|  |  |  |  |
| --- | --- | --- | --- |
| NPRR Number | [885](http://www.ercot.com/mktrules/issues/NPRR885) | NPRR Title | Must-Run Alternative (MRA) Details and Revisions Resulting from PUCT Project No. 46369, Rulemaking Relating to Reliability Must-Run Service |
| Date Posted | | July 3, 2018 | |
|  | |  | |
| Requested Resolution | | Normal | |
| Nodal Protocol Sections Requiring Revision | | 1.3.1.2, Items Not Considered Protected Information  2.1, Definitions  3.14, Contracts for Reliability Resources and Emergency Response Service Resources  3.14.4, Must-Run Alternative Service (new)  3.14.4.1, Overview and Description of MRAs (new)  3.14.4.2, Preliminary Review of Prospective Demand Response MRAs (new)  3.14.4.3, MRA Substitution (new)  3.14.4.4, Commitment and Dispatch (new)  3.14.4.5, Standards for Generation Resource MRAs (new)  3.14.4.6, Standards for Other Generation MRAs and Demand Response MRAs (new)  3.14.4.6.1, MRA Telemetry Requirements (new)  3.14.4.6.2, Baseline Performance Evaluation Methodology for Demand Response MRAs (new)  3.14.4.6.3, MRA Metering and Metering Data (new)  3.14.4.6.4, MRA Availability Measurement and Verification (new)  3.14.4.6.5, MRA Event Performance Measurement and Verification (new)  3.14.4.6.5.1, Event Performance Measurement and Verification for Co-Located Demand Response MRAs and Other Generation MRAs (new)  3.14.4.7, MRA Testing (new)  3.14.4.8, MRA Misconduct Events (new)  6.5.5.2, Operational Data Requirements  6.6.6, Reliability Must-Run Settlement  6.6.6.7, MRA Standby Payment (new)  6.6.6.8, MRA Contributed Capital Expenditures Payment (new)  6.6.6.9, MRA Payment for Deployment Event (new)  6.6.6.10, MRA Variable Payment for Deployment (new)  6.6.6.11, MRA Charge for Unexcused Misconduct (new)  6.6.6.12, MRA Service Charge (new)  6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge  9.5.3, Real-Time Market Settlement Charge Types  Section 22: Attachment M, Standard Form Must-Run Alternative Agreement (new) | |
| Related Documents Requiring Revision/Related Revision Requests | | Nodal Protocol Revision Request (NPRR) 862, Updates to Address Revisions under PUCT Project 46369 | |
| Revision Description | | This NPRR incorporates a number of revisions to address changes by the Public Utility Commission of Texas (PUCT) to P.U.C. SUBST. R. 25.502, Pricing Safeguards in Markets Operated by the Electric Reliability Council of Texas, in PUCT Project No. 46369, Rulemaking Relating to Reliability Must-Run Service (RMR). More specifically, this NPRR proposes new Protocol language to address numerous issues related to the solicitation and operation of Must-Run Alternative (MRA) Service.  This is the second in a series of ERCOT-sponsored NPRRs that will address the amendments to P.U.C. SUBST. R. 25.502. The first in this series, NPRR862, Updates to Address Revisions under PUCT Project 46369, is currently pending.  The amendments to P.U.C. SUBST. R. 25.502, which went into effect on January 1, 2018, require that a Resource Entity file a Notification of Suspension of Operations (NSO) at least 150 days prior to the date on which the Resource Entity intends to cease or suspend operation of a Generation Resource, except when the unit is seasonally mothballed. Within this 150-day notice period, ERCOT must evaluate whether the capacity provided by the retiring Generation Resource is needed for reliability and, if it is, must then evaluate whether to enter into an RMR Agreement, an MRA Agreement, or take some other reliability action to address the identified reliability need.  This NPRR proposes new Protocol language as well as Protocol revisions to address the following issues specific to MRA Service:   * Defines MRA Service, types of MRA, and MRA Site; * Describes the types of resources that may qualify for MRA Service; * Establishes certain MRA procedures such as:   + Communication with ERCOT;   + Commitment and Dispatch;   + Telemetry requirements including an additional telemetry point; and   + Resource substitution provisions. * Clarifies treatment for MRA participation by transmission-connected and Non-Modeled Generation and Demand Response MRAs; * Codifies rules for submitting MRA offers; * Describes how the performance of Demand Response MRAs will be measured and verified, including rules for calculating event performance and availability; * Defines Settlement equations for:   + MRA standby payments;   + MRA contributed capital expenditures;   + Event deployment payment;   + Variable Payment for Deployment;   + Charges for unexcused misconduct; and   + MRA Service charges. * Includes a Standard Form MRA Supplement to Market Participant Standard Form Agreement   This NPRR does not address every aspect of MRA Service. Rather, ERCOT plans to submit additional NPRRs addressing other MRA-related issues, including but not limited to the following matters:   * Evaluation process to be used by ERCOT in determining whether to enter into an RMR Agreement, MRA Agreement, or some other reliability action; * Price formation impacts due to deployment of MRAs; and * Requirements for reporting and posting of MRAs. | |
| Reason for Revision | | Addresses current operational issues.  Meets Strategic goals (tied to the [ERCOT Strategic Plan](http://www.ercot.com/content/news/presentations/2013/ERCOT%20Strat%20Plan%20FINAL%20112213.pdf) or directed by the ERCOT Board).  Market efficiencies or enhancements  Administrative  Regulatory requirements  Other: (explain)  *(please select all that apply)* | |
| Business Case | | The PUCT’s recent amendments to PUC Subst. R. 20.502(c) contemplate that ERCOT may enter into an MRA Agreement when it “identifies a resource or group of resources that will address a reliability need resulting from a planned suspension of operation of a generation resource in a more cost-effective manner than entering into an RMR service agreement.” However, current ERCOT Protocols do not address the process by which ERCOT will solicit, evaluate and compensate an MRA. Further, ERCOT systems are not currently configured to account for MRAs. In order to effectuate the amendments to 25.502(c), ERCOT must make system changes to account for this type of service. Entering into an MRA Agreement in lieu of an RMR Agreement could potentially result in significant savings, which could more than offset the cost of these system changes. | |

|  |  |
| --- | --- |
| Sponsor | |
| Name | Mark Ruane / Ino Gonzalez / Carl Raish |
| E-mail Address | [Mark.Ruane@ercot.com](mailto:Mark.Ruane@ercot.com) / [Ino.Gonzalez@ercot.com](mailto:Ino.Gonzalez@ercot.com) / [Carl.Raish@ercot.com](mailto:Carl.Raish@ercot.com) |
| Company | ERCOT |
| Phone Number | 512-248-6534 / 512-248-3954 / 512-248-3876 |
| Cell Number |  |
| Market Segment | Not applicable |

|  |  |
| --- | --- |
| **Market Rules Staff Contact** | |
| **Name** | Cory Phillips |
| **E-Mail Address** | [Cory.phillips@ercot.com](mailto:Cory.phillips@ercot.com) |
| **Phone Number** | 512-248-6464 |

|  |
| --- |
| Market Rules Notes |

Please note that the following NPRR(s) also propose revisions to the following section(s):

* NPRR845, RMR Process and Agreement Revisions
  + Section 1.3.1.2
* NPRR847, Exceptional Fuel Cost Included in the Mitigated Offer Cap
  + Section 9.5.3
* NPRR862, Updates to Address Revisions under PUCT Project 46369
  + Section 2.1
  + Section 9.5.3
* NPRR863, Creation of Primary Frequency Response Service Product and Revisions to Responsive Reserve
  + Section 6.5.5.2
  + Section 6.7.5
* NPRR884, Adjustments to Pricing and Settlement for Reliability Unit Commitments (RUCs) of On-Line Combined Cycle Generation Resources
  + Section 6.7.5

|  |
| --- |
| Proposed Protocol Language Revision |

1.3.1.2 Items Not Considered Protected Information

(1) Notwithstanding the definition of “Protected Information” in Section 1.3.1.1, Items Considered Protected Information, the following items are not Protected Information even if so designated:

(a) Data comprising Load flow cases, which may include estimated peak and off-peak Demand of any Load;

(b) Existence of Power System Stabilizers (PSSs) at each interconnected Generation Resource and PSS status (in service or out of service);

(c) RMR Agreements;

(d) Studies, reports and data used in ERCOT’s assessment of whether a Reliability Must-Run (RMR) Unit satisfies ERCOT’s criteria for operational necessity to support ERCOT System reliability but only if they have been redacted to exclude Protected Information under Section 1.3.1.1;

(e) Status of RMR Units;

(f) Information provided to ERCOT in support of an “Application for Reliability Must Run (RMR) Status” according to Section 3.14.1, Reliability Must Run;

(g) Black Start Agreements;

(h) RMR Settlement charges and payments;

(i) Must Run Alternative (MRA) Agreements;

(j) Settlement charges and payments for MRA Service;

(k) Within two Business Days of a request from a potential generating Facility for a full resource interconnection study, the county in which the Facility is located, Facility fuel type(s), Facility nameplate capacity, and anticipated Commercial Operations Date(s) and signed generation interconnection agreements; and

(l) Any other information specifically designated in these Protocols or in the PUCT Substantive Rules as information to be posted to the Market Information System (MIS) Public Area or MIS Secure Area that is not specified as information that is subject to the requirements of Section 1.3, Confidentiality.

(2) Protected Information that Receiving Party is permitted or required to disclose or use under the Protocols or under an agreement between Receiving Party and a Disclosing Party does not cease to be regarded as Protected Information in all other circumstances not encompassed by these Protocols or such agreement by virtue of the permitted or required disclosure or use under these Protocols or such agreement.

(3) Within ten Business Days of executing a generator interconnection agreement, the TSP shall provide a copy to ERCOT.

## 2.1 DEFINITIONS

**Availability Plan**

An hourly representation of availability of Reliability Must-Run (RMR) Units, Must-Run Alternatives (MRAs), or Synchronous Condenser Units, or an hourly representation of the capability of Black Start Resources as submitted to ERCOT by 0600 in the Day-Ahead by QSEs representing RMR Units, MRAs, Synchronous Condenser Units, or Black Start Resources.

Must-Run Alternative (MRA) Contracted Hour(s)

The hour(s) during which an MRA is contracted under an MRA Agreement to provide MRA Service.

Must-Run Alternative (MRA) Contracted Month(s)

The month(s) during which an MRA is contracted under an MRA Agreement to provide MRA Service.

Must-Run Alternative (MRA)

A resource operated under the terms of an Agreement with ERCOT as an alternative to a Reliability Must-Run (RMR) Unit. An MRA may be one of the following:

Generation Resource MRA

A generator that is registered with ERCOT as a Generation Resource that is dispatchable in SCED and is providing MRA Service under an Agreement with ERCOT.

Other Generation MRA

Unregistered generation, or generation registered with ERCOT that is not dispatchable in SCED, that is providing MRA Service under an Agreement with ERCOT. An Other Generation MRA may include, but is not limited to, Non-Modeled Generators and Distributed Generation (DG).

Demand Response MRA

A Load providing MRA Service under an Agreement with ERCOT by reducing energy consumption in response to an ERCOT instruction. A Demand Response MRA may be an unregistered Load or a registered Load Resource other than a Controllable Load Resource.

Weather-Sensitive MRA

A type of MRA Service in which a Demand Response MRA provides MRA Service only after meeting the qualification requirements for weather sensitivity set forth in paragraph (5) of Section 3.14.3.1, Emergency Response Service Procurement.

**Must-Run Alternative (MRA) Service**

The use by ERCOT, under contracts with Qualified Scheduling Entities (QSEs), of capacity and energy from MRAs as an alternative to Reliability Must-Run (RMR) Service.

**Must-Run Alternative (MRA) Site**

An individually metered component of an aggregated MRA.

**3.14 Contracts for Reliability Resources and Emergency Response Service Resources**

(1) ERCOT shall procure Reliability Must-Run (RMR) Service, Must-Run Alternative (MRA) Service, Black Start Service (BSS), or Emergency Response Service (ERS) through Agreements.

3.14.4 Must-Run Alternative Service

3.14.4.1 Overview and Description of MRAs

(1) Subject to approval by the ERCOT Board, ERCOT may procure Must-Run Alternative (MRA) Service as an alternative to contracting with a Reliability Must-Run (RMR) Unit if ERCOT determines that the MRA Agreement(s) will, in whole or in part, address the reliability need identified in the RMR study in a more cost-effective manner.

(2) ERCOT will issue a request for proposal (RFP) to solicit offers from Qualified Scheduling Entities (QSEs) to provide MRA Service.

(a) A QSE may submit an offer in response to the RFP or enter into an MRA Agreement only if it meets all registration and qualification criteria in Section 16.2, Registration and Qualification of Qualified Scheduling Entities.

(b) QSEs whose offers for MRA Service are accepted will be paid according to their offers, subject to the terms of the RFP, MRA Agreement and ERCOT Protocols. A clearing price mechanism shall not be used for awarding offers for MRA Service.

(c) A QSE may submit more than one offer for MRA Service in response to a single RFP. A QSE may not submit the same MRA or MRA Sites in more than one of its offers. ERCOT may award multiple offers to a QSE, so long as the MRA or MRA Sites in an awarded offer are not included in any other awarded offer. A QSE may condition ERCOT’s acceptance of an offer for a Demand Response MRA on ERCOT’s acceptance of an offer for a co-located Other Generation MRA offer.

(3) An MRA may be connected at either transmission or distribution voltage.

(4) An MRA offer is ineligible to the extent it offers capacity that was included as a Resource in ERCOT’s RMR analysis or in the Load forecasts from the Steady State Working Group base cases used as the basis for the RMR analysis, as provided for in paragraph (3)(a) of Section 3.14.1.2, ERCOT Evaluation.

(5) Each MRA must provide at least five (5) MW of capacity.

(6) Eligible MRA resources may include:

(a) A proposed Generation Resource that was not included in the reliability need evaluation pursuant to paragraph (3)(a) of Section 3.14.1.2.

(i) Proposed Generation Resources must adhere to all interconnection requirements, including the requirements of Planning Guide Section 5, Generation Resource Interconnection or Change Request.

(ii) If the proposed Generation Resource is an Intermittent Renewable Resource, the QSE shall provide capacity values based on the Resource’s projected peak average capacity contribution during the MRA Contracted Hours.

(b) Proposed capacity additions to existing Generation Resources, if the additional capacity was not included in the reliability need evaluation pursuant to paragraph (3)(a) of Section 3.14.1.2.

(i) Prior to providing MRA Service, the Resource Entity will be required to modify its Resource Asset Registration Form and complete necessary Generator interconnection requirements with respect to this additional capacity.

(ii) If the capacity is being added to an Intermittent Renewable Resource, the QSE shall provide capacity values based on the Resource’s projected peak average capacity contribution during the hours identified during the MRA Contracted Hours.

(c) A proposed or existing generator registered, or proposed to be registered, with ERCOT as a Non-Modeled Generator or as a Distributed Generation (DG). If the generator is an intermittent renewable generator, the QSE, when responding to an RFP for MRA Service, shall provide capacity values based on the MRA’s projected peak average capacity contribution during the hours identified in the MRA Contracted Hours.

(d) Proposed or existing Demand response assets, which may include Load Resources and Emergency Response Service (ERS) Loads.

(7) An MRA must be able to provide power injection or Demand response to the ERCOT System at ERCOT’s discretion during the MRA Contracted Hours.

(a) QSE offers in response to an RFP for MRA Service must fully describe all of the MRA’s temporal constraints.

(b) For a Demand Response MRA, QSE offers in response to an RFP for MRA Service must include a statement as to whether the offered capacity is a Weather–Sensitive MRA.

(8) The QSE representing an MRA must be capable of receiving both Verbal Dispatch Instructions (VDI) and Extensible Markup Language (XML) instructions.

(9) ERCOT will periodically validate an MRA’s telemetry using 15-minute interval meter data.

(10) An MRA for which the MRA or every MRA Site, is metered with either an Advanced Meter or an ERCOT-Polled Settlement (EPS) Meter must be available for qualification testing no later than 10 days prior to the first day of the contracted MRA Service.  Other MRAs must be available for qualification testing no later than 45 days prior to the first day of the contracted MRA Service.

(11) All MRA Sites within an MRA must be of the same type (i.e., all Generation Resource MRA, Other Generation MRA, or Demand Response MRA).

(12) A QSE representing an MRA shall submit to ERCOT and continuously update an Availability Plan for each MRA Contracted Hour for the current Operating Day and the next six Operating Days.

(13) A QSE representing an MRA or MRA Site may not submit DAM Offers or carry an Ancillary Service Resource Responsibility or an ERS responsibility on behalf of any MRA or MRA Site during the MRA Contracted Hours. Demand Response MRAs may not participate in TDSP standard offer programs during any MRA Contracted Hours.

(14) A Combined Cycle Train serving as an MRA must be configured as a single Combined Cycle Generation Resource.

(15) QSEs representing MRAs shall submit offers using an MRA offer sheet as provided by ERCOT.

(16) QSEs must submit the following information for each MRA offer:

(a) The capacity, months and hours offered;

(b) For an aggregated MRA, the offered capacity allocated to each MRA Site for all months and hours offered;

(c) The Resource ID, ESI ID and or unique meter ID associated with the MRA, or in the case of an aggregated MRA, a list of the Resource IDs, ESI IDs and/or unique meter IDs of the offered MRA Sites;

(d) The MRA Standby Price, represented in dollars per MW per hour;

(e) Required capital expenditure, if any, if the MRA offer is awarded;

(f) The MRA Event Deployment Price, in dollars per deployment event, or proxy fuel consumption rate;

(g) The ramp period or startup time of the MRA or aggregated MRA;

(h) The MRA Variable Price, in dollars per MW per hour, and/or proxy heat rate;

(i) The target availability of the MRA or aggregated MRA; and

(j) Any additional information required by ERCOT within the RFP.

(17) Demand Response MRAs shall not be deployed more than once per Operating Day.

(18) Except for a Forced Outage, any Outage of an MRA must be approved by ERCOT.

(19) For any MRA that is registered with ERCOT as a Resource, the QSE representing the MRA must be the same as the QSE representing the Resource.

3.14.4.2 Preliminary Review of Prospective Demand Response MRAs

(1) In order to assist QSEs prior to their submission of MRA offers, ERCOT may provide QSEs, upon request, with an analysis of their prospective Demand Response MRA’s consumption patterns.

(2) ERCOT will provide a QSE with the analysis described under this Section only when the QSE makes its request in conformance with submission requirements and deadline set forth in the relevant MRA RFP.

(3) In response to a proper and timely request by a QSE, ERCOT will provide the following information for each prospective Demand Response MRA:

(a) Substation identification for each MRA or MRA Site;

(b) Demand Response MRA baseline options, if the resource qualifies for a default baseline; and

(c) Historical reference Load levels; and

(d) Any known errors or exceptions, such as whether the MRA or any MRA Sites are currently suspended from participation in another service (e.g., Emergency Response Service (ERS)), whether any listed MRA or MRA Sites have erroneous Electric Service Identifiers (ESI IDs), or whether any prospective MRA or MRA Site lacks sufficient historical meter data.

(4) A submission by a QSE of a prospective Demand Response MRA does not bind the QSE to submit an offer for MRA Service.

3.14.4.3 MRA Substitution

(1) Subject to approval by ERCOT, a QSE may provide a substitution for a contracted MRA. Any substituted MRA is subject to the same obligations as the originally awarded MRA.

(2) ERCOT, at its discretion, may disallow an MRA substitution if it determines that the substitution may cause operational or reliability concerns, does not provide expected reliability benefits equivalent to those under the MRA Agreement, or is inconsistent with Protocols.

(3) Any substitution must cover all MRA Contracted Hours in an Operating Day and may cover one or more Operating Days.

(4) For purposes of payment, for any calendar day during which one or more MRA substitutions was made, the performance of an MRA shall be determined based on the combined performance of the original and substitution MRAs.

3.14.4.4 Commitment and Dispatch

(1) ERCOT may commit and/or Dispatch an MRA during the term of the MRA Agreement for the purpose of utilizing the MRA’s contracted capacity at any time during the contracted hours in the MRA Agreement.

(2) ERCOT may commit an MRA, via VDI, prior to the contracted hours in the MRA Agreement based on the MRA’s ramp period or startup time, in order to ensure that the MRA Service is provided during the contracted hours.

(3) In an MRA deployment event or unannounced test, the start time of the Demand response Ramp Period and/or generator startup time will be determined by ERCOT upon review of the time-stamped recording of the VDI. The start time begins when the ERCOT operator confirms the QSE’s repeat-back of the instruction.

3.14.4.5 Standards for Generation Resource MRAs

(1) A Generation Resource MRA shall at all times communicate accurate Resource Status to ERCOT via telemetry as described in Section 6.4.6, Resource Status.

(2) A Generation Resource MRA shall be committed by ERCOT Verbal Dispatch Instruction (VDI) and Dispatched by SCED.

3.14.4.6 Standards for Other Generation MRAs and Demand Response MRAs

3.14.4.6.1 MRA Telemetry Requirements

(1) A QSE representing an Other Generation MRA shall at all times communicate an accurate status to ERCOT via telemetry at the MRA level and shall provide at least the following values:

(a) Status (e.g., ON, OUT, etc…);

(b) High Sustained Limit (HSL);

(c) Low Sustained Limit (LSL);

(d) Current output level in MW;

(e) Gross Reactive Power in MVAr; and

(f) Net Reactive Power in MVAr.

(2) A Demand Response MRA’s QSE shall at all times communicate accurate MRA status to ERCOT via telemetry and shall provide at least the following values:

(a) Net Power Consumption (NPC); and

(b) Low Power Consumption (LPC)

(3) Event performance for Other Generation MRAs that are not Dispatched by SCED shall be evaluated by ERCOT as described in Section 3.14.4.6.5, MRA Event Performance Measurement and Verification.

3.14.4.6.2 Baseline Performance Evaluation Methodology for Demand Response MRAs

(1) A Demand Response MRA must qualify for one or more options described in the document entitled “Default Baseline Methodology” posted on the ERCOT website. The baseline will be used to verify the Demand Response MRA’s performance as compared to its contracted capacity during an MRA deployment event.

3.14.4.6.3 MRA Metering and Metering Data

(1) Each Demand Response MRA, or each MRA Site within an aggregated Demand Response MRA, must have an ESI ID and dedicated 15-minute Interval Data Recorder (IDR) metering. A Demand Response MRA, or an MRA Site within an aggregated Demand Response MRA, that is located outside of a competitive service area may use a unique meter ID in lieu of an ESI ID.

(2) Each Other Generation MRA, or each MRA Site within an aggregated Other Generation MRA, must have an ESI ID and, if applicable, a Resource ID and dedicated 15-minute Interval Data Recorder (IDR) metering. An Other Generation MRA, or an MRA Site within an aggregated Other Generation MRA, that is located outside of a competitive service area may use unique meter IDs in lieu of the ESI ID and Resource ID.

(3) For ESI IDs and Resource IDs situated in either NOIE or competitive choice areas of the ERCOT Region, meter data is stored in the ERCOT systems and will be accessed by ERCOT and used for all performance evaluations.

(4) A QSE representing an MRA or MRA Site in a NOIE service territory is responsible for arranging with the NOIE TDSP to provide ERCOT with interval meter data for the MRA or MRA Site in a format prescribed by ERCOT on a monthly basis within 35 days following the end of a calendar month.

(5) ERCOT shall use 15-minute interval meter data, adjusted for the deemed actual Distribution Loss Factors (DLFs), for each Demand Response MRA and each Other Generation MRA for purposes of availability and event performance measurement.

(a) The interval meter data for an MRA or MRA Site located in a competitive choice area will be adjusted by the DLFs used for Settlement for that MRA or MRA Site.

(b) The interval meter data for an MRA or MRA Site associated with a Unique Meter ID in a NOIE area will be adjusted based on a NOIE DSP DLF study submitted to ERCOT pursuant to Section 13.3, Distribution Losses. If no such study has been submitted, the interval meter data will not be adjusted for distribution losses.

3.14.4.6.4 MRA Availability Measurement and Verification

(1) Demand Response MRA and Other Generation MRA availability will be evaluated on a monthly basis.

(2) Within 45 days after the end of each month that a Demand Response MRA or an Other Generation MRA is obligated to be available under the terms of an MRA Agreement, ERCOT shall provide each QSE representing that MRA with a report of the MRAs availability for that month.

(3) For a Demand Response MRA or an Other Generation MRA, ERCOT will treat the MRA as unavailable for any committed intervals for which the meter data is not in ERCOT systems, regardless of the reason.

(4) For a Demand Response MRA, ERCOT will consider the Demand Response MRA to have been available for any 15-minute interval in which the Demand Response MRA was contracted and for which the most current Availability Plan for the Demand Response MRA indicates that the Demand Response MRA is available and for which the actual Load was greater than 95% of the Demand Response MRA’s contracted capacity; otherwise, the Demand Response MRA will be considered unavailable for that 15-minute interval. For purposes of payment under Section 6.6.6.7, MRA Standby Payment, the Demand Response MRA’s Monthly Availability Factor will be the ratio of the number of 15-minute intervals the Demand Response MRA was available during the MRA Contracted Month divided by the total number of contracted 15-minute intervals in the MRA Contracted Month.

(5) For an Other Generation MRA, ERCOT will consider the Other Generation MRA to have been available for any 15-minute interval in which the Other Generation MRA was contracted and for which the most current Availability Plan for the Other Generation MRA indicates that the Other Generation MRA is available and for which the Other Generation MRA’s export to the ERCOT System was equal to zero; otherwise, the Other Generation MRA will be considered unavailable for that 15-minute interval. For purposes of payment under Section 6.6.6.7, the Other Generation MRA’s Monthly Availability Factor will be the ratio of the number of 15-minute intervals the Other Generation MRA was available during the MRA Contracted Month divided by the total number of contracted 15-minute intervals in the MRA Contracted Month.

(6) The following intervals will be excluded in ERCOT’s calculations of an MRA’s Monthly Availability Factor, for purposes of payment under Section 6.6.6.7:

(a) Any 15-minute interval in which an MRA was deployed during an MRA deployment event or an unannounced ERCOT test;

(b) Any 15-minute intervals on the day of an MRA deployment or an unannounced ERCOT test following the issuance of the ERCOT recall instruction applicable to that MRA; and

(c) Any 15-minute interval in which an MRA or MRA Site was disabled or unverifiable due to events on the TDSP side of the meter affecting the generation, delivery or measurement of electricity to the MRA or MRA Site. QSEs must obtain documentation from the TDSP regarding such events and must provide copies of such documentation to ERCOT for any interval to be excluded from the Monthly Availability Factor calculation.

3.14.4.6.5 MRA Event Performance Measurement and Verification

(1) This section applies to both Demand Response MRAs and Other Generation MRAs. For purposes of this section, the following definitions apply:

(a) “Ramp Period” is the period of time, as set out in the MRA Agreement, by which the MRA agrees to begin delivering its contracted capacity following the ERCOT deployment VDI.

(b) “MRA Deployment Period” is the window of time beginning with the end of the MRA’s Ramp Period or the beginning of the MRA Contracted Hours, whichever is later, and ending with ERCOT’s VDI to recall the MRA.

(2) No later than 45 days after an event in which one or more Demand Response MRA or Other Generation MRA were tested or deployed, ERCOT shall provide each QSE representing an MRA with a performance report containing the results of ERCOT’s evaluation of the event or test for each deployed or tested MRA. The Event Performance Reduction Factor (MRAEPRF) for each MRA shall be the time-weighted average of the MRA’s Interval Performance Factors (MRAIPF) which are calculated as set out in paragraph (3) below.

(3) ERCOT shall calculate the MRAIPF for intervals during an unannounced ERCOT test or an MRA deployment as follows:

MRAIPF *q, r, i*  = Max(Min(((Effective Base\_MW *i* – Effective Actual\_MW *i*) / (IntFrac *i*

\* Effective Contracted\_Capacity\_MW *i*)),1),0)

Where:

IntFrac *i*= (CEndT *i* – CBegT *i*) / 15

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| MRAEPRF *q, r, m* | None | *Must-Run Alternative Event Performance Reduction Factor per QSE for the month*—The Event Performance Reduction Factor of the MRA *r* represented by QSE *q*, for each hour of the month *m*. The event performance reduction factor shall be determined as the time-weighted average of the Interval Performance Factor (MRAIPF). |
| MRAIPF *q, r, i* | None | *Must-Run Alternative Interval Performance Factor per QSE per Resource for the interval*— The interval performance factor of the MRA *r* represented by QSE *q*, for the Settlement Interval *i*. |
| IntFrac *i* | None | Interval fraction for that MRA for each Settlement Interval *i* in an MRA deployment period. |
| Effective Base\_MW*i* | MW | For an aggregated Demand Response MRA, the aggregated sum of the product of the MRA Site Shift Factor and the MRA Site baseline MW values estimated by ERCOT for all MRA Sites in the MRA for that interval. For a Demand Response MRA that is not an aggregation, the product of the MRA Shift Factor and the MRA baseline MW value estimated by ERCOT for that interval.  For an aggregated Other Generation MRA, the aggregated sum of the product of the MRA Site Shift Factor and the MRA Site MW injected to the ERCOT System for the Settlement Interval *i*. For an Other Generation MRA that is not an aggregation, the product of the MRA Shift Factor and the MW injected to the grid by the MRA for that interval. |
| Effective Actual\_MW *i* | MW | For an aggregated Demand Response MRA, the aggregated sum of the product of the MRA Site Shift Factor and the metered MW values for all MRA Sites in the MRA for the Settlement Interval *i*. For a Demand Response MRA that is not an aggregation, the product of the MRA Shift Factor and the metered MW value for the Settlement Interval *i*.  For an Other Generation MRA, zero. |
| Effective Contracted\_Capacity\_MW *i* | MW | For an aggregated MRA, the sum of the product of the MRA Site Shift Factor and the MRA Site portion of the contracted capacity of the MRA for the Settlement Interval *i*. |
| CBegT *i* | Minutes | If the MRA deployment period begins during that interval, the time in minutes and fractions of minutes from the beginning of that interval to the beginning of the MRA deployment period, otherwise it is zero. |
| CEndT *i* | Minutes | If the MRA deployment period ends during that interval, the time in minutes and fractions of minutes from the beginning of that interval to the end of the MRA deployment period, otherwise it is 15. |
| *i* | None | A 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *m* | None | The index for a given month within the MRA Contracted Hours. |
| *r* | None | An MRA. |

(4) For each unannounced ERCOT test or MRA deployment of a Demand Response MRA or Other Generation MRA, ERCOT will calculate an MRA Event Performance Reduction Factor (MRAEPRF) as described in paragraph (2) above for the intervals covered by the test/event. The Event Performance Reduction Factor calculation will begin with the first partial or full interval in the MRA deployment period and will end with the last full interval in the MRA deployment period.

(5) A Demand Response MRA shall be deemed to have met its test/event performance requirements if it is determined by ERCOT to have met its Demand response obligations in the MRA deployment event as measured using the ERCOT-established baseline that ERCOT determines most accurately represents the Demand Response MRA’s Demand response contribution.

(6) The MRA deployment period for a Demand Response MRA or Other Generation MRA will end at the time ERCOT issues a release instruction via VDI, or the end of the last MRA Contracted Hour on the day of the deployment, whichever is earlier.

(7) Event Performance Reduction Factors are expressed as a number between 0 and 1, rounded to three decimal places.

(8) A Demand Response MRA or an Other Generation MRA that achieves an Event Performance Reduction Factor of 0.950 or greater for a test/event and an Interval Performance Factor for the first full interval of the test/event of 0.950 or greater will be deemed to have successfully met its deployment obligations for that test/event.

(9) If a Demand Response MRA or an Other Generation MRA fails to achieve an Event Performance Reduction Factor of 0.950 or greater, the Interval Performance Factors for that MRA for that event will be multiplied by an adjustment factor such that the Event Performance Reduction Factor for the test/event will be equal to the square of the original event performance factor.

(10) If a Demand Response MRA has been classified by ERCOT as providing Weather-Sensitive MRA, and if ERCOT determines that the normalized peak Demand reduction value for the Demand Response MRA is greater than 95% of the largest contracted capacity value offered in any MRA Contracted Hour by the QSE for the Demand Response MRA, ERCOT shall not apply the adjustment factors as specified in paragraph (9) above. To determine the normalized peak Demand reduction value, ERCOT shall:

(a) Calculate an average Demand reduction value across the intervals for each test and/or actual deployment event during the MRA contract period. For this purpose the Demand reduction value for an interval shall be calculated as the greater of zero or effective base MW for the interval less the effective actual MW for the interval; and

(b) Model the relationship of the average Demand reduction values determined in paragraph (a) above to actual weather and use the derived normalized peak Demand reduction value as the value that would be realized under normalized peak weather conditions.

(11) For any contracted month in which ERCOT has deployed one or more Demand Response MRAs or Other Generation MRAs more than once for either an unannounced test or an MRA deployment, the Event Performance Reduction Factor (MRAEPRF) as described in paragraph (2) above for the MRA for the contracted month shall be the time-weighted average of the interval performance factor values for all tests/events in the Contracted Month. The interval performance factors used for this calculation shall reflect any squaring applied pursuant to paragraph (9) above.

3.14.4.6.5.1 Event Performance Measurement and Verification for Co-Located Demand Response MRAs and Other Generation MRAs

(1) A Demand Response MRA shall be deemed by ERCOT to be co-located with an Other Generation MRA when all of the following conditions are satisfied:

(a) For an aggregated Demand Response MRA and an aggregated Other Generation MRA, each MRA Site in the Demand Response MRA is physically located with an MRA Site in the Other Generation MRA; (b) For a Demand Response MRA that is not an aggregation and an Other Generation MRA that is not an aggregation, the Demand Response MRA is physically located with the Other Generation MRA;

(c) For a Demand Response MRA that is not an aggregation and an aggregated Other Generation MRA, the Demand Response MRA is physically located with an MRA Site the Other Generation MRA;

(d) The MRA Contracted Hours for the Demand Response MRA are the same as the MRA Contracted Hours for the Other Generation MRA; and

(e) The Demand Response MRA has not been classified by ERCOT as providing Weather-Sensitive MRA.

(2) If a Demand Response MRA has been deemed by ERCOT to be co-located with an Other Generation MRA, the event performance of the two Resources shall be calculated as a combination. For the calculations described in paragraph (2) of Section 3.14.4.6.5, MRA Event Performance Measurement and Verification, the effective base MW of the combination shall be the sum of the values calculated for the Demand Response MRA and Other Generation MRA, the effective actual MW shall be the sum of the values calculated for the Demand Response MRA and Other Generation MRA, and the effective contract capacity MW shall be the sum of the values calculated for the Demand Response MRA and Other Generation MRA.

(3) For the calculations described in paragraph (3) of Section 3.14.4.6.5, the MRAEPRF for the co-located combination shall be calculated as the time-weighted average of the interval performance factors calculated for the combination of the Demand Response MRA and Other Generation MRA. The steps described in paragraphs (4) through (10) of Section 3.14.4.6.5 shall be followed for the combination of the Demand Response MRA and Other Generation MRA, and the MRAEPRF for the Demand Response MRA and Other Generation MRA for the MRA Contracted Month shall be equal to the MRAEPRF calculated for the combination for the MRA Contracted Month.

3.14.4.7 MRA Testing

(1) ERCOT shall conduct a test of every MRA prior to the initial MRA Contracted Month.

(2) ERCOT may conduct an unannounced test of any MRA at any time during a MRA Contracted Month. Testing for MRAs, other than for Demand Response MRAs classified as providing Weather-Sensitive MRA, will be limited to no more than once per MRA Contracted Month. Testing for Demand Response MRAs classified as Weather-Sensitive MRA will be limited to no more than twice per MRA Contracted Month.

(3) ERCOT will not conduct an unannounced test of an MRA during a calendar month subsequent to an actual MRA deployment event.

(4) A substituted Demand Response MRA or Other Generation MRA will be subject to monthly unannounced testing regardless of tests or events occurring prior to the start date of the substitution.

(5) ERCOT shall limit the duration of MRA deployment periods of any single test to a maximum of one hour.

(6) For the purposes of Section 6.6.6.7, MRA Standby Payment, ERCOT may adjust the testing capacity results for a Generation Resource MRA to reflect conditions beyond the control of the Generation Resource MRA.

3.14.4.8 MRA Misconduct Events

(1) With respect to MRA Service, a “Misconduct Event” means any MRA Contracted Hour during which the MRA, in a deployment event, is directed to but does not make available to ERCOT the power injection or Demand response in the amount shown in the MRA Availability Plan.

(2) ERCOT will charge a QSE representing an MRA for unexcused Misconduct Events as specified in Section 6.6.6.11, MRA Charge for Unexcused Misconduct.

(3) ERCOT will assess a single charge to the QSE for each Operating Day on which one or more Misconduct Event occurs.

(4) The QSE may be excused by ERCOT from a Misconduct Event charge if ERCOT determines, in its discretion, that the Misconduct Event was not due to intentionally incomplete or inaccurate reporting to ERCOT regarding the availability of the MRA.

(5) ERCOT shall inform the QSE in writing of its determination if a Misconduct Event is deemed unexcused.

**6.5.5.2 Operational Data Requirements**

(1) ERCOT shall use Operating Period data to monitor and control the reliability of the ERCOT Transmission Grid and shall use it in network analysis software to predict the short-term reliability of the ERCOT Transmission Grid. Each TSP, at its own expense, may obtain that Operating Period data from ERCOT or directly from QSEs.

(2) A QSE representing a Generation Resource connected to Transmission Facilities or distribution facilities shall provide the following Real-Time telemetry data to ERCOT for each Generation Resource. ERCOT shall make that data available, in accordance with ERCOT Protocols, NERC Reliability Standards, and Governmental Authority requirements, to requesting TSPs and DSPs operating within ERCOT. Such data must be provided to the requesting TSP or DSP at the requesting TSP’s or DSP’s expense, including:

(a) Net real power (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered gross real power and conversion constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process. Net real power represents the actual generation of a Resource for all real power dispatch purposes, including use in Security-Constrained Economic Dispatch (SCED), determination of the High Ancillary Service Limit (HASL), High Dispatch Limit (HDL), Low Dispatch Limit (LDL) and Low Ancillary Service Limit (LASL), and is consistent with telemetered HSL, LSL and Non-Frequency Responsive Capacity (NFRC);

(b) Gross real power (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered real power, which may include Supervisory Control and Data Acquisition (SCADA) metering, and conversions constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process;

(c) Gross Reactive Power (in Megavolt-Amperes reactive (MVAr));

(d) Net Reactive Power (in MVAr);

(e) Power to standby transformers serving plant auxiliary Load;

(f) Status of switching devices in the plant switchyard not monitored by the TSP or DSP affecting flows on the ERCOT Transmission Grid;

(g) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;

(h) Generation Resource breaker and switch status;

(i) HSL (Combined Cycle Generation Resources) shall:

(i) Submit the HSL of the current operating configuration; and

(ii) When providing RRS, update the HSL as needed, to be consistent with Resource performance limitations of RRS provision;

(j) NFRC currently available (unloaded) and included in the HSL of the Combined Cycle Generation Resource’s current configuration;

(k) High Emergency Limit (HEL), under Section 6.5.9.2, Failure of the SCED Process;

(l) Low Emergency Limit (LEL), under Section 6.5.9.2;

(m) LSL;

(n) Configuration identification for Combined Cycle Generation Resources;

(o) Ancillary Service Schedule for each quantity of RRS and Non-Spin which is equal to the Ancillary Service Resource Responsibility minus the amount of Ancillary Service deployment;

(i) For On-line Non-Spin, Ancillary Service Schedule shall be set to zero;

(ii) For Off-Line Non-Spin and for On-Line Non-Spin using Off-Line power augmentation technology the Ancillary Service Schedule shall equal the Non-Spin obligation and then shall be set to zero within 20 minutes following Non-Spin deployment;

(p) Ancillary Service Resource Responsibility for each quantity of Regulation Up Service (Reg-Up), Regulation Down Service (Reg-Down), RRS and Non-Spin. The sum of Ancillary Service Resource Responsibility for all Resources in a QSE is equal to the Ancillary Service Supply Responsibility for that QSE;

(q) Reg-Up and Reg-Down participation factors represent how a QSE is planning to deploy the Ancillary Service energy on a percentage basis to specific qualified Resource(s). The Reg-Up and Reg-Down participation factors for a Resource providing Fast Responding Regulation Up Service (FRRS-Up) or Fast Responding Regulation Down Service (FRRS-Down) shall be zero; and

(r) The designated Master QSE of a Generation Resource that has been split to function as two or more Split Generation Resources shall provide Real-Time telemetry for items (a), (b), (c), (d), (e), (g), and (h) above, PSS and AVR status for the total Generation Resource in addition to the Split Generation Resource the Master QSE represents.

(3) For each Intermittent Renewable Resource (IRR), the QSE shall set the HSL equal to the current net output capability of the facility. The net output capability should consider the net real power of the IRR generation equipment, IRR generation equipment availability, weather conditions, and whether the IRR net output is being affected by compliance with a SCED Dispatch Instruction.

(4) For each Aggregate Generation Resource (AGR), the QSE shall telemeter the number of its generators online.

(5) A QSE representing a Load Resource connected to Transmission Facilities or distribution facilities shall provide the following Real-Time data to ERCOT for each Load Resource and ERCOT shall make the data available, in accordance with ERCOT Protocols, NERC standards and policies, and Governmental Authority requirements, to the Load Resource’s host TSP or DSP at the TSP’s or DSP’s expense. The Load Resource’s net real power consumption, Low Power Consumption (LPC) and Maximum Power Consumption (MPC) shall be telemetered to ERCOT using a positive (+) sign convention:

(a) Load Resource net real power consumption (in MW);

(b) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;

(c) Load Resource breaker status;

(d) LPC (in MW);

(e) MPC (in MW);

(f) Ancillary Service Schedule (in MW) for each quantity of RRS and Non-Spin, which is equal to the Ancillary Service Resource Responsibility minus the amount of Ancillary Service deployment;

(g) Ancillary Service Resource Responsibility (in MW) for each quantity of Reg-Up and Reg-Down for Controllable Load Resources, and RRS and Non-Spin for all Load Resources;

(h) The status of the high-set under-frequency relay, if required for qualification;

(i) For a Controllable Load Resource providing Non-Spin, the Scheduled Power Consumption that represents zero Ancillary Service deployments;

(j) For a single-site Controllable Load Resource with registered maximum Demand response capacity of ten MW or greater, net Reactive Power (in MVAr);

(k) Resource Status (Resource Status shall be ONRL if high-set under-frequency relay is active);

(l) Reg-Up and Reg-Down participation factor, which represents how a QSE is planning to deploy the Ancillary Service energy on a percentage basis to specific qualified Resource(s). The Reg-Up and Reg-Down participation factors for a Resource providing FRRS-Up or FRRS-Down shall be zero; and

(m) For a Controllable Load Resource providing Non-Spin, the “Scheduled Power Consumption Plus Two Hours,” representing the QSE’s forecast of the Controllable Load Resource’s instantaneous power consumption for a point two hours in the future.

(6) A QSE with Resources used in SCED shall provide communications equipment to receive ERCOT-telemetered control deployments.

(7) A QSE providing any Regulation Service shall provide telemetry indicating the appropriate status of Resources providing Reg-Up or Reg-Down, including status indicating whether the Resource is temporarily blocked from receiving Reg-Up and/or Reg-Down deployments from the QSE. This temporary blocking will be indicated by the enabling of the Raise Block Status and/or Lower Block Status telemetry points.

(a) Raise Block Status and Lower Block Status are telemetry points used in transient unit conditions to communicate to ERCOT that a Resource’s ability to adjust its output has been unexpectedly impaired.

(b) When one or both of the telemetry points are enabled for a Resource, ERCOT will cease using the regulation capacity assigned to that Resource for Ancillary Service deployment.

(c) This hiatus of deployment will not excuse the Resource’s obligation to provide the Ancillary Services for which it has been committed.

(d) These telemetry points shall only be utilized during unforeseen transient unit conditions such as plant equipment failures. Raise Block Status and Lower Block Status shall only be enabled until the Resource operator has time to update the Resource limits and Ancillary Service telemetry to reflect the problem.

(e) The Resource limits and Ancillary Service telemetry shall be updated as soon as practicable.  Raise Block Status and Lower Block Status will then be disabled.

(8) Real-Time data for reliability purposes must be accurate to within three percent. This telemetry may be provided from relaying accuracy instrumentation transformers.

(9) Each QSE shall report the current configuration of combined-cycle Resources that it represents to ERCOT. The telemetered Resource Status for a Combined Cycle Generation Resource may only be assigned a Resource Status of OFFNS if no generation units within that Combined Cycle Generation Resource are On-Line.

(10) A QSE representing Combined Cycle Generation Resources shall provide ERCOT with the possible operating configurations for each power block with accompanying limits. Combined Cycle Train power augmentation methods may be included as part of one or more of the registered Combined Cycle Generation Resource configurations. Power augmentation methods may include:

(a) Combustion turbine inlet air cooling methods;

(b) Duct firing;

(c) Other ways of temporarily increasing the output of Combined Cycle Generation Resources; and

(d) For Qualifying Facilities (QFs), an LSL that represents the minimum energy available for Dispatch by SCED, in MW, from the Combined Cycle Generation Resource based on the minimum stable steam delivery to the thermal host plus a justifiable reliability margin that accounts for changes in ambient conditions.

(11) A QSE representing Generation Resources other than Combined Cycle Generation Resources may telemeter an NFRC value for their Generation Resource only if the QSE or Resource Entity associated with that Generation Resource has first requested and obtained ERCOT’s approval of the Generation Resource’s NFRC quantity.

|  |
| --- |
| ***[NPRR829: Insert paragraph (12) below upon system implementation:]***  (12) A QSE representing a Non-Modeled Generator that elects to include the net generation of the Non-Modeled Generator in the estimate of Real-Time Liability (RTL) shall provide ERCOT Real-Time telemetry of the net generation of the Non-Modeled Generator. |

(13) A QSE representing an MRA shall telemeter the MRA MW currently available (unloaded) and not included in the HSL.

6.6.6 Reliability Must-Run and Must-Run Alternative Settlement

**6.6.6.7 MRA Standby Payment**

(1) The Standby Payment for MRA Service is paid to each QSE representing an MRA for each MRA Contracted Hour under performance requirements set forth in Section 22, Attachment M, Standard Form Must-Run Alternative Agreement, the MRA Request for Proposal (RFP), and the Protocols.

(2) The standby payment to each QSE representing a Generation Resource MRA registered is calculated as follows for each hour:

MRASBAMT *q, r, h* = (-1) \* MRASBPR *q, r, m* \* MRACCAP *q, r, m* \* MRAGRCRF *q, r, m* \* MRAARF *q, r, m*

Where:

MRAGRCRF *q, r, m* = (MRATCAP *q, r, m* + MRATCAPA *q, r, m*) /MRACCAP *q, r, m*

(3) The standby payment to each QSE representing an Other Generation MRA or Demand Response MRA is calculated as follows for each hour:

MRASBAMT *q, r, h* = (-1) \* MRASBPR *q, r, m* \* MRACCAP *q, r, m* \* MRAEPRF*q, r, m* \* MRAARF *q, r, m*

(4) The MRA Capacity Availability Reduction Factor (MRAARF) is calculated as:

For initial Settlement

MRAARF *q, r, m* = 1

For all other resettlements

If MRACMAF *q, r, m*  ≥ 95% \* MRATA *q, r, m*

MRAARF*q, r, m* = 1

If 85% \* MRATA *q, r, m* ≤ MRACMAF *q, r,m*  < 95%\* MRATA *q, r, m*

MRAARF*q, r, m* = MRACMAF *q, r, m*

If MRACMAF *q, r, m*  < 85% \* MRATA *q, r, m*

MRAARF*q, r, m* = (MRACMAF *q, r, m )2*

Where:

For an MRA registered as a Generation Resource,

MRACMAF *q, r, m*  = **** (MRAMAH *q, r, h* ) / (MH *q, r, m)*

And,

For an MRA not registered as a Generation Resource, the availability factor is calculated pursuant to Section 3.14.4.6.4, MRA Availability Measurement and Verification.

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MRASBAMT *q, r, h* | $ | *Must-Run Alternative Standby Amount per QSE per Resource by hour*—The hourly standby payment amount for MRA *r* represented by QSE *q*, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. |
| MRASBPR *q, r, m* | $/MW per hour | *Must-Run Alternative Standby Price per QSE per Resource per MW per hour*—The hourly standby price per MW for MRA *r* represented by QSE *q*, for the month *m*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. |
| MRAEPRF *q, r, m* | None | *Must-Run Alternative Event Performance Reduction Factor per QSE per Resource*—The Event Performance Reduction Factor of the MRA *r* represented by QSE *q*, for each hour of the month m, as calculated per Section 3.14.4.6.5, MRA Event Performance Measurement and Verification. If the MRAEPRF for the month is not available then the most recent MRAEPRF prior to month of the Operating Day shall be used. If no previous MRAEPRF is available then MRAEPRF shall be set to 1. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRAGRCRF *q, r, m* | None | *Must-Run Alternative Generation Resource Capacity Reduction Factor per QSE per Resource per month* —The capacity reduction factor of the Generation Resource MRA *r* represented by QSE *q*, for each hour of the month *m*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRACCAP*q, r, m* | MW | *Must-Run Alternative Contract Capacity per QSE per Resource*—The capacity of MRA *r* represented by QSE *q* as specified in the MRA Agreement, for the MRA Contracted Month *m*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRAARF *q, r, m* | None | *Must-Run Alternative Availability Reduction Factor per QSE per Resource*—The availability reduction factor of MRA *r* represented by QSE *q*, for each hour of the MRA Contracted Month *m*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRATCAPA*q, r, m* | MW | *Must-Run Alternative Testing Capacity Adjustment per month*—The testing capacity adjustment factor of an MRA *r* represented by QSE *q*, for each hour of the MRA Contracted Month *m*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRATCAP *q, r, m* | MW | *Must-Run Alternative Testing Capacity per month*—The testing capacity value of MRA *r* represented by QSE *q*, for each hour of the MRA Contracted Month *m*. If the MRATCAP for the month is not available then the most recent MRATCAP prior to month of the Operating Day shall be used. If no previous MRATCAP is available, then MRATCAP shall be set to MRACCAP. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. |
| MRATA *q, r, m* | None | *Must-Run Alternative Target Availability per QSE per Resource per Month*—The monthly Target Availability of MRA *r* represented by QSE *q*, as specified in the MRA Agreement and divided by 100 to convert a percentage to a fraction. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. |
| MRACMAF *q, r, m* | None | *Must-Run Alternative Calculated Monthly Availability Factor per QSE per Resource*—The calculated monthly availability factor of MRA *r* represented by QSE *q*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRAMAH *q, r, h* | Hour | *Number of Available Hours in the Month per QSE per Resource*— For an MRA registered as a Generation Resource, the total number of hours in the month when the MRA *r* represented by QSE *q* was available for the MRA Contracted Hours if the MRA’s Availability Plan and telemetry both indicate availability for that hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MH *q, r, m* | Hour | *Number of Total MRA Contracted Hours in the Month per QSE per Resource*—The total number of MRA Contracted Hours in the month for the MRA *r* represented by QSE *q* as indicated in the MRA Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *h* | None | A MRA Contracted Hour under the MRA Agreement for the MRA Contracted month. |
| *q* | None | A QSE. |
| *r* | None | An MRA. |
| *m* | None | An MRA Contracted Month under the MRA Agreement. |

(5) The total of the Standby Payments for all MRAs represented by the QSE for a given hour is calculated as follows:

MRASBAMTQSETOT *q*= MRASBAMT *q, r, h*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| MRASBAMTQSETOT *q* | $ | *Must-Run Alternative Standby Amount Total per QSE per hour* ⎯ The total of the Standby Payments for all MRAs represented by the QSE *q* for the hour. |
| MRASBAMT *q, r, h* | $ | *Must-Run Alternative Standby Amount per QSE per Resource by hour* —The hourly standby payment amount for MRA *r* represented by QSE *q*, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. |
| *q* | None | A QSE. |
| *r* | None | An MRA. |
| *h* | None | An MRA Contracted Hour under the MRA Agreement for the calendar month. |

(6) The total of the Standby Payments for a given hour is calculated as follows:

MRASBAMTTOT =  MRASBAMTQSETOT *q*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| MRASBAMTTOT | $ | *Must-Run Alternative Standby Amount Total* ⎯The total of the Standby Payments to all QSEs *q* for all MRAs for the hour. |
| MRASBAMTQSETOT *q* | $ | *Must-Run Alternative Standby Amount Total per QSE per hour* ⎯The total of the Standby Payments for all MRAs represented by the QSE *q* for the hour. |
| *q* | None | A QSE. |

**6.6.6.8 MRA Contributed Capital Expenditures Payment**

(1) The contributed capital expenditure payment to each QSE for each MRA for each MRA Contracted Hour of each month is calculated as follows:

MRACAPEXAMT *q, r* = (-1) \* MRAMCAPEX *q, r, m* / MH *q, r, m*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MRACAPEXAMT *q, r* | $ | *Must-Run Alternative Contributed Capital Expenditures Amount per QSE per Resource per hour*— The total monthly contributed capital expenditure payment for MRA *r* represented by QSE *q*, allocated to each MRA Contracted Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. |
| MRAMCAPEX *q, r, m* | $ | *Must-Run Alternative Monthly Contributed Capital Expenditures per QSE*— The total monthly contributed capital expenditures for MRA *r* represented by QSE *q*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. |
| MH *q, r, m* | hour | *Number of Total Contracted Hours in the Month per QSE per Resource*—The total number of MRA Contracted Hours in the MRA Contracted Month *m* for the MRA *r* represented by QSE *q* as indicated in the MRA Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An MRA. |
| *m* | none | An MRA Contracted Month under the MRA Agreement. |

(2) The total of the contributed capital expenditure payments for all MRAs represented by the QSE for a given hour is calculated as follows:

MRACAPEXAMTQSETOT *q* = MRACAPEXAMT *q, r*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| MRACAPEXAMTQSETOT *q* | $ | *Must-Run Alternative Contributed Capital Expenditures per QSE per hour* – The total contributed capital expenditures for all MRAs *r* represented by QSE *q* for the MRA Contracted Hour. |
| MRACAPEXAMT *q, r* | $ | *Must-Run Alternative Contributed Capital Expenditures Amount per QSE per Resource* – The total monthly contributed capital expenditure payment for MRA *r* represented by QSE q, allocated to each MRA Contracted Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An MRA. |

(3) The total contributed capital expenditure payments for a given MRA Contracted Hour is calculated as follows:

MRACAPEXAMTTOT =  MRACAPEXAMTQSETOT *q*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| MRACAPEXAMTTOT | $ | *Must-Run Alternative Contributed Capital Expenditures per hour* – The total contributed capital expenditures to all QSEs for all MRAs for the MRA Contracted Hour. |
| MRACAPEXAMTQSETOT *q* | $ | *Must-Run Alternative Contributed Capital Expenditures per QSE per hour* – The total contributed capital expenditures for all MRAsrepresented by QSE *q* for the MRA Contracted Hour. |
| *q* | none | A QSE. |

**6.6.6.9 MRA Payment for Deployment Event**

(1) The deployment event payment to each QSE representing a Generation Resource MRA:

MRADEAMT *q, r, h* = (-1) \* Max{EDPRICE *q, r, m*, (FIP + MRACEFA *q, r*) \* MRAPSUFQ *q, r*} \* MRAFLAG *q, r, h* */* MRAH *q, r*

(2) The deployment event payment to each QSE representing a Demand Response MRA or Other Generation MRA:

MRADEAMT *q, r, h* = (-1) \* Max{EDPRICE *q, r*, (FIP + MRACEFA *q, r*) \*

MRAPSUFQ *q, r*} \* MRAEPRF *q, r, m* */* MRAH *q, r*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MRADEAMT *q, r, h* | $ | *Must-Run Alternative Deployment Event Amount per QSE per Resource by hour*—The deployment event payment to QSE *q* for MRA *r*, for the MRA Contracted Hour *h*. Where for a Combined Cycle Train, the Resource r is the Combined Cycle Train. |
| FIP | $/MMBtu | *Fuel Index Price*—The FIP for the Operating Day. |
| EDPRICE *q, r* | $ | *Event Deployment Price per QSE per Resource*—The event deployment price to QSE *q* for MRA *r*, as specified in the MRA Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRAEPRF *q, r, m* | None | *Must-Run Alternative Event Performance Reduction Factor per QSE per Resource* —The event performance reduction factor of the MRA *r* represented by QSE *q*, for each hour of the month *m*, as calculated per Section 3.14.4.6.5, MRA Event Performance Measurement and Verification. If the MRAEPRF for the month is not available then the most recent MRAEPRF prior to the month of the Operating Day shall be used. If no previous MRAEPRF is available then MRAEPRF shall be set to 1. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRAPSUFQ *q, r* | MMBtu | *Must-Run Alternative Proxy Startup Fuel Quantity per QSE per Resource*⎯The proxy start up fuel quantity specified in the MRA Agreement for MRA *r* represented by QSE *q*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRAH *q, r* | Hour | *Must-Run Alternative Hours*—The number of hours during which MRA *r* represented by QSE *q* received a deployment instruction for each deployment event for the Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRAFLAG *q, r, h* | none | *Must-Run Alternative Flag –* An indicator to signify that an MRA *r* represented by QSE *q* followed the deployment instruction for the event for the hour *h*. An MRAFLAG value of 1 represents followed and a 0 represents did not follow the deployment. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRACEFA*q, r* | $/MMBtu | *Must-Run Alternative Contractual Estimated Fuel Adder*—The Estimated Fuel Adder for the MRA *r* represented by QSE *q* as specified in the MRA Agreement. Where for a Combined Cycle Train, the Generation Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An MRA. |
| *m* | none | An MRA Contracted Month under the MRA Agreement. |
| *h* | none | An MRA Contracted Hour under the MRA Agreement for the MRA Contracted Month. |

(3) The total of the deployment event payments for all MRAs represented by the QSE for a given MRA Contracted Hour is calculated as follows:

MRADEAMTQSETOT *q* =  MRADEAMT *q, r, h*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MRADEAMTQSETOT *q* | $ | *Must-Run Alternative Deployment Event Amount per QSE by hour*—The total of the deployment event payments for all MRAs *r*, represented by the QSE q for the hour. |
| MRADEAMT *q, r, h* | $ | *Must-Run Alternative Deployment Event Amount per QSE per Resource by hour*—The deployment event payment to QSE *q* for MRA *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An MRA. |
| *h* | none | An MRA Contracted Hour under the MRA Agreement for the MRA Contracted Month. |

(4) The total of the deployment event payments for a given MRA Contracted Hour is calculated as follows:

MRADEAMTTOT =  MRADEAMTQSETOT *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MRADEAMTTOT | $ | *Must-Run Alternative Deployment Event Amount Total by hour*—The total deployment event payment to all QSEs for all MRAs, for the hour. |
| MRADEAMTQSETOT *q* | $ | *Must-Run Alternative Deployment Event Amount per QSE by hour*—The total of the deployment event payments for all MRAs represented by the QSE *q* for the MRA Contracted Hour. |
| *q* | none | A QSE. |

**6.6.6.10 MRA Variable Payment for Deployment**

(1) The variable payment to each QSE representing a Generation Resource MRA:

Outside of the MRA Contracted Hours, a Generation Resource MRA shall be treated in Settlements in the same manner as any Generation Resource registered with ERCOT

For MRA Contracted Hours with a deployment instruction:

MRAVAMT *q, r, h* = (-1) \* (MRAGRCVP *q, r, h* – MRARTREV *q, r, h*)

For MRA Contracted Hours without a deployment instruction:

MRAVAMT *q, r, h* = (-1) \* (Min (MRAGRCVP *q, r, h*, MRARTREV *q, r, h*) – MRARTREV *q, r, h*)

Where,

MRAGRCVP *q, r, h* = Max [VPRICE *q*, *r*, (FIP + MRACEFA *q, r*) \*

MRAPHR *q, r*] \* Min(RTMG *q, r, p, i*, MRACCAP*q, r, m* / 4)

MRARTREV *q,*r,h = Max [0, (RESREV*q, r, gsc, p, i*+ (-1) \* (EMREAMT *q, r, p, i* +

VSSVARAMT *q, r, i*+ VSSEAMT *q, r, i*))]

(2) The variable payment to each QSE representing an Other Generation MRA:

For MRA Contracted Hours with a deployment instruction:

MRAVAMT *q, r, h* = (-1) \* (MRACVP *q, r, h* – MRACRTREV *q, r, h*)

For MRA Contracted Hours without a deployment instruction:

MRAVAMT *q, r,h* = (-1) \* (Min(MRACVP *q, r, h*, MRACRTREV *q, r, h*) –MRACRTREV *q, r, h*)

Where,

MRACVP *q, r, h*= Max[VPRICE *q, r*, (FIP + MRACEFA *q, r*) \* MRAPHR *q, r* ] \*

RTVQ *q, r, i*

MRACRTREV *q, r, h*= (Max(0, Min(RTVQ *q, r, i* , MRACCAP*q, r, m* / 4) \* RTSPP *p, i*))

Where,

RTVQ *q, r, i* = MRAIPF *q, r,i* \* MRACCAP*q, r, m* / 4

(3) The variable payment to each QSE representing a Demand Response MRA:

For MRA Contracted Hours with a deployment instruction:

MRAVAMT*q, r*, *h* = (-1) \* Max[VPRICE *q, r*, (FIP + MRACEFA *q, r*) \* MRAPHR *q, r* ] \* RTVQ *q, r, i*

Where,

RTVQ *q, r, i* = MRAIPF *q, r,i* \* MRACCAP*q, r, m* / 4

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MRAVAMT *q, r, h* | $ | *Must-Run Alternative Variable Amount per QSE per Resource by hour*—The variable payment to QSE *q* for MRA *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRAGRCVP *q, r, h* | $ | *Must-Run Alternative Generation Resource Calculated Variable Payment per QSE per Resource -* The variable payment to QSE *q* for Generation Resource MRA *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| FIP | $/MMBtu | *Fuel Index Price*—The FIP for the Operating Day. |
| MRARTREV*q, r*, *h* | $ | *Must-Run Alternative Real-Time Revenues per QSE per Resource by hour*—The revenues received in Real-Time for QSE *q* for MRA *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRACCAP*q, r, m* | MW | *Must-Run Alternative Contract Capacity per QSE per Resource*—The capacity of MRA *r* represented by QSE *q* as specified in the MRA Agreement, for the month. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRAIPF *q, r, i* | none | *Must-Run Alternative Interval Performance Factor per QSE per Resource for the interval*— The interval performance factor of the MRA *r* represented by QSE *q*, for the 15-minute Settlement Interval *i*. |
| MRACVP *q, r,h* | $ | *Must-Run Alternative Calculated Variable Payment per QSE per Resource -* The variable payment to QSE *q* for an Other Generation MRA or Demand Response MRA *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| VSSVARAMT *q, r, i* | $ | *Voltage Support Service VAr Amount per QSE per Generation Resource -* The payment to QSE *q* for the VSS provided by Generation Resource MRA *r*, for the 15-minute Settlement Interval *i*. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| VSSEAMT *q, r, i* | $ | *Voltage Support Service Energy Amount per QSE per Generation Resource*—The lost opportunity payment to QSE *q* for ERCOT-directed VSS from Generation Resource MRA *r* for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| RESREV *q, r, gsc, p, i* | $ | *Resource Share Revenue Settlement Payment*—The Resource share of the total payment to the entire Facility with a net metering arrangement attributed to Generation Resource MRA *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
| EMREAMT *q, r, p, i* | $ | *Emergency Energy Amount per QSE per Settlement Point per unit per interval—*The payment to QSE *q* for the additional energy produced by Generation Resource MRA *r* at Resource Node *p* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. Payment for emergency energy is made to the Combined Cycle Train. |
| VPRICE *q, r* | $/MWh | *Must-Run Alternative Variable Price per QSE per Resource*—The variable price for QSE *q* for MRA *r*, as specified in the MRA Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRAPHR *q, r* | MMBtu /MWh | *Must-Run Alternative Proxy Heat Rate per QSE per Resource – A proxy heat rate value for* MRA *r* represented by QSE *q, as* specified in the MRA Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRACRTREV *q, r, h* | $ | *Must-Run Alternative Calculated Real-Time Revenues per QSE per Resource* —The calculated variable revenue to QSE *q* for MRA *r*, for the hour. |
| RTVQ *q, r, i,* | MWh | *Real-Time Variable Quantity per QSE per Resource by Settlement Interval* — The Real-Time variable quantity for MRA *r* represented by QSE *q*, for the 15-minute Settlement Interval *i*. |
| RTMG *q, r, p, i* | MWh | *Real-Time Metered Generation per QSE per Settlement Point per Generation Resource*—The metered generation of Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRACEFA*q, r* | $/MMBtu | *Must-Run Alternative Contractual Estimated Fuel Adder*—The Estimated Fuel Adder that is contractually agreed upon in Section 22, Attachment M, Standard Form Must-Run Alternative Agreement. Where for a Combined Cycle Train, the Generation Resource *r* is the Combined Cycle Train. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price*⎯The Real-Time Settlement Point Price at the Settlement Point *p* for the 15-minute Settlement Interval *i*. |
| *q* | none | A QSE. |
| *r* | none | An MRA. |
| *m* | none | An MRA Contracted Month. |
| *h* | none | An MRA Contracted Hour for the MRA Contracted Month. |
| *i* | none | A 15-minute Settlement Interval during the MRA Contracted Hours. |
| *gsc* | none | A generation site code. |
| *p* | none | A Resource Node Settlement Point. |

(2) The total of the variable payments for all MRAs represented by the QSE for a given hour is calculated as follows:

MRAVAMTQSETOT *q* =  MRAVAMT *q, r, h*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MRAVAMTQSETOT *q* | $ | *Must-Run Alternative Variable Amount Total per QSE by hour*—The total variable payment for all MRAs *r,* represented by the QSE *q*, for the hour. |
| MRAVAMT *q, r, h* | $ | *Must-Run Alternative Variable Amount per QSE per Resource by hour*—The variable payment to QSE *q* representing MRA *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An MRA. |
| *h* | none | An MRA Contracted Hour for the MRA Contracted Month. |

(3) The total of the variable payments for a given MRA Contracted Hour is calculated as follows:

MRAVAMTTOT =  MRAVAMTQSETOT *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MRAVAMTTOT | $ | *Must-Run Alternative Variable Amount Total by hour*—The total variable payments for the MRA Contracted Hour. |
| MRAVAMTQSETOT *q* | $ | *Must-Run Alternative Variable Amount Total per QSE by hour*—The total variable payment for all MRAs*,* represented by the QSE *q*, for the MRA Contracted Hour. |
| *q* | none | A QSE. |

**6.6.6.11 MRA Charge for Unexcused Misconduct**

(1) If one or more Misconduct Events are not excused, as provided for in Section 3.14.4.8, MRA Misconduct Events, then ERCOT shall charge the QSE that represents the MRA an unexcused misconduct amount for the Operating Day as follows:

MRAUMAMT *q, r,h* = $10,000 \* MRAUMFLAG *q, r*, *d* / MRACH *q, r*, *d*

The above variable is defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MRAUMAMT *q, r, h* | $ | *Must-Run Alternative Unexcused Misconduct Charge per QSE per Resource*—The charge to QSE *q* for the unexcused Misconduct Event of MRA *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRAUMFLAG *q, r, d* | none | *Must-Run Alternative Unexecused Misconduct Flag per QSE per Resource*—A flag for the QSE *q* for the unexcused Misconduct Event of MRA *r* for an Operating Day *d*. The MRAUMFLAG of MRA represented by QSE *q*, 1 for a unexcused misconduct and 0 for none, for the day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MRACH *q, r, d* | hour | *Must-Run Alternative Contract Hours in the Operating Day –* The number of MRA Contracted Hours for QSE *q* for the MRA *r* for an Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An MRA. |
| *d* | none | An Operating Day within a month under an MRA Agreement |
| *h* | none | An MRA Contracted Hour for the MRA Contracted Month. |

(2) The total of the charges to each QSE for unexcused Misconduct Events of all MRAs represented by this QSE for a given hour is calculated as follows:

MRAUMAMTQSETOT *q* = MRAUMAMT *q, r*, *h*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MRAUMAMTQSETOT *q* | $ | *Must-Run Alternative Unexcused Misconduct Amount per QSE*⎯The total of the charges to QSE *q* for unexcused Misconduct Events of the MRAs for an MRA Contracted Hour. |
| MRAUMAMT *q, r, h* | $ | *Must-Run Alternative Unexcused Misconduct Charge per QSE per Resource*—The charge to QSE *q* for the unexcused Misconduct Event of MRA *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An MRA. |
| *h* | none | An MRA Contracted Hour for the MRA Contracted Month. |

(3) The total of the charges to all QSEs for unexcused Misconduct Events of all MRAs for an MRA Contracted Hour is calculated as follows:

MRAUMAMTTOT =  MRAUMAMTQSETOT *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MRAUMAMTTOT | $ | *Must-Run Alternative Unexcused Misconduct Amount Total per hour* ⎯The total of the charges for unexcused Misconduct Events for the hour. |
| MRAUMAMTQSETOT *q* | $ | *Must-Run Alternative Unexcused Misconduct Amount per QSE*⎯The total of the charges to QSE *q* for unexcused Misconduct Events of the MRAs for an MRA Contracted Hour. |
| *q* | none | A QSE. |

**6.6.6.12 MRA Service Charge**

(1) The total MRA cost for all MRAs is allocated to the QSEs representing Loads based on HLRS. The MRA Service charge to each QSE for a given hour is calculated as follows:

LAMRAAMT *q* = (-1) \* (MRASBAMTTOT + MRACAPEXAMTTOT + MRADEAMTTOT + MRAVAMTTOT + MRAUMAMTTOT) \* HLRS *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| LAMRAAMT *q* | $ | *Load-Allocated Must-Run Alternative Amount per QSE*—The MRA cost allocated to QSE *q* based on its HLRS. |
| MRASBAMTTOT | $ | *Must-Run Alternative Standby Amount Total ⎯*The total of the Standby Payments to all QSEs *q* for all MRAs for the hour. |
| MRACAPEXAMTTOT | $ | *Must-Run Alternative Contributed Capital Expenditures per hour* - The total contributed capital expenditures to all QSEs *q* for all MRAs *r* for the hour. |
| MRADEAMTTOT | $ | *Must-Run Alternative Deployment Event Amount Total by hour—*The total deployment event payment to all QSEs *q* for all MRAs *r*, for the hour. |
| MRAVAMTTOT | $ | *Must-Run Alternative Variable Amount Total by hour—*The total variable payments for the hour. |
| MRAUMAMTTOT | $ | *Must-Run Alternative Unexcused Misconduct Amount Total per hour* ⎯The total of the charges for unexcused Misconduct Events for the hour. |
| HLRS*q* | none | *The hourly LRS calculated for QSE q for the hour*. See Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour. |
| *q* | none | A QSE. |

***6.7.5 Real-Time Ancillary Service Imbalance Payment or Charge***

(1) Based on the Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders and a Real-Time Off-Line Reserve Price Adders, ERCOT shall calculate Ancillary Service imbalance Settlement, which will make Resources indifferent to the utilization of their capacity for energy or Ancillary Service reserves, as set forth in this Section.

(2) The payment or charge to each QSE for Ancillary Service imbalance is calculated based on the price calculation set forth in paragraph (11) of Section 6.5.7.3, Security Constrained Economic Dispatch, and applied to the following amounts for each QSE:

(a) The amount of Real-Time Metered Generation from all Generation Resources, represented by the QSE for the 15-minute Settlement Interval;

(b) The amount of On-Line capacity based on the telemetered High Sustained Limit (HSL) for all On-Line Generation Resources, the telemetered consumption from Load Resources with a validated Ancillary Service Schedule for RRS controlled by high-set under-frequency relay, and the capacity from Controllable Load Resources available to SCED;

(c) The amount of Ancillary Service Resource Responsibility for Reg-Up, RRS and Non-Spin for all Generation and Load Resources represented by the QSE for the 15-minute Settlement Interval.

(3) Resources meeting one or more of the following conditions will be excluded from the amounts calculated pursuant to paragraphs (2)(a) and (b) above:

(a) Intermittent Renewable Resources (IRRs) excluding Wind-powered Generation Resources (WGRs);

(b) Nuclear Resources;

(c) Resources with a telemetered ONTEST, STARTUP (except Resources with Non-Spin Ancillary Service Resource Responsibility greater than zero), or SHUTDOWN Resource Status excluding Resources telemetering both STARTUP Resource Status and greater than zero Non-Spin Ancillary Service Responsibility; or

(d) Resources with a telemetered net real power (in MW) less than 95% of their telemetered Low Sustained Limit (LSL) excluding Resources telemetering both STARTUP Resource Status and greater than zero Non-Spin Ancillary Service Responsibility.

(4) Reliability Must-Run (RMR) Units, and Must-Run Alternatives (MRAs), and Reliability Unit Commitment (RUC) Resources On-Line during the hour due to an ERCOT instruction, except for any RUC Resource committed by a RUC Dispatch Instruction where that Resource’s QSE subsequently opted out of RUC Settlement pursuant to paragraph (11) of Section 5.5.2, Reliability Unit Commitment (RUC) Process, will be excluded from the amounts calculated for the 15-minute Settlement Interval pursuant to paragraphs (2)(a), (b), and (c) above.

(5) The Real-Time Off-Line Reserve Capacity for the QSE (RTOFFCAP) shall be administratively set to zero when the SCED snapshot of the Physical Responsive Capability (PRC) is less than or equal to the PRC MW at which Energy Emergency Alert (EEA) Level 1 is initiated.

(6) Resources that have a Under Generation Volume (UGEN) greater than zero, and are not-exempt from a Base Point Deviation Charge, as set forth in Section 6.6.5, Base Point Deviation Charge, or are not already excluded in paragraphs (3) or (4) above, for the 15-minute Settlement Interval will have the UGEN amounts removed from the amounts calculated pursuant to paragraphs (2)(a) and (b) above.

(7) The payment or charge to each QSE for the Ancillary Service Imbalance for a given 15-minute Settlement Interval is calculated as follows:

**RTASIAMT *q* = (-1) \* [(RTASOLIMB *q* \* RTRSVPOR) + (RTASOFFIMB *q* \* RTRSVPOFF)]**

**RTRDASIAMT *q*= (-1) \* (RTASOLIMB *q* \* RTRDP)**

Where:

RTASOLIMB *q*= RTOLCAP *q* – [((SYS\_GEN\_DISCFACTOR \* RTASRESP *q* ) \* ¼) – RTASOFF *q* – RTRUCNBBRESP *q*– RTCLRNSRESP *q* – RTRMRRESP *q*]

Where:

RTASOFF *q* = SYS\_GEN\_DISCFACTOR \* RTASOFFR *q, r, p*



RTRUCNBBRESP *q*= SYS\_GEN\_DISCFACTOR \* RTRUCASA *q, r* \* ¼



RTCLRNSRESP *q* = SYS\_GEN\_DISCFACTOR \* RTCLRNSRESPR *q, r, p*



RTRMRRESP *q* = SYS\_GEN\_DISCFACTOR \*(HRRADJ *q, r, p* + HRUADJ *q, r, p* + HNSADJ *q, r, p*) \* ¼



RTOLCAP *q* = (RTOLHSL *q* – RTMGQ *q* – SYS\_GEN\_DISCFACTOR \* (UGENA *q, r, p*)) + RTCLRCAP *q* + RTNCLRCAP *q*



Where:

RTNCLRCAP *q* = Min(Max(RTNCLRNPC *q* – RTNCLRLPC *q*, 0.0), RTNCLRRRS *q* \* 1.5)

RTNCLRRRS *q =* SYS\_GEN\_DISCFACTOR \*  RTNCLRRRSR *q, r, p*

RTNCLRNPC *q =* SYS\_GEN\_DISCFACTOR \* RTNCLRNPCR *q, r, p*

RTNCLRLPC *q =* SYS\_GEN\_DISCFACTOR \* RTNCLRLPCR *q, r, p*

RTOLHSL *q* = SYS\_GEN\_DISCFACTOR \* RTOLHSLRA *q, r, p*



RTMGQ *q* = SYS\_GEN\_DISCFACTOR \* RTMGA *q, r, p*



If RTMGA *q, r, p* > RTOLHSLRA *q, r, p*

Then RTMGA *q, r, p* = RTOLHSLRA *q, r, p*

RTCLRCAP *q*= RTCLRNPC *q* – RTCLRLPC *q* – RTCLRNS *q* + RTCLRREG *q*

Where:

RTCLRNPC *q*= SYS\_GEN\_DISCFACTOR \* RTCLRNPCR ***q, r, p***



RTCLRLPC *q* = SYS\_GEN\_DISCFACTOR \* RTCLRLPCR ***q, r, p***



RTCLRNS *q* = SYS\_GEN\_DISCFACTOR \* RTCLRNSR ***q, r, p***



RTCLRREG *q* = SYS\_GEN\_DISCFACTOR \* RTCLRREGR *q, r, p*



RTRSVPOR = image010(RNWF  *y* \* RTORPA *y*)

RTASOFFIMB *q* = RTOFFCAP *q* – (RTASOFF *q* + RTCLRNSRESP *q*)

RTOFFCAP *q* = (SYS\_GEN\_DISCFACTOR \* RTCST30HSL *q*) + (SYS\_GEN\_DISCFACTOR \* RTOFFNSHSL *q*)+ RTCLRNS *q*

RTRSVPOFF = image010(RNWF  *y* \* RTOFFPA *y*)

RTRDP = (RNWF  *y* \* RTORDPA *y*)



RNWF *y*= TLMP *y* / TLMP *y*



The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RTASIAMT *q* | $ | *Real-Time Ancillary Service Imbalance Amount*—The total payment or charge to QSE *q* for the Real-Time Ancillary Service imbalance associated with Operating Reserve Demand Curve (ORDC) for each 15-minute Settlement Interval. |
| RTRDASIAMT *q* | $ | *Real-Time Reliability Deployment Ancillary Service Imbalance Amount*—The total payment or charge to QSE *q* for the Real-Time Ancillary Service imbalance associated with Reliability Deployments for each 15-minute Settlement Interval. |
| RTASOLIMB *q* | MWh | *Real Time Ancillary Service On-Line Reserve Imbalance for the QSE* ⎯The Real-Time Ancillary Service On-Line reserve imbalance for the QSE *q*, for each 15-minute Settlement Interval. |
| RTORPA*y* | $/MWh | *Real-Time On-Line Reserve Price Adder per interval*⎯The Real-Time Price Adder for On-Line Reserves for the SCED interval *y*. |
| RTOFFPA *y* | $/MWh | *Real-Time Off-Line Reserve Price Adder per interval*⎯The Real-Time Price Adder for Off-Line Reserves for the SCED interval *y*. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y*. |
| RTRDP | $/MWh | *Real-Time On-Line Reliability Deployment Price*⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-time On-Line Reliability Deployment Price Adder. |
| RTORDPA*y* | $/MWh | *Real-Time On-Line Reliability Deployment Price Adder*⎯The Real-Time Price Adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. |
| RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Resource Node Settlement Point Price calculation for the portion of the SCED interval *y* within the 15-minute Settlement Interval. |
| RTRSVPOR | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval. |
| RTRSVPOFF | $/MWh | *Real-Time Reserve Price for Off-Line Reserves*⎯The Real-Time Reserve Price for Off-Line Reserves for the 15-minute Settlement Interval. |
| RTOLCAP *q* | MWh | *Real-Time On-Line Reserve Capacity for the QSE*⎯The Real-Time reserve capacity of On-Line Resources available for the QSE *q*, for the 15-minute Settlement Interval. |
| RTOLHSLRA *q, r, p* | MWh | *Real-Time Adjusted On-Line High Sustained Limit for the Resource*⎯The Real-Time telemetered HSL for the Resource *r* represented by QSE *q* at Resource Node *p* that is available to SCED, integrated over the 15-minute Settlement Interval, and adjusted pursuant to paragraphs (3) and (4) above. |
| RTOLHSL *q* | MWh | *Real-Time On-Line High Sustained Limit for the QSE*⎯The Real-Time telemetered HSL for all Generation Resources available to SCED, pursuant to paragraphs (3) and (4) above, integrated over the 15-minute Settlement Interval for the QSE *q*, discounted by the system-wide discount factor. |
| RTASRESP *q* | MW | *Real-Time Ancillary Service Supply Responsibility for the QSE*⎯The Real-Time Ancillary Service Supply Responsibility for Reg-Up, RRS and Non-Spin pursuant to Section 4.4.7.4, Ancillary Service Supply Responsibility, for all Generation and Load Resources for the QSE *q*, for the 15-minute Settlement Interval. |
| RTCLRCAP *q* | MWh | *Real-Time Capacity from Controllable Load Resources for the QSE*—The Real-Time capacity and Reg-Up minus Non-Spin available from all Controllable Load Resources available to SCED for the QSE *q*, integrated over the 15-minute Settlement Interval. |
| RTNCLRCAP ***q*** | MWh | *Real-Time Capacity from Non-Controllable Load Resources carrying Responsive Reserve for the QSE*—The Real-Time capacity for all Load Resources other than Controllable Load Resources that have a validated Real-Time RRS Ancillary Service Schedule for the QSE *q*, integrated over the 15-minute Settlement Interval. |
| RTNCLRRRS *q* | MWh | *Real-Time Non-Controllable Load Resources Responsive Reserve for the QSE—*The validated Real-Time telemetered RRS Ancillary Service Supply Responsibility for all Load Resources other than Controllable Load Resources for QSE *q* discounted by the system-wide discount factor, integrated over the 15-minute Settlement Interval. |
| RTNCLRRRSR *q, r, p* | MWh | *Real-Time Non-Controllable Load Resource Responsive Reserve—*The validated Real-Time telemetered RRS Ancillary Service Resource Responsibility for the Load Resource *r* (which is not a Controllable Load Resource) represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval. |
| RTNCLRNPCR *q, r, p* | MWh | *Real-Time Non-Controllable Load Resource Net Power Consumption—*The Real-Time net real power consumption from the Load Resource *r* (which is not a Controllable Load Resource)represented by QSE *q* at Resource Node *p* that has a validated Real-Time RRS Ancillary Service Schedule integrated over the 15-minute Settlement Interval. |
| RTNCLRLPCR *q, r, p* | MWh | *Real-Time Non-Controllable Load Resource Low Power Consumption—*The Real-Time Low Power Consumption (LPC) from the Load Resource *r* (which is not a Controllable Load Resource)represented by QSE *q* at Resource Node *p* that has a validated Real-Time RRS Ancillary Service Schedule integrated over the 15-minute Settlement Interval |
| RTNCLRNPC *q* | MWh | *Real-Time Non-Controllable Load Resource Net Power Consumption for the QSE—*The Real-Time net real power consumption from all Load Resources other than Controllable Load Resources for QSE *q* that have a validated Real-Time RRS Ancillary Service Schedule integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |
| RTNCLRLPC *q* | MWh | *Real-Time Non-Controllable Load Resource Low Power Consumption for the QSE—*The Real-Time LPC from all Load Resources other than Controllable Load Resourcesfor QSE *q* that have a validated Real-Time RRS Ancillary Service Schedule integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |
| RTCLRNPCR *q, r, p* | MWh | *Real-Time Net Power Consumption from the Controllable Load Resource—*The Real-Time net real power consumption from the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p* available to SCED integrated over the 15-minute Settlement Interval. |
| RTCLRNPC *q* | MWh | *Real-Time Net Power Consumption from Controllable Load Resources for the QSE*—The Real-Time net real power consumption from all Controllable Load Resources available to SCED integrated over the 15-minute Settlement Interval for the QSE *q* discounted by the system-wide discount factor. |
| RTCLRLPCR *q, r, p* | MWh | *Real-Time Low Power Consumption for the Controllable Load Resource—*The Real-Time LPC from the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p* available to SCED integrated over the 15-minute Settlement Interval. |
| RTCLRLPC *q* | MWh | *Real-Time Low Power Consumption from Controllable Load Resources for the QSE*—The Real-Time LPC from Controllable Load Resources available to SCED integrated over the 15-minute Settlement Interval for the QSE *q* discounted by the system-wide discount factor. |
| RTCLRREG *q* | MWh | *Real-Time Controllable Load Resources Regulation-Up Schedule for the QSE*—The Real-Time Reg-Up Ancillary Service Schedule from all Controllable Load Resources with Primary Frequency Response for the QSE *q*, integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |
| RTCLRREGR*q, r, p* | MWh | *Real-Time Controllable Load Resource Regulation-Up Schedule for the Resource*—The validated Real-Time Reg-Up Ancillary Service Schedule for the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p* with Primary Frequency Response, integrated over the 15-minute Settlement Interval. |
| RTMGA *q, r, p* | MWh | *Real-Time Adjusted Metered Generation per QSE per Settlement Point per Resource*—The adjusted metered generation, pursuant to paragraphs (3) and (4) above, of Generation Resource *r* represented by QSE *q* at Resource Node *p* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMGQ *q* | MWh | *Real-Time Metered Generation per QSE*—The metered generation, discounted by the system-wide discount factor, of all generation Resources represented by QSE *q* in Real-Time for the 15-minute Settlement Interval, pursuant to paragraphs (3) and (4) above. |
| RTASOFFIMB *q* | MWh | *Real-Time Ancillary Service Off-Line Reserve Imbalance for the QSE*⎯The Real-Time Ancillary Service Off-Line reserve imbalance for the QSE *q*, for each 15-minute Settlement Interval. |
| RTOFFCAP *q* | MWh | *Real-Time Off-Line Reserve Capacity for the QSE*⎯The Real-Time reserve capacity of Off-Line Resources available for the QSE *q*, for the 15-minute Settlement Interval. |
| RTCST30HSL *q* | MWh | *Real-Time Generation Resources with Cold Start Available in 30 Minutes*⎯The Real-Time telemetered HSLs of Generation Resources, excluding IRRs, that have telemetered an OFF Resource Status and can be started from a cold temperature state in 30 minutes for the QSE *q*, time-weighted over the 15-minute Settlement Interval. |
| RTOFFNSHSL *q* | MWh | *Real-Time Generation Resources with Off-Line Non-Spin Schedule*⎯The Real-Time telemetered HSLs of Generation Resources that have telemetered an OFFNS Resource Status for the QSE *q*, time-weighted over the 15-minute Settlement Interval. |
| RTASOFFR *q, r, p* | MWh | *Real-Time Ancillary Service Schedule for the Off-Line Generation Resource*⎯The validated Real-Time telemetered Ancillary Service Schedule for the Off-Line Generation Resource *r* represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval. |
| RTASOFF *q* | MWh | *Real-Time Ancillary Service Schedule for Off-Line Generation Resources for the QSE*⎯The Real-Time telemetered Ancillary Service Schedule for all Off-Line Generation Resources discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval. |
| HRRADJ *q, r, p* | MW | *Ancillary Service Resource Responsibility Capacity for Responsive Reserve at Adjustment Period—*The Responsive Reserve Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last Current Operating Plan (COP) and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval. |
| HRUADJ *q, r, p* | MW | *Ancillary Service Resource Responsibility Capacity for Reg-Up at Adjustment Period—*The Regulation Up Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last COP and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval. |
| HNSADJ *q, r, p* | MW | *Ancillary Service Resource Responsibility Capacity for Non-Spin at Adjustment Period—*The Non-Spin Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last COP and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval. |
| RTRUCNBBRESP *q* | MWh | *Real-Time RUC Ancillary Service Supply Responsibility for the QSE in Non-Buy-Back hours*⎯The Real-Time Ancillary Service Supply Responsibility for Reg-Up, RRS and Non-Spin pursuant to the Ancillary Service awards, for the 15-minute Settlement Interval that falls within a RUC-Committed Hour, discounted by the system-wide discount factor for the QSE *q.* |
| RTRUCASA *q, r* | MW | *Real-Time RUC Ancillary Service Awards*⎯The Real-Time Ancillary Service award to the RUC Resource *r* for Reg-Up, RRS and Non-Spin for the hour that includes the 15-minute Settlement Interval that falls within a RUC-Committed Hour for the QSE *q.* |
| RTCLRNSRESP *q* | MWh | *Real-Time Controllable Load Resource Non-Spin Responsibility for the QSE*⎯The Real Time telemetered Non-Spin Ancillary Service Supply Responsibility for all Controllable Load Resources available to SCED discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval. |
| RTCLRNSRESPR *q, r, p* | MWh | *Real-Time Controllable Load Resource Non-Spin Responsibility for the Resource*⎯The Real-Time telemetered Non-Spin Ancillary Service Resource Responsibility for the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p* available to SCED, integrated over the 15-minute Settlement Interval. |
| RTRMRRESP *q* | MWh | *Real-Time Ancillary Service Supply Responsibility for RMR Units represented by the QSE*⎯The Real-Time Ancillary Service Supply Responsibility as set forth in the end of the Adjustment Period COP for Reg-Up, RRS and Non-Spin for all RMR Units discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval. |
| RTCLRNSR *q, r, p* | MWh | *Real-Time Non-Spin Schedule for the Controllable Load Resource ⎯*The validated Real Time telemetered Non-Spin Ancillary Service Schedule for the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval. |
| RTCLRNS *q* | MWh | *Real-Time Non-Spin Schedule for Controllable Load Resources for the QSE*⎯The Real-Time telemetered Non-Spin Ancillary Service Schedule for all Controllable Load Resources for the QSE *q*, integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |
| SYS\_GEN\_DISCFACTOR | none | *System-Wide Discount Factor* – The system-wide discount factor used to discount inputs used in the calculation of Real-Time Ancillary Services Imbalance payment or charge is calculated as the average of the currently approved Reserve Discount Factors (RDFs) applied to the temperatures from the current Season from the year prior. |
| UGEN *q, r, p* | MWh | *Under Generation Volumes per QSE per Settlement Point per Resource*—The amount under-generated by the Generation Resource *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval. |
| UGENA *q, r, p* | MWh | *Adjusted Under Generation Volumes per QSE per Settlement Point per Resource*—The amount under-generated by the Generation Resource *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval adjusted pursuant to paragraph (6) above. |
| *r* | none | A Generation or Load Resource. |
| *y* | none | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Resource Node Settlement Point. |

(8) The payment to each QSE for the Ancillary Service reserves associated with RUC Resources that have received a RUC Dispatch to provide Ancillary Services in which the 15-minute Settlement Interval is part of a RUC Buy-Back Hour based on the RUC opt out provision set forth in paragraph (11) of Section 5.5.2 for a given 15-minute Settlement Interval is calculated as follows:

**RTRUCRSVAMT *q* = (-1) \* (RTRUCRESP *q* \* RTRSVPOR)**

**RTRDRUCRSVAMT *q* = (-1) \* (RTRUCRESP *q* \* RTRDP)**

Where:

RTRUCRESP *q* = RTRUCASA *q, r* \* ¼



The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RTRUCRSVAMT*q* | $ | *Real-Time RUC Ancillary Service Reserve Amount*—The total payment |to QSE *q* for the Real-Time RUC Ancillary Service Reserve payment associated with ORDC for each 15-minute Settlement Interval. |
| RTRDRUCRSVAMT *q* | $ | *Real-Time Reliability Deployment RUC Ancillary Service Reserve Amount*—The total payment |to QSE *q* for the Real-Time RUC Ancillary Service Reserve payment associated with reliability deployments for each 15-minute Settlement Interval. |
| RTRUCRESP *q* | MWh | *Real-Time RUC Ancillary Service Supply Responsibility for the QSE*⎯The Real-Time Ancillary Service Supply Responsibility pursuant to the Ancillary Service awards for Reg-Up, RRS and Non-Spin for all RUC Resources that have opted out per paragraph (11) of Section 5.5.2 for the QSE *q*, for the 15-minute Settlement Interval. |
| RTRUCASA *q, r* | MW | *Real-Time RUC Ancillary Service Awards*⎯The Real-Time Ancillary Service award to the RUC Resource *r* for Reg-Up, RRS and Non-Spin for the 15-minute Settlement Interval that falls within a RUC-Committed Hour for the QSE *q.* |
| RTRSVPOR | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval. |
| RTRDP | $/MWh | *Real-Time On-Line Reliability Deployment Price* ⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-time On-Line Reliability Deployment Price Adder. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

***9.5.3 Real-Time Market Settlement Charge Types***

(1) ERCOT shall provide, on each RTM Settlement Statement, the dollar amount for each RTM Settlement charge and payment. The RTM Settlement “Charge Types” are:

(a) Section 5.7.1, RUC Make-Whole Payment;

(b) Section 5.7.2, RUC Clawback Charge;

(c) Section 5.7.3, Payment When ERCOT Decommits a QSE-Committed Resource;

(d) Section 5.7.4.1, RUC Capacity-Short Charge;

(e) Section 5.7.4.2, RUC Make-Whole Uplift Charge;

(f) Section [5.7.5, RUC Clawback Payment](#_Toc109528011);

(g) Section [5.7.6, RUC Decommitment Charge](#_Toc109528014);

(h) Section 6.6.3.1, Real-Time Energy Imbalance Payment or Charge at a Resource Node;

(i) Section 6.6.3.2, Real-Time Energy Imbalance Payment or Charge at a Load Zone;

(j) Section 6.6.3.3, Real-Time Energy Imbalance Payment or Charge at a Hub;

(k) Section 6.6.3.4, Real-Time Energy Payment for DC Tie Import;

(l) Section 6.6.3.5, Real-Time Payment for a Block Load Transfer Point;

(m) Section 6.6.3.6, Real-Time Energy Charge for DC Tie Export Represented by the QSE Under the Oklaunion Exemption;

|  |
| --- |
| ***[NPRR664: Insert items (n) and (o) below upon system implementation and renumber accordingly:]***  (n) Section 6.6.3.7, Real-Time Make-Whole Payment for Exceptional Fuel Cost;  (o) Section 6.6.3.8, Real-Time Make-Whole Charge for Exceptional Fuel Cost; |

(n) Section 6.6.3.7, Real-Time High Dispatch Limit Override Energy Payment;

(o) Section 6.6.3.8, Real-Time High Dispatch Limit Override Energy Charge;

(p) Section 6.6.4, Real-Time Congestion Payment or Charge for Self-Schedules;

(q) Section 6.6.5.1.1.1, Base Point Deviation Charge for Over Generation;

(r) Section 6.6.5.1.1.2, Base Point Deviation Charge for Under Generation;

(s) Section 6.6.5.2, IRR Generation Resource Base Point Deviation Charge;

(t) Section 6.6.5.4, Base Point Deviation Payment;

(u) Section 6.6.6.1, RMR Standby Payment;

(v) Section 6.6.6.2, RMR Payment for Energy;

(w) Section 6.6.6.3, RMR Adjustment Charge;

(x) Section 6.6.6.4, RMR Charge for Unexcused Misconduct;

(y) Section 6.6.6.5, RMR Service Charge;

(z) Section 6.6.6.7, MRA Standby Payment;

(aa) Section 6.6.6.8, MRA Contributed Capital Expenditures Payment;

(bb) Section 6.6.6.9, MRA Payment for Deployment Event;

(cc) Section 6.6.6.10, MRA Variable Payment for Deployment;

(dd) Section 6.6.6.11, MRA Charge for Unexcused Misconduct;

(ee) Section 6.6.6.12, MRA Service Charge;

(ff) Paragraph (2) of Section 6.6.7.1, Voltage Support Service Payments;

(gg) Paragraph (4) of Section 6.6.7.1;

(hh) Section 6.6.7.2, Voltage Support Charge;

(ii) Section 6.6.8.1, Black Start Hourly Standby Fee Payment;

(jj) Section 6.6.8.2, Black Start Capacity Charge;

(kk) Section 6.6.9.1, Payment for Emergency Power Increase Directed by ERCOT;

(ll) Section 6.6.9.2, Charge for Emergency Power Increases;

(mm) Section 6.6.10, Real-Time Revenue Neutrality Allocation;

(nn) Paragraph (1)(a) of Section 6.7.1, Payments for Ancillary Service Capacity Sold in a Supplemental Ancillary Services Market (SASM) or Reconfiguration Supplemental Ancillary Services Market (RSASM);

(oo) Paragraph (1)(b) of Section 6.7.1;

(pp) Paragraph (1)(c) of Section 6.7.1;

(qq) Paragraph (1)(d) of Section 6.7.1;

(rr) Paragraph (1)(a) of Section 6.7.2, Payments for Ancillary Service Capacity Assigned in Real-Time Operations;

(ss) Paragraph (1)(b) of Section 6.7.2;

(tt) Paragraph (1)(a) of Section 6.7.2.1, Charges for Infeasible Ancillary Service Capacity Due to Transmission Constraints;

(uu) Paragraph (1)(b) of Section 6.7.2.1;

(vv) Paragraph (1)(c) of Section 6.7.2.1;

(ww) Paragraph (1)(d) of Section 6.7.2.1;

|  |
| --- |
| ***[NPRR841: Insert item (xx) below upon system implementation and renumber accordingly:]***  (xx) Paragraph (3) of Section 6.7.2.2, Real-Time Adjustments to Day-Ahead Make-Whole Payments due to Ancillary Services Infeasibility Charges; |

(xx) Paragraph (1)(a) of Section 6.7.3, Charges for Ancillary Service Capacity Replaced Due to Failure to Provide;

(yy) Paragraph (1)(b) of Section 6.7.3;

(zz) Paragraph (1)(c) of Section 6.7.3;

(aaa) Paragraph (1)(d) of Section 6.7.3;

(bbb) Paragraph (2) of Section 6.7.4, Adjustments to Cost Allocations for Ancillary Services Procurement;

(ccc) Paragraph (3) of Section 6.7.4;

(ddd) Paragraph (4) of Section 6.7.4;

(eee) Paragraph (5) of Section 6.7.4;

(fff) Paragraph (7) of Section 6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge (Real-Time Ancillary Service Imbalance Amount);

(ggg) Paragraph (7) of Section 6.7.5, (Real-Time Reliability Deployment Ancillary Service Imbalance Amount);

(hhh) Paragraph (8) of Section 6.7.5, (Real-Time RUC Ancillary Service Reserve Amount);

(iii) Paragraph (8) of Section 6.7.5, (Real-Time Reliability Deployment RUC Ancillary Service Reserve Amount);

(jjj) Section 6.7.6, Real Time Ancillary Service Imbalance Revenue Neutrality Allocation (Load-Allocated Ancillary Service Imbalance Revenue Neutrality Amount);

(kkk) Section 6.7.6, (Load-Allocated Reliability Deployment Ancillary Service Imbalance Revenue Neutrality Amount);

(lll) Section 7.9.2.1, Payments and Charges for PTP Obligations Settled in Real-Time; and

(mmm) Section 9.16.1, ERCOT System Administration Fee.

(2) In the event that ERCOT is unable to execute the Day-Ahead Market (DAM), ERCOT shall provide, on each RTM Settlement Statement, the dollar amount for the following RTM Congestion Revenue Right (CRR) Settlement charges and payments:

(a) Section 7.9.2.4, Payments for FGRs in Real-Time; and

(b) Section 7.9.2.5, Payments and Charges for PTP Obligations with Refund in Real-Time.

**ERCOT Protocols**

**Section 22**

**Attachment M: Standard Form Must-Run Alternative Agreement**

**TBD**

Standard Form Must-Run Alternative

Supplement to the Market Participant Agreement

Between

(Name of Participant)

and

Electric Reliability Council of Texas, Inc.

This Must-Run Alternative Service Supplement to the Market Participant Agreement (“Agreement”), effective as of the \_\_\_\_\_\_\_\_\_\_ day of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_ (“Effective Date”), is entered into by and between [insert Participant’s name], a [insert business Entity type and state] (“Participant”) and Electric Reliability Council of Texas, Inc., a Texas non-profit corporation (“ERCOT”).

Recitals

WHEREAS:

A. Participant is a Qualified Scheduling Entity (QSE) as defined in the ERCOT Protocols, has executed a Standard Form Market Participant Agreement (“Market Participant Agreement”) with ERCOT, and intends to provide Must-Run Alternative (MRA) Service;

B. ERCOT is the Independent Organization certified under PURA §39.151 for the ERCOT Region;

C. On \_\_\_\_\_\_\_, 20\_\_, ERCOT issued a Request for Proposals (“MRA RFP”) seeking offers from QSEs able to provide MRA Service;

D. Participant submitted an offer to provide MRA Service in response to the RFP that satisfies the requirements for MRA Service, as set forth in the ERCOT Protocols;

E. Pursuant to PUC Substantive Rule 25.502, the ERCOT Board of Directors has approved a recommendation to enter into this Agreement;

F. The Parties enter into this Agreement in order to establish the terms and conditions by which ERCOT and Participant will discharge their respective duties and responsibilities under the ERCOT Protocols.

Agreements

NOW, THEREFORE, in consideration of the mutual covenants and promises contained herein, ERCOT and Participant (the “Parties”) hereby agree as follows:

Section 1. MRA Terms.

A. Start Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, 20\_\_\_\_\_.

B. Stop Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, 20\_\_\_\_\_.

C. MRA: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

D. Description of MRA or, if an aggregation, MRA Sites [*including location(s), type(s) of unit, etc.]:* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

E. MRA Information

(1) MRA Contracted Capacity, Target Availability and Standby Price for each MRA Contracted Month

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **MRA Contracted Month - Year** | **MRA Contracted Hours (whole Hours Ending (HEs))** | **Capacity (MW per hr)** | **Days of Week** | **Target Availability (%)** | **Standby Price ($/MW per hr)** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

(2) MRA Contributed Capital Expenditures

|  |  |
| --- | --- |
| **Month - Year** | **Capital Expenditure ($)** |
|  |  |
|  |  |
|  |  |

(3) Data for MRA deployment event compensation

(a) Proxy Fuel Consumption (MMBtu/Deployment Event): \_\_\_\_\_\_\_\_\_\_, or

(b) Event Deployment Price ($/Deployment Event): \_\_\_\_\_\_\_\_\_\_

(c) Ramp period or start-up time (hrs): \_\_\_\_\_\_\_\_\_

(4) Data needed for variable compensation

(a) Proxy Heat Rate (MMBtu/MWh): \_\_\_\_\_\_\_\_\_\_, and/or

(b) Variable Price ($/MWh): \_\_\_\_\_\_\_\_\_\_

(5) Proxy Fuel Adder Price ($/MMBtu): \_\_\_\_\_\_\_\_\_\_

F. For Thermal and Non-Thermal Generators (Transmission or Distribution Connected)

(1) Delivery Point:\_\_\_\_\_\_\_

(2) Revenue Meter Location (Use Resource ID):\_\_\_\_\_\_\_\_\_\_

***[If multiple MRAs awarded to a single QSE, duplicate Sections 1(A)-1(F) for each MRA here]***

Section 2. Additional Terms.

A. The terms and conditions of the Market Participant Agreement between Participant and ERCOT remain in full force and effect.

B. Participant agrees to make available for ERCOT’s use the MRA Service described in Section I of this Agreement, in accordance with and subject to ERCOT Protocols, the Market Participant Agreement, and the MRA RFP, all of which are hereby incorporated by reference.

C. Term of Agreement

(1) This Agreement is effective beginning on the Effective Date, subject to paragraph 2(F) below.

(2) The Term of this Agreement begins at 0000 hours on the Start Date and ends at 2400 hours on the Stop Date.

D. Except as provided in paragraphs 2(E) and 2(F) below, this Agreement terminates upon the completion of all obligations under the terms of this Agreement, provided that the Term of this Agreement may be extended for a period of up to 90 days if, in ERCOT’s sole discretion, such an extension is necessary. ERCOT shall provide written notice of such an extension no later than 30 days before the date the extension is to begin.

E. ERCOT, at its sole discretion, may terminate the Parties’ obligations under this Agreement with respect to any MRA listed in Section 1 above at any time upon 90 days’ notice if it determines that the MRA Service provided by the MRA is no longer necessary.  If more than one MRA is listed in Section 1, the Parties’ obligations under this Agreement will continue with respect to any MRA not terminated pursuant to this paragraph.

F. Participant may, at its option, immediately terminate this Agreement upon the failure of ERCOT to continue to be certified by the PUCT as the Independent Organization under PURA §39.151 without the immediate certification of another Independent Organization under PURA §39.151.

G. If ERCOT has awarded offers to multiple QSEs for MRA Service in response to a single MRA RFP, this Agreement will be effective only upon written confirmation by ERCOT to Participant that ERCOT has secured fully executed MRA Agreements from each QSE with an awarded offer. This confirmation is a condition precedent to performance of any obligation under this Agreement.

H. If this Agreement is terminated by a Party pursuant to the terms hereof, the rights and obligations of the Parties hereunder shall terminate, except that the rights and obligations of the Parties that have accrued under this Agreement prior to the date of termination shall survive.

I. Payments to Participant for MRA Service shall be made based on the MRA offers awarded by ERCOT and in accordance with the ERCOT Protocols applicable to MRA Service.

J. Automatic Default. The occurrence of either of the following shall constitute an automatic Default by Participant under this Agreement:

(1) The MRA or one or more MRA Sites is abandoned without an intention to return to operation during the term of the MRA Agreement or approval by ERCOT of a substitute MRA or MRA Site in accordance with Protocol Section 3.14.4.3, MRA Substitution; or

(2) Three or more unexcused Misconduct Events, as described in Protocol Section 3.14.4.8, MRA Misconduct Events, occur during the term of the MRA Agreement.

K. Other Default Events. A material failure by Participant to comply with the ERCOT Protocols governing MRA Service, the terms of this Agreement, or the MRA RFP shall constitute a Default unless cured within fourteen (14) Business Days after ERCOT gives notice of the material breach to Participant.

L. Remedies for Default. In addition to ERCOT’s remedies for Default described in the Market Participant Agreement, ERCOT may, in its sole discretion, terminate this Agreement upon seven days’ written notice in the event of Participant’s Default.

M. This Agreement may be executed in two or more counterparts, each of which is deemed an original but all constitute one and the same instrument.

SIGNED, ACCEPTED, AND AGREED TO by each undersigned signatory who, by signature hereto, represents and warrants that he or she has full power and authority to execute this Agreement.

***Electric Reliability Council of Texas, Inc.:***

By: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Title: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***Participant:***

By: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Title: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Market Participant Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Market Participant DUNS: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_