|  |  |  |  |
| --- | --- | --- | --- |
| NPRR Number | [1256](https://www.ercot.com/mktrules/issues/NPRR1256) | NPRR Title | Settlement of MRA of ESRs |
| Date of Decision | | March 12, 2025 | |
| Action | | Recommended Approval | |
| Timeline | | Normal | |
| Estimated Impacts | | Cost/Budgetary: Between $25K and $50K  Project Duration: 3 to 5 months | |
| Proposed Effective Date | | Upon system implementation; and and upon system implementation of Nodal Protocol Revision Request (NPRR) 885, Must-Run Alternative (MRA) Details and Revisions Resulting from PUCT Project No. 46369, Rulemaking Relating to Reliability Must-Run Service | |
| Priority and Rank Assigned | | Priority – 2027; Rank – 4800 | |
| Nodal Protocol Sections Requiring Revision | | 6.6.6.7, MRA Standby Payment  6.6.6.9, MRA Payment for Deployment Event  6.6.6.10, MRA Variable Payment for Deployment | |
| Related Documents Requiring Revision/Related Revision Requests | | None | |
| Revision Description | | This NPRR changes language in select provisions in Section 6, Adjustment Period and Real-Time Operations, related to Must-Run Alternatives (MRAs) primarily in grey-boxed language from NPRR885 in order to align the terminology for Energy Storage Resources (ESRs) for the single-model era and specify how Qualified Scheduling Entities (QSEs) representing ESR MRAs would be settled for the provision of MRA Service. The Settlement changes reflect that ESR MRAs would not have fuel costs, but would have costs associated with charging. | |
| Reason for Revision | | [Strategic Plan](https://www.ercot.com/files/docs/2023/08/25/ERCOT-Strategic-Plan-2024-2028.pdf) Objective 1 – Be an industry leader for grid reliability and resilience  [Strategic Plan](https://www.ercot.com/files/docs/2023/08/25/ERCOT-Strategic-Plan-2024-2028.pdf) Objective 2 - Enhance the ERCOT region’s economic competitiveness with respect to trends in wholesale power rates and retail electricity prices to consumers  [Strategic Plan](https://www.ercot.com/files/docs/2023/08/25/ERCOT-Strategic-Plan-2024-2028.pdf) Objective 3 - Advance ERCOT, Inc. as an independent leading industry expert and an employer of choice by fostering innovation, investing in our people, and emphasizing the importance of our mission  General system and/or process improvement(s)  Regulatory requirements  ERCOT Board/PUCT Directive  *(please select ONLY ONE – if more than one apply, please select the ONE that is most relevant)* | |
| Justification of Reason for Revision and Market Impacts | | NPRR885 introduced the rules for compensating Resources under an MRA Agreement. Specifically, NPRR885 focused on the MRA Settlement of Generation Resources, Demand response, and other generation. With this NPRR, ERCOT provides specific language needed to describe the Settlement approach for an ESR MRA. | |
| PRS Decision | | On 11/14/24, PRS voted unanimously to table NPRR1256 and refer the issue to WMS. All Market Segments participated in the vote.  On 2/12/25, PRS voted unanimously to recommend approval of NPRR1256 as amended by the 1/27/25 ERCOT comments. All Market Segments participated in the vote.  On 3/12/25, PRS voted unanimously to endorse and forward to TAC the 2/12/25 PRS Report and 10/14/24 Impact Analysis for NPRR1256 with a recommended priority of 2027 and rank of 4800. All Market Segments participated in the vote. | |
| Summary of PRS Discussion | | On 11/14/24, ERCOT Staff provided an overview of NPRR1256.  On 2/12/25, there was no discussion.  On 3/12/25, participants reviewed the Impact Analysis for NPRR1256 and discussed the appropriate priority and rank. | |

|  |  |
| --- | --- |
| **Opinions** | |
| Credit Review | ERCOT Credit Staff and the Credit Finance Sub Group (CFSG) have reviewed NPRR1256 and do not believe that it requires changes to credit monitoring activity or the calculation of liability. |
| Independent Market Monitor Opinion | To be determined |
| ERCOT Opinion | ERCOT supports approval of NPRR1256. |
| ERCOT Market Impact Statement | ERCOT Staff has reviewed NPRR1256 and believes the market impact for NPRR1256 clarifies the Settlement treatment of ESR MRAs. |

|  |  |
| --- | --- |
| Sponsor | |
| Name | Ino Gonzalez / Magie Shanks |
| E-mail Address | [ino.gonzalez@ercot.com](mailto:ino.gonzalez@ercot.com) / [magie.shanks@ercot.com](mailto:magie.shanks@ercot.com) |
| Company | ERCOT |
| Phone Number | 512-248- 3954 / 512-248-6472 |
| 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 |

|  |  |
| --- | --- |
| **Comments Received** | |
| Comment Author | **Comment Summary** |
| WMS 120524 | Requested PRS continue to table NPRR1256 for further review by the Wholesale Market Working Group (WMWG) |
| ERCOT 012725 | Provided revisions to clarify how ERCOT ensures MRA ESRs meet the awarded capacity and energy requirements |
| WMS 020625 | Endorsed NPRR1256 as amended by the 1/27/25 ERCOT comments |

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

None

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR885: Insert Section 6.6.6.7 below upon system implementation:]***  **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 N, 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* \* MRARCRF *q, r, m* \* MRAARF *q, r, m*  Where:  MRARCRF *q, r, m* = (MRATCAP *q, r, m* + MRATCAPA *q, r, m*) /MRACCAP *q, r, m*  (3) The standby payment to each QSE representing an Energy Storage Resource (ESR) MRA registered is calculated as follows for each hour:  MRASBAMT *q, r, h* = (-1) \* MRASBPR *q, r, m* \* MRACCAP *q, r, m* \* MRACRF *q, r, m* \* MRAARF *q, r, m* \* MRAESRERF *q, r, h*  Where:  MRACRF *q, r, m* = (MRATCAP *q, r, m* + MRATCAPA *q, r, m*) / MRACCAP *q, r, m*  And,  MRAESRERF *q, r, h* = Min [1, (MRAHOSOC *q, r, b, m*) / (MRACCAP *q, r, m* \* MRABHO *q, r, b, m*)]  (4) 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*  (5) 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 or ESR,  MRACMAF *q, r, m*  =  (MRAMAH *q, r, h* ) / (MH *q, r, m)*  And,  For an MRA not registered as a Generation Resource or ESR, 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. | | MRARCRF *q, r, m* | None | *Must-Run Alternative Generation Resource or ESR Capacity Reduction Factor per QSE per Resource per month* —The capacity reduction factor of the Generation Resource or ESR 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. | | MRAESRERF *q, r, h* | None | *Must-Run Alternative Energy Storage Resource Energy Reduction Factor per QSE per Resource per hour*—The energy reduction factor of the MRA ESR *r* represented by QSE *q*, for each hour *h* of the obligation block(s) of the month. | | MRAHOSO*C q, r, b, m* | MWh | *Must-Run Alternative Hour of Obligation Block State of Charge per QSE per Resource—*The most recent telemetered state-of-charge prior to or at the start of the obligation block *b* for MRA ESR *r* represented by QSE *q* as specified in the MRA Agreement, for the MRA Contracted Month *m*. | | MRABHO *q, r, b, m* | Hours | *Must-Run Alternative Hours of Obligation Block per QSE per Resource—*The number of hours per block *b* of hours of obligation for a registered MRA ESR *r,* represented by QSE *q,* as specified in the MRA Agreement, for the MRA Contracted Month *m.* | | 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 or ESR, 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. | | *b* | None | An obligation block under the MRA Agreement. |   (6) 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. |   (7) 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. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR885: Insert Section 6.6.6.9 below upon system implementation:]***  **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 an ESR MRA:  MRADEAMT *q, r, h* = (-1) \* (EDPRICE *q, r, m*) \* MRAFLAG *q, r, h* */* MRAH *q, r*  (3) 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 MRA 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. |   (4) 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. |   (5) 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. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR885, NPRR1010, and NPRR1014: Insert applicable portions of Section 6.6.6.10 below upon system implementation for NPRR885 or NPRR1014; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]***  **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 Energy Storage Resource (ESR) MRA:  (a) ESR MRA will be compensated for energy consumed to re-charge the MRA capability after the hours of injection to the ERCOT system during an event deployment or an ERCOT-required Capacity Test based on the cost of the energy as metered by the meter recording load. The QSE will not be compensated for energy costs incurred during a re-test. An ESR shall only consume energy in hours that are not Contracted Hours, and it must be re-charged to a level sufficient to provide the contracted amount of MRA Service prior to the next start of a block of Contracted Hours. Additionally, the QSE shall use its best efforts to minimize the cost to re-charge and submit bid-to-buy curves taking into consideration estimates of future prices. The cost to re-charge shall be determined by starting with the least expensive consumed energy.  (b) Outside of the MRA Contracted Hours, an ESR MRA shall be treated in Settlements in the same manner as any ESR registered with ERCOT.  For MRA Contracted Hours with a deployment instruction:  MRAVAMT *q, r, h* = (-1) \* (MRAESRCVP *q, r, h* – MRARTREV *q, r, h*)  For MRA Contracted Hours without a deployment instruction:  MRAVAMT *q, r, h* = (-1) \* (Min (MRAESRCVP *q, r, h*, MRARTREV *q, r, h*) – MRARTREV *q, r, h*)  Where,  MRAESRCVP *q, r, h* = Max [VPRICE *q*, *r*, ESRARCOST *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*))]  (3) 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  (4) 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 *h*. 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 *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. | | 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 *h*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRAESRCVP *q, r, h* | $ | *Must-Run Alternative Energy Storage Resource Calculated Variable Payment per QSE per Resource*—The variable payment to QSE *q* for ESR MRA *r*, for the hour *h*. | | ESRARCOST *q, r* | $/MWh | *Must-Run Alternative Energy Storage Resource Average Recharge Cost per QSE per Resource*—The average cost to recharge the ESR MRA *r*, for QSE *q*, during the period the ESR is charging to restore its capability to provide the contracted amount of MRA service. | | 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 *h*. 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* as additional compensation for the additional energy or Ancillary Services produced or consumed by 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 N, 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. |   (5) 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. |   (6) 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. | |