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| NPRR Number | [1256](https://www.ercot.com/mktrules/issues/NPRR1256) | NPRR Title | Settlement of MRA of ESRs |
|  |  |
| Date | January 27, 2025 |
|  |  |
| Submitter’s Information |
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| Company | ERCOT |
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| Cell Number |  |
| Market Segment | Not applicable |

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| Comments |

ERCOT submits these comments to Nodal Protocol Revision Request (NPRR) 1256 to offer additional clarification to how ERCOT ensures Must-Run Alternative (MRA) Energy Storage Resources (ESRs) meet the awarded capacity and energy requirements. Specifically, ERCOT recommends adding a new Standby Payment reduction factor to reduce the Standby if the ESR does not have the required State of Charge (SOC) at the start of the block of the hour of obligation to meet the awarded capacity.

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| Revised Cover Page Language |

None

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| Revised Proposed Protocol Language |

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| ***[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 SettlementMRAARF *q, r, m* = 1For all other resettlementsIf 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. |

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| ***[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. |

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| ***[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 ERCOTFor 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* / 4The 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. |

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