have ended
  - The resource will receive a Capability of 0 for all hours during which it is disqualified as if it had made itself unavailable
- If fewer than 65 Hours that are Capacity At Risk Hours and Resource Adequacy Hours have occurred prior to disqualification, the resource will receive the Emergency Deficiency Capability value multiplied by the remaining hours
- Resources disqualified twice in a three-year span will be disqualified from participating in the PRA for three years

Important Dates

- The feedback deadline has been pushed back one week, to February 6th, to allow stakeholders to respond to the white paper and Calculated Baseline methodology

- MISO Dashboard ID#: *RASC-2019-9*

- Feedback requests and responses are managed through the Feedback Tool on the MISO website: misoenergy.org/stakeholder-engagement/stakeholder-feedback/



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Overview of DRERR Proposal

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

1 Demand Resource
2 Non-Thermal BTMG
3 DRR – Type I may provide Spin, Sup, and STR; DRR – Type II may provide Reg if telemetry information is provided
4 Tier 1 Hours and Resource Adequacy Hours
5 LMR – Type II resources may opt out and be tested 1x/3 years if qualified

Table 2 Resource Type Overview					
	Statistical DR	FSL DR	Calculated DR	BTMG	Intermittent BTMG
Attachment TT M&V	Direct Load Control or Statistical M&V	Firm Service Level	Calculated Baseline	BTMG	N/A
Capacity Availability	As Participation Option[1]	As Participation Option[1]	As Participation Option	As Participation Option[1]	N/A
Seasonal Capacity[2]	No	Yes	No	N/A	N/A
Hourly Capability	Demand Curve	Metered Demand	Metered Demand	Capacity Availability or Meter Data	Meter Data
Resource Class	No	No	No	Yes	Yes
Line Loss	Yes	Yes	Yes	Yes	Yes
PRMR Gross Up	Yes	Yes	Yes	No	No
Firm Service Level	N/A	Registered	N/A	N/A	N/A
Test Frequency	1x/year	1x/3 years	1x/3 years	GVTC	GVTC

1 DRR submit Offers, LMR submit Availability
2 Seasonal Capacity is calculated for each Hour of the day and is the average of the top 15 hours for each Hour in a Season on weekdays and 6 hours on weekends