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| **NPRR Number** | [**1008**](http://www.ercot.com/mktrules/issues/nprr1008) | **NPRR Title** | **RTC – NP 4: Day-Ahead Operations** |
| **Date Posted** | March 25, 2020 |
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| **Requested Resolution**  | Normal |
| **Nodal Protocol Sections Requiring Revision**  | 4.1, Introduction4.2.1.1, Ancillary Service Plan4.2.1.2, Ancillary Service Obligation Assignment and Notice4.3, QSE Activities and Responsibilities in the Day-Ahead4.4.4, DC Tie Schedules4.4.7.1, Self-Arranged Ancillary Service Quantities4.4.7.1.1, Negative Self-Arranged Ancillary Service Quantities4.4.7.2, Ancillary Service Offers 4.4.7.2.1, Resource-Specific Ancillary Service Offer Criteria4.4.7.2.2, Resource-Specific Ancillary Service Offer Validation4.4.7.2.3, Ancillary Service Only Offer Criteria (new)4.4.7.2.4, Ancillary Service Only Offer Validation (new)4.4.7.3, Ancillary Service Trades4.4.7.4, Ancillary Service Supply Responsibility (delete)4.4.8, RMR Offers4.4.9.3.1, Energy Offer Curve Criteria4.4.9.3.3, Energy Offer Curve Caps for Make-Whole Calculation Purposes4.4.9.4.1, Mitigated Offer Cap 4.4.9.5.1, DAM Energy-Only Offer Curve Criteria4.4.10, Credit Requirement for DAM Bids and Offers4.4.11, System-Wide Offer Caps4.4.11.1, Scarcity Pricing Mechanism 4.4.12, Determination of Ancillary Service Demand Curves (new)4.5.1, DAM Clearing Process4.5.2, Ancillary Service Insufficiency (delete)4.5.3, Communicating DAM Results4.6.2.3.1, Day-Ahead Make-Whole Payment4.6.4, Settlement of Ancillary Services Procured in the DAM4.6.4.1.1, Regulation Up Service Payment4.6.4.1.2, Regulation Down Service Payment4.6.4.1.3, Responsive Reserve Service Payment4.6.4.1.4, Non-Spinning Reserve Service Payment4.6.4.1.5, ERCOT Contingency Reserve Service Payment4.6.4.2.1, Regulation Up Service Charge4.6.4.2.2, Regulation Down Service Charge4.6.4.2.3, Responsive Reserve Service Charge4.6.4.2.4, Non-Spinning Reserve Service Charge4.6.4.2.5, ERCOT Contingency Reserve Service Charge |
| **Related Documents Requiring Revision/Related Revision Requests** | Nodal Operating Guide Revision Request (NOGRR) 211, RTC - NOG 2 and 9: System Operations and Control Requirements and Monitoring ProgramsNodal Protocol Revision Request (NPRR) 1007, RTC – NP 3: Management Activities for the ERCOT SystemNPRR1009, RTC - NP 5: Transmission Security Analysis and Reliability Unit CommitmentNPRR1010, RTC - NP 6: Adjustment Period and Real-Time OperationsNPRR1011, RTC - NP 8: Performance MonitoringNPRR1012, RTC - NP 9: Settlement and BillingNPRR1013, RTC - NP 1, 2, 16, and 25: Overview, Definitions and Acronyms, Registration and Qualification of Market Participants, and Market Suspension and RestartOther Binding Document Revision Request (OBDRR) 020, RTC - Methodology for Setting Maximum Shadow Prices for Network and Power Balance Constraints |
| **Revision Description** | This Nodal Protocol Revision Request (NPRR) updates Day-Ahead Operations in the Protocols to address changes associated with the implementation of Real-Time Co-optimization (RTC) of energy and Ancillary Services. Specifically, this NPRR addresses the following Key Principles:* KP1.1 – Ancillary Service Demand Curves and Current Market Price Adders
* KP1.2 – System-Wide Offer Cap and Power Balance Penalty Curve
* KP1.3 – Offering and Awarding of Ancillary Services in Real-Time
* KP1.4 – Systems/Applications that Provide Input into the Real-Time Optimization Engine
* KP1.5 – Process for Deploying Ancillary Services
* KP4 – The Supplemental Ancillary Service Market Process
* KP5 – Day-Ahead Market
* KP6 – Market-Facing Reports
* KP7 – Performance Monitoring
 |
| **Reason for Revision** |  Addresses current operational issues. Meets Strategic goals (tied to the [ERCOT Strategic Plan](http://www.ercot.com/content/wcm/lists/144926/ERCOT_Strategic_Plan_2019-2023.pdf) or directed by the ERCOT Board). Market efficiencies or enhancements Administrative Regulatory requirements Other: (explain)*(please select all that apply)* |
| **Business Case** | Aligns Day-Ahead Operations with the upcoming RTC terminology and operating environment. |

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| **Market Segment** | Not applicable |

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| **Market Rules Notes** |

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

* NPRR947, Clarification to Ancillary Service Supply Responsibility Definition and Improvements to Determining and Charging for Ancillary Service Failed Quantities
	+ Section 4.4.7.4
* NPRR981, Day-Ahead Market Price Correction Process
	+ Section 4.5.1
	+ Section 4.5.3
* NPRR991, Day-Ahead Market (DAM) Point-to-Point (PTP) Obligation Bid Clearing Price Clarification
	+ Section 4.5.1
* NPRR999, DC Tie Ramp Limitations
	+ Section 4.4.4
* NPRR1004, Load Distribution Factor Process Update
	+ Section 4.5.1

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| **Proposed Protocol Language Revision** |

4.1 Introduction

(1) The Day-Ahead Market (DAM) is a daily, co-optimized market in the Day-Ahead for forward financial energy, Ancillary Services, and congestion transactions.

(2) Participation in the DAM is voluntary.

(3) DAM energy settlements use DAM Settlement Point Prices that are calculated for Resource Nodes, Load Zones, and Hubs for a one-hour Settlement Interval using the Locational Marginal Prices (LMPs) from DAM. In contrast, the Real-Time energy settlements use Real-Time Settlement Point Prices that are calculated for Resource Nodes, Load Zones, and Hubs for a 15-minute Settlement Interval.

(4) To the extent that the ERCOT CEO or designee determines that Market Participant activities have produced an outcome inconsistent with the efficient operation of the ERCOT administered markets as defined in subsection (c)(2) of P.U.C. Subst. R. 25.503, Oversight of Wholesale Market Participants, ERCOT may prohibit the activity by Notice for a period beginning on the date of the Notice and ending no later than 45 days after the date of the Notice. ERCOT may issue subsequent Notices on the same activity. The ERCOT CEO may deem any Nodal Protocol Revision Request (NPRR) designed to correct the activity or issues affecting the activity as Urgent pursuant to Section 21.5, Urgent and Board Priority Nodal Protocol Revision Requests and System Change Requests.

4.1.1 Day-Ahead Timeline Summary

(1) The figure below shows the major activities that occur in the Day-Ahead:



4.2.1.1 Ancillary Service Plan

(1) ERCOT shall analyze the expected Load conditions for the Operating Day and develop an Ancillary Service Plan that identifies the Ancillary Service MW necessary for each hour of the Operating Day. The MW of each Ancillary Service required may vary from hour to hour depending on ERCOT System conditions. ERCOT must post the Ancillary Service Plan to the Market Information System (MIS) Public Area by 0600 of the Day-Ahead.

(2) If ERCOT determines that an Emergency Condition may exist that would adversely affect ERCOT System reliability, it may change the percentage of Load Resources that are allowed to provide Responsive Reserve (RRS) from the monthly amounts determined previously, as described in Section 3.16, Standards for Determining Ancillary Service Quantities, and must post any change in the percentage to the MIS Public Area by 0600 of the Day-Ahead.

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| ***[NPRR863: Replace paragraph (2) above with the following upon system implementation:]***(2) If ERCOT determines that an Emergency Condition may exist that would adversely affect ERCOT System reliability, it may change the percentage of Load Resources that are allowed to provide ERCOT Contingency Reserve Service (ECRS) and Responsive Reserve (RRS) from the monthly amounts determined previously, as described in Section 3.16, Standards for Determining Ancillary Service Quantities, and must post any change in the percentage to the MIS Public Area by 0600 of the Day-Ahead. |

(3) ERCOT shall determine the total required amount of each Ancillary Service under Section 3.16, or use its operational judgment and experience to change the daily quantity of each required Ancillary Service.

(4) ERCOT shall include in the Ancillary Service Plan enough capacity to automatically control frequency with the intent to meet North American Electric Reliability Corporation (NERC) Reliability Standards.

(5) Once specified by ERCOT for an hour and published on the MIS Public Area, Ancillary Service quantity requirements for an Operating Day may not be decreased.

(6) ERCOT shall create an Ancillary Service Demand Curve (ASDC) for each Ancillary Service as described in Section 4.4.12, Determination of Ancillary Service Demand Curves. ERCOT must post the ASDCs to the MIS Public Area by 0600 of the Day-Ahead. If ERCOT changes the Ancillary Service Plan per Section 6.4.9.1.2, Changes to Operating Day Ancillary Service Plan, the ASDCs will be updated to reflect the change and be posted to the MIS Public Area.

4.2.1.2 Ancillary Service Obligation Assignment and Notice

(1) ERCOT shall assign part of the Ancillary Service Plan quantity, or total Ancillary Service procurement quantity, if different, by service, by hour, to each Qualified Scheduling Entity (QSE) based on its Load Serving Entity (LSE) Load Ratio Shares (LRSs) (including the shares for Direct Current Tie (DC Tie) exports not eligible for the Oklaunion Exemption) aggregated by hour to the QSE level. If the resultant QSE-level share is negative, the QSE’s share will be set to zero and all other QSE shares will be adjusted on a pro rata basis such that the sum of all shares is equal to one. The resulting Ancillary Service quantity for each QSE, by service, by hour, is called its Ancillary Service Obligation. ERCOT shall base the QSE Ancillary Service allocation on the QSE to LSE relationships for the operating date and on the hourly LSE LRSs from the Real-Time Market (RTM) data used for Initial Settlement for the same hour and day of the week, for the most recent day for which Initial Settlement data is available, multiplied by the quantity of that service required in the Day-Ahead Ancillary Service Plan. The Ancillary Service Obligation defined shall be adjusted based on the most current real time settlement and resettlement data for the Operating Day for which the Ancillary Service was procured.

(2) By 0600 of the Day-Ahead, ERCOT shall notify each QSE of its advisory Ancillary Service Obligation for each service and for each hour of the Operating Day, based on the Ancillary Service Plan, as well as that QSE’s proportional limit for any Self-Arranged Ancillary Services as set forth in Section 3.16, Standards for Determining Ancillary Service Quantities. The minimum Ancillary Service Obligation quantity will be 0.1 MW.

(3) By 0600 of the Day-Ahead, ERCOT shall post on the MIS Certified Area each QSE’s LRS used for both the advisory and final Ancillary Service Obligation calculations.

(4) After DAM has published, ERCOT shall notify each QSE of its final Ancillary Service Obligation based on the total DAM Ancillary Service procurement quantity, comprised of DAM Ancillary Service Awards and Self-Arranged Ancillary Service Quantities for each service and for each hour of the Operating Day. The minimum Ancillary Service Obligation quantity will be 0.1 MW.

4.3 QSE Activities and Responsibilities in the Day-Ahead

(1) During the Day-Ahead, a Qualified Scheduling Entity (QSE):

(a) Must submit its Current Operating Plan (COP) and update its COP as required in Section 3.9, Current Operating Plan (COP); and

(b) May submit Three-Part Supply Offers, Day-Ahead Market (DAM) Energy-Only Offers, DAM Energy Bids, Energy Trades, Self-Schedules, Capacity Trades, Direct Current (DC) Tie Schedules, Resource-Specific Ancillary Service Offers, DAM Ancillary Service Only Offers, Ancillary Service Trades, Self-Arranged Ancillary Service Quantities, and Point-to-Point (PTP) Obligation bids as specified in this Section.

(2) By 0600 in the Day-Ahead, each QSE representing Reliability Must-Run (RMR) Units or Black Start Resources shall submit its Availability Plan to ERCOT indicating availability of RMR Units and Black Start Resources for the Operating Day and any other information that ERCOT may need to evaluate use of the units as set forth in the applicable Agreements and this Section.

4.4.4 DC Tie Schedules

(1) All schedules between the ERCOT Control Area and a non-ERCOT Control Area(s) over Direct Current Tie(s) (DC Ties(s)), must be implemented under these Protocols, any applicable North American Electric Reliability Corporation (NERC) Reliability Standards, North American Energy Standards Board (NAESB) Practice Standards, and operating agreements between ERCOT and the Comision Federal de Electricidad (CFE).

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| ***[NPRR857: Replace paragraph (1) above with the following upon system implementation:]***(1) All Direct Current Tie (DC Tie) Schedules between the ERCOT Control Area and a non-ERCOT Control Area(s) must be implemented in accordance with these Protocols, any applicable North American Electric Reliability Corporation (NERC) Reliability Standards, North American Energy Standards Board (NAESB) Practice Standards, and operating agreements between ERCOT and the appropriate operating authority for the non-ERCOT Control Area. |

(2) A DC Tie Schedule for hours in the Operating Day corresponding to an Electronic Tag (e-Tag) that is reported to ERCOT before 1430 in the Day-Ahead creates a capacity supply for the equivalent Resource or an obligation for the equivalent Load of the DC Tie in the DRUC process. DC Tie Schedules corresponding to e-Tags approved after 1430 in the Day-Ahead for the Operating Day create a capacity supply or obligation in any applicable HRUC processes. DC Tie Schedules corresponding to e-Tags approved after the Reliability Unit Commitment (RUC) snapshot are considered in the Adjustment Period snapshot in accordance with the market timeline.

(3) A QSE that is an importer into ERCOT through a DC Tie in a Settlement Interval under an approved e-Tag must be treated as a Resource at that DC Tie Settlement Point for that Settlement Interval.

(4) A QSE that is an exporter from ERCOT through a DC Tie in a Settlement Interval under an approved e-Tag must be treated as a Load at the DC Tie Settlement Point for that Settlement Interval and is responsible for allocated Transmission Losses, Unaccounted for Energy (UFE), System Administration Fee, and any other applicable ERCOT fees. This applies to all exports across the DC Ties except those that qualify for the Oklaunion Exemption.

(5) ERCOT shall approve any e-Tag that does not exceed the available physical capacity of the DC Tie and any limits supplied the non-ERCOT Control Area for the time period for which the e-Tag is requested unless a DC Tie Curtailment Notice is in effect for the particular DC Tie for which the e-Tag request is made. While a DC Tie Curtailment Notice is in effect, ERCOT will deny any additional e-Tag requests that would exacerbate the transmission security violations that led to that DC Tie Curtailment Notice. Notwithstanding the foregoing, ERCOT shall deny or curtail any e-Tag over any of the DC Ties if necessary to avoid causing any Entity in the ERCOT Region that is not a “public utility” as defined in the Federal Power Act (FPA), including ERCOT, to become such a public utility. If ERCOT determines that it is necessary to deny or curtail e-Tags in order to prevent any Entity from becoming a “public utility,” it shall provide notice of that determination by posting an operations message to the MIS Public Area and issuing a Market Notice.

(6) ERCOT shall perform schedule confirmation with the applicable non-ERCOT Control Area(s) and shall coordinate the approval process for the e-Tags for the ERCOT Control Area. An e-Tag for a schedule across a DC Tie is considered approved if:

(a) All Control Areas and Transmission Service Providers (TSPs) with approval rights approve the e-Tag (active approval); or

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| ***[NPRR857: Replace paragraph (a) above with the following upon system implementation:]***(a) All Control Areas and Direct Current Tie Operators (DCTOs) with approval rights approve the e-Tag (active approval); or |

(b) No Entity with approval rights over the e-Tag has denied it, and the approval time window has ended (passive approval).

(7) Using the DC Tie Schedule information corresponding to e-Tags submitted by QSEs, ERCOT shall update and maintain a Current Operating Plan (COP) for each DC Tie for which the aggregated DC Tie Schedules for that tie show a net export out of ERCOT for the applicable interval. When the net energy schedule for a DC Tie indicates an export, ERCOT shall treat the DC Tie as an Off-Line Resource and set the High Sustained Limit (HSL) and Low Sustained Limit (LSL) for that DC Tie Resource to zero. ERCOT shall monitor the associated Resource Status telemetry during the Operating Period. When the net energy schedule for a DC Tie shows a net import, the Resource HSL and LSL must be set appropriately, considering the resulting net import.

(8) A QSE exporting from ERCOT and/or importing to ERCOT through a DC Tie shall:

(a) Secure and maintain an e-Tag service to submit e-Tags and monitor e-Tag status according to NERC requirements;

(b) Submit e-Tags for all proposed transactions; and

(c) Implement backup procedures in case of e-Tag service failure.

(9) ERCOT shall post a notice to the MIS Certified Area when a confirmed e-Tag is downloaded, cancelled, or curtailed by ERCOT’s systems.

(10) ERCOT shall use the DC Tie e-Tag MW amounts for Settlement. The DC Tie operator shall communicate deratings of the DC Ties to ERCOT and other affected regions and all parties shall agree to any adjusted or curtailed e-Tag amounts.

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| ***[NPRR857: Replace paragraph (10) above with the following upon system implementation:]***(10) ERCOT shall use the DC Tie e-Tag MW amounts for Settlement. The DCTO shall communicate deratings of the DC Ties to ERCOT and other affected regions and all parties shall agree to any adjusted or curtailed e-Tag amounts.  |

(11) DC Tie Load is considered as Load for daily and hourly reliability studies, and settled as Adjusted Metered Load (AML). DC Tie Load is curtailed prior to other Load on the ERCOT System as described below, and during Energy Emergency Alert (EEA) events as set forth in Section 6.5.9.4.2, EEA Levels.

(12) DC Tie Load shall neither be curtailed by ERCOT during the Adjustment Period, nor for more than one hour at a time, except for the purpose of maintaining reliability, or as indicated in paragraphs (13), (14), (15), and (16) below.

(13) If a system operator in a non-ERCOT Control Area requests curtailment of a DC Tie Schedule due to an actual or anticipated emergency in its Control Area, ERCOT may curtail the DC Tie Schedule. If the DC Tie Schedule is curtailed, ERCOT shall post a DC Tie Curtailment Notice to the MIS Public Area as soon as practicable.

(14) If a DC Tie experiences an Outage, ERCOT may curtail DC Tie Schedules that are, or that are expected to be, affected by the Outage based on system conditions and expected restoration time of the Outage. ERCOT shall post a post a DC Tie Curtailment Notice to the MIS Public Area as soon as practicable. Updated DC Tie limits shall be posted as required in paragraph (1) of Section 3.10.7.7, DC Tie Limits.

(15) If market-based congestion management techniques embedded in Security-Constrained Economic Dispatch (SCED) as specified in these Protocols will not be adequate to resolve one or more transmission security violations that would be fully or partially resolved by the curtailment of DC Tie Load and, in ERCOT’s judgment, no approved Constraint Management Plan (CMP) is adequate to resolve those violations, ERCOT may instruct Resources to change output and, if still necessary, curtail DC Tie Load to maintain reliability and shall post a DC Tie Curtailment Notice to the MIS Public Area as soon as practicable. The quantity of DC Tie Load to be curtailed shall be the minimum required to resolve the constraint(s) after the other remediation actions described above have been taken.

(16) ERCOT may curtail DC Tie Schedules as necessary to ensure that any Entity in the ERCOT Region that is not a “public utility” as defined in the FPA, including ERCOT, does not become such a public utility.

4.4.7.1 Self-Arranged Ancillary Service Quantities

(1) For each Ancillary Service, a QSE may self-arrange all or a portion of the advisory Ancillary Service Obligation allocated to it by ERCOT, subject to the QSE’s share of system-wide limits as established by Section 3.16, Standards for Determining Ancillary Service Quantities. If a QSE elects to self-arrange Ancillary Service capacity, then ERCOT shall not pay the QSE for the Self-Arranged Ancillary Service Quantities for the portion that meets its final Ancillary Service Obligation; ERCOT shall pay the QSE the DAM Market Clearing Price for Capacity for any Self-Arranged Ancillary Service Quantities that exceed a QSE’s final Ancillary Service Obligation.

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| ***[NPRR863: Replace paragraph (1) above with the following upon system implementation:]***(1) For each Ancillary Service, a QSE may self-arrange all or a portion of the advisory Ancillary Service Obligation allocated to it by ERCOT, subject to the QSE’s share of system-wide limits as established by Section 3.16, Standards for Determining Ancillary Service Quantities. If a QSE elects to self-arrange Ancillary Service capacity, then ERCOT shall not pay the QSE for the Self-Arranged Ancillary Service Quantities for the portion that meets its final Ancillary Service Obligation; ERCOT shall pay the QSE the DAM Market Clearing Price for Capacity for any Self-Arranged Ancillary Service Quantities that exceed a QSE’s final Ancillary Service Obligation.  |

(2) The QSE must indicate before 1000 in the Day-Ahead the Self-Arranged Ancillary Service Quantities, by service, so ERCOT can determine how much Ancillary Service capacity, by service, remains to be obtained based on DAM offers and their respective ASDCs.

(3) At or after 1000 in the Day-Ahead, a QSE may not change its Self-Arranged Ancillary Service Quantities.

(4) Before 1430 in the Day-Ahead, all Self-Arranged Ancillary Service Quantities must be represented by physical capacity, either by Generation Resources or Load Resources, or backed by Ancillary Service Trades.

(5) The QSE may self-arrange Reg-Up, Reg-Down, RRS, and Non-Spin.

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| ***[NPRR863: Replace paragraph (5) above with the following upon system implementation:]***(5) The QSE may self-arrange Reg-Up, Reg-Down, ECRS, RRS, and Non-Spin. |

(6) The QSE may self-arrange Ancillary Services from one or more Resources it represents and/or through an Ancillary Service Trade.

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(7) A QSE shall not submit Ancillary Services trades that result in the QSE’s purchased quantities of Ancillary Services exceeding the QSE’s Self-Arranged Ancillary Service Quantities.

(a) At 1430 in the Day-Ahead, ERCOT shall post a report on the MIS Certified Area to notify the QSE if there is an overage in the QSE’s purchased quantities of Ancillary Services in violation of the above limitation.

(b) If the QSE has such an overage as of the end of the Adjustment Period, that QSE will be charged for any quantity that exceeds their Self-Arranged Ancillary Service Quantities per Section 6.7.5.1, Real-Time Ancillary Service Imbalance Payment or Charge.

(9) For self-arranged RRS Service, the QSE shall indicate the quantity of the service that is provided from:

(a) Generation Resources;

(b) Controllable Load Resources; and

(c) Fast Frequency Response (FFR) Resources and/or Load Resources controlled by high-set under-frequency relays.

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| ***[NPRR863: Replace paragraph (9) above with the following upon system implementation:]***(9) For self-arranged RRS or ECRS, the QSE shall indicate the quantity of the service that is provided from:(a) Generation Resources;(b) Controllable Load Resources;(c) Load Resources that may or may not be controlled by high-set under-frequency relays; and(d) Fast Frequency Response (FFR) Resources. |

***4.4.7.1.1 Negative Self-Arranged Ancillary Service Quantities***

(1) A QSE may submit a negative Self-Arranged Ancillary Service Quantity in the DAM. ERCOT shall procure all negative Self-Arranged Ancillary Service Quantities submitted by a QSE. Such negative Self-Arranged Ancillary Service Quantities will be considered by DAM to be equivalent to a bid to buy Ancillary Services at the highest price on each respective Ancillary Service Demand Curve.

(2) Procurements of negative Self-Arranged Ancillary Service Quantities by ERCOT shall be settled in the same manner as Ancillary Service Obligations that are not self-arranged and according to the charges defined in Section 4.6.4.2, Charges for Ancillary Services Procurement in the DAM, and Section 6.7, Real-Time Settlement Calculations for the Ancillary Services.

(3) A QSE may not submit a negative Self-Arranged Ancillary Service Quantity in the DAM that is less than -500 MW per Ancillary Service. For negative self-arranged RRS, the QSE shall not specify FFR Resources, Controllable Load Resources, and Load Resources controlled by high-set under-frequency relays. For compliance purposes, a QSE may not submit a negative Self-Arranged Ancillary Service Quantity in the DAM that is greater in magnitude than the absolute value of the net sales of its Ancillary Service Trades per Ancillary Service.

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| ***[NPRR863: Replace paragraph (3) above with the following upon system implementation:]***(3) A QSE may not submit a negative Self-Arranged Ancillary Service Quantity in the DAM that is less than -500 MW per Ancillary Service. For negative self-arranged RRS and ECRS, the QSE shall not specify FFR Resources, Controllable Load Resources, and Load Resources controlled by high-set under-frequency relays. For compliance purposes, a QSE may not submit a negative Self-Arranged Ancillary Service Quantity in the DAM that is greater in magnitude than the absolute value of the net sales of its Ancillary Service Trades per Ancillary Service. |

4.4.7.2 Ancillary Service Offers

(1) By 1000 in the Day-Ahead, a QSE may submit Generation Resource-Specific Ancillary Service Offers to ERCOT for the DAM and may offer the same Generation Resource capacity for any or all of the Ancillary Service products simultaneously with any Energy Offer Curves from that Generation Resource in the DAM. Offers of more than one Ancillary Service product from one Generation Resource may be inclusive or exclusive of each other and of any Energy Offer Curves, as specified according to a procedure developed by ERCOT.

(2) By 1000 in the Day-Ahead, a QSE may submit Load Resource-Specific Ancillary Service Offers for Regulation Service, Non-Spin and RRS to ERCOT and may offer the same Load Resource capacity for any or all of those Ancillary Service products simultaneously. Offers of more than one Ancillary Service product from one Load Resource may be inclusive or exclusive of each other, as specified according to a procedure developed by ERCOT.

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| ***[NPRR863: Replace paragraph (2) above with the following upon system implementation:]***(2) By 1000 in the Day-Ahead, a QSE may submit Load Resource-Specific Ancillary Service Offers for Regulation Service, Non-Spin, RRS, and ECRS to ERCOT and may offer the same Load Resource capacity for any or all of those Ancillary Service products simultaneously. Offers of more than one Ancillary Service product from one Load Resource may be inclusive or exclusive of each other, as specified according to a procedure developed by ERCOT. |

(3) By 1000 in the Day-Ahead, a QSE may submit an Ancillary Service Only Offer to ERCOT for the DAM. An individual Ancillary Service Only Offer must be exclusive to a single Ancillary Service product. For purposes of Ancillary Service sub-category limitations and validations, an Ancillary Service Only Offer for RRS will be treated as if it was an offer for RRS from an On-Line Generation Resource. Likewise, an Ancillary Service Only Offer for ECRS will be treated as if it was an offer for ECRS from an On-Line Generation Resource.

(4) Ancillary Service Offers remain active for the offered period unless the offer is:

(a) Effective after DAM and is higher than the Real-Time System-Wide Offer Cap (RTSWCAP);

(b) Automatically inactivated by the software at the offer expiration time specified by the QSE when the offer is submitted; or

(c) Withdrawn by the QSE, but a withdrawal is not effective if the deadline for submitting offers has already passed.

(5) A Load Resource that is not a Controllable Load Resource may specify whether its Resource-Specific Ancillary Service Offer for RRS may only be procured by ERCOT as a block.

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| ***[NPRR863: Insert paragraph (6) below upon system implementation and renumber accordingly:]***(6) A Load Resource that is not a Controllable Load Resource may specify whether its Resource-Specific Ancillary Service Offer for ECRS may only be procured by ERCOT as a block. |

(6) A QSE that submits an On-Line Resource-Specific Ancillary Service Offer without also submitting a Three-Part Supply Offer for the DAM for any given hour will be considered by the DAM to be self-committed for that hour, as long as a Resource-Specific Ancillary Service Offer for Off-Line Non-Spin was not also submitted for that hour. When the DAM considers a self-committed offer for clearing, the Resource constraints identified in paragraph (4)(c)(ii) of Section 4.5.1, DAM Clearing Process, other than HSL, are ignored. A Combined Cycle Generation Resource will be considered by the DAM to be self-committed based on an On-Line Resource-Specific Ancillary Service Offer submittal if:

(a) Its QSE submits an On-Line Resource-Specific Ancillary Service Offer without also submitting a Three-Part Supply Offer for the DAM for any Combined Cycle Generation Resource within the Combined Cycle Train for that hour;

(b) No Resource-Specific Ancillary Service Offer for Off-Line Non-Spin for any Combined Cycle Generation Resource within the Combined Cycle Train is submitted for that hour; and

(c) No On-Line Resource-Specific Ancillary Service Offer for any other Combined Cycle Generation Resource within the Combined Cycled Train is submitted for that hour.

(7) ERCOT will attempt to procure the quantity from its Ancillary Service Plan from Resource-Specific Ancillary Service Offers as well as Ancillary Service Only Offers against respective ASDCs.

4.4.7.2.1 Resource-Specific Ancillary Service Offer Criteria

(1) Each Resource-Specific Ancillary Service Offer must be submitted by a QSE and must include the following information:

(a) The selling QSE;

(b) The Resource represented by the QSE from which the offer would be supplied;

(c) The quantity in MW and Ancillary Service type from that Resource for this specific offer and the specific quantity in MW and Ancillary Service type of any other Ancillary Service offered from this same capacity;

(d) A Resource-Specific Ancillary Service Offer linked to a Three-Part Supply Offer from a Resource designated to be Off-Line for the offer period in its COP may only be struck if the Three-Part Supply Offer is struck. The total capacity struck must be within limits as defined in item (4)(c)(iii) of Section 4.5.1, DAM Clearing Process;

(e) A Resource-Specific Ancillary Service Offer linked to other Resource-Specific Ancillary Service Offers or an Energy Offer Curve from a Resource designated to be On-Line for the offer period in its COP may only be struck if the total capacity struck is within limits as defined in item (4)(c)(iii) of Section 4.5.1;

(f) The first and last hour of the offer;

(g) A fixed quantity block, or variable quantity block indicator for the offer:

(i) If a fixed quantity block, not to exceed 150 MW, which may only be offered by a Load Resource controlled by high-set under-frequency relay providing RRS, and which may clear at a Market Clearing Price for Capacity (MCPC) below the Resource-Specific Ancillary Service Offer price for that block, the single price (in $/MW) and single quantity (in MW) for all hours offered in that block. This fixed quantity block indicator will only be considered in the DAM and will be ignored for awarding of Ancillary Services in the Real-Time Market (RTM); or

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| ***[NPRR863: Replace paragraph (i) above with the following upon system implementation:]***(i) If a fixed quantity block, not to exceed 150 MW, which may only be offered by a Load Resource controlled by high-set under-frequency relay providing RRS or ECRS, and which may clear at a Market Clearing Price for Capacity (MCPC) below the Resource-Specific Ancillary Service Offer price for that block, the single price (in $/MW) and single quantity (in MW) for all hours offered in that block. This fixed quantity block indicator will only be considered in the DAM and will be ignored for awarding of Ancillary Services in the Real-Time Market (RTM); or |

(ii) If a variable quantity block, which may be offered by a Generation Resource or a Load Resource, the single price (in $/MW) and single “up to” quantity (in MW) contingent on the purchase of all hours offered in that block. This variable quantity block indicator will only be considered in the DAM and will be ignored for awarding of Ancillary Services in the RTM; and

(h) The expiration time and date of the offer.

(2) A valid Resource-Specific Ancillary Service Offer in the DAM must be received before 1000 for the effective DAM.

(3) No Resource-Specific Ancillary Service Offer received before 1000 in the Day-Ahead may contain a price exceeding the Day-Ahead System-Wide Offer Cap (DASWCAP) (in $/MW). No Resource-Specific Ancillary Service Offer received after 1430 in the Day-Ahead may contain a price exceeding the Real-Time System-Wide Offer Cap (RTSWCAP) (in $/MW). No Ancillary Service Offer price may be less than $0 per MW.

(4) The minimum amount per Resource for each Ancillary Service product that may be offered is one-tenth (0.1) MW.

(5) A Resource may offer more than one Ancillary Service.

(6) Offers for Load Resources may be adjusted to reflect Distribution Losses in accordance with Section 8.1.1.2, General Capacity Testing Requirements.

(7) A Load Resource that is qualified to perform as a Controllable Load Resource may not offer to provide Ancillary Services as a Controllable Load Resource and a Load Resource controlled by high-set under-frequency relay simultaneously behind a common breaker.

***4.4.7.2.2 Resource-Specific Ancillary Service Offer Validation***

(1) A valid Resource-Specific Ancillary Service Offer is one that ERCOT has determined meets the criteria listed in Section 4.4.7.2.1, Resource-Specific Ancillary Service Offer Criteria.

(2) ERCOT shall continuously validate Resource-Specific Ancillary Service Offers and continuously display on the MIS Certified Area information that allows any QSE named in a Resource-Specific Ancillary Service Offer to view its confirmed Resource-Specific Ancillary Service Offers.

(3) ERCOT shall notify the QSE submitting a Resource-Specific Ancillary Service Offer if the offer was rejected or was considered invalid for any reason. The QSE may then resubmit the offer within the appropriate market timeline.

***4.4.7.2.3*** ***Ancillary Service Only Offer Criteria***

(1) Each Ancillary Service Only Offer must be submitted by a QSE and must include the following information:

(a) The selling QSE;

(b) The quantity in MW and Ancillary Service type;

(c) The first and last Operating Hour of the offer;

(2) A valid Ancillary Service Only Offer in the DAM must be received before 1000 in the Day-Ahead.

(3) No Ancillary Service Only Offer price may exceed the DASWCAP (in $/MW). No Ancillary Service Only Offer price may be less than $0 per MW.

(4) The minimum amount that may be offered is one-tenth (0.1) MW.

***4.4.7.2.4 Ancillary Service Only Offer Validation***

(1) A valid Ancillary Service Only Offer is one that ERCOT determines meets the criteria listed in Section 4.4.7.2.3, Ancillary Service Only Offer Criteria.

(2) ERCOT shall continuously validate Ancillary Service Only Offers and continuously display on the MIS Certified Area information that allows any QSE named in an Ancillary Service Only Offer to view its confirmed Ancillary Service Only Offers.

(3) ERCOT will notify the QSE submitting an Ancillary Service Only Offer using the MIS Certified Area if the offer was rejected or was considered invalid for any reason. The QSE may resubmit the offer if the time for receiving offers has not elapsed.

4.4.7.3 Ancillary Service Trades

(1) An Ancillary Service Trade is the information for a QSE-to-QSE transaction that transfers an obligation to provide Ancillary Service capacity or purchase Ancillary Services in the Real-Time Market (RTM) between a buyer and a seller.

(2) An Ancillary Service Trade that is reported to ERCOT by 1430 in the Day-Ahead transfers the Ancillary Service position from the buyer to the seller for the DRUC process. An Ancillary Service Trade that is reported to ERCOT after 1430 in the Day-Ahead transfers the Ancillary Service position from the buyer to the seller for any applicable HRUC process, the deadline for which is after the trade is submitted.

(3) As soon as practicable, ERCOT shall notify each QSE through the Messaging System of any of its Ancillary Service Trades that are invalid Ancillary Service Trades. The QSE may correct and resubmit any invalid Ancillary Service Trade, but the reporting time of the trade is determined by when the validated Ancillary Service Trade was submitted and not when the original invalid Ancillary Service Trade was submitted.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR863: Insert paragraphs (4)-(6) below upon system implementation and renumber accordingly:]***(4) A QSE with an Ancillary Service position for ECRS, originally designated to be provided by a Generation Resource, may transfer its responsibility via Ancillary Service Trade(s) to another QSE only if that QSE designates the ECRS will be provided by a Generation Resource. (5) A QSE with an Ancillary Service position for ECRS, originally designated to be provided by a Load Resource providing ECRS triggered with or without under-frequency relays set at 59.70 Hz, may transfer its responsibility via Ancillary Service Trade(s) to another QSE only if that QSE designates the ECRS will be provided by either: (a) A Generation Resource; or (b) A Load Resource providing ECRS triggered with or without under-frequency relays set at 59.70 Hz. (6) The table below shows the ECRS trades that are allowed for each type of original responsibility:

|  |  |
| --- | --- |
|  | **Allowable ECRS Ancillary Service Trades** |
| **Original Responsibility** | **Generation Resource** | **Load Resource** |
| Generation Resource | Yes | No |
| Load Resource | Yes | Yes |

 |

(4) The table below shows the RRS trades that are allowed for each type of original responsibility:

|  |  |
| --- | --- |
|  | **Allowable RRS Ancillary Service Trades** |
| **Original Responsibility** | **Generation Resource** | **Resource capable of FFR triggered at 59.85 Hz** | **Load Resource triggered at 59.7 Hz** |
| Generation Resource | Yes | No | No |
| Resource providing FFR triggered at 59.85 Hz | Yes | Yes | Yes |
| Load Resource triggered at 59.7 Hz | Yes | No | Yes |

4.4.8 RMR Offers

(1) ERCOT shall decide, in its sole discretion, to commit a Reliability Must-Run (RMR) Unit using the DRUC or HRUC process only when it has determined that the RMR Unit is likely to be needed in Real-Time for reliability reasons, taking into consideration whether SCED will solve transmission constraints without the RMR Resource, contractual constraints on the Resource, and any other adverse effects on the RMR Unit that may occur as the result of the dispatch of the RMR Resource.

(a) If ERCOT has determined that an RMR Unit will be needed in Real-Time to resolve a transmission constraint, then ERCOT shall manually commit the Resource for the capacity required to resolve the transmission constraint using the DRUC or HRUC process.

(b) ERCOT may submit Energy Offer Curves at the Real-Time System Wide Offer Cap (RTSWCAP) in $/MWh on behalf of RMR Units committed in the DRUC or HRUC, and subsequently available for Dispatch by SCED, unless ERCOT declares a Market Suspension, in which case no Energy Offer Curves will be submitted, and ERCOT may, at its discretion, Dispatch RMR Units to restore the ERCOT Transmission Grid.

(c) RMR offers shall be treated as if they were Resource offers for purposes of posting under Section 3.2.5, Publication of Resource and Load Information*.*

4.4.9.3.1 Energy Offer Curve Criteria

(1) Each Energy Offer Curve must be reported by a QSE and must include the following information:

(a) The selling QSE;

(b) The Resource represented by the QSE from which the offer would be supplied;

(c) A monotonically increasing offer curve for both price (in $/MWh) and quantity (in MW) with no more than ten price/quantity pairs;

(d) The first and last hour of the Offer;

(e) The expiration time and date of the offer;

(f) Inclusive or exclusive designation relative to other DAM offers (for Real-Time, Energy Offer Curves are always considered to be inclusive with Ancillary Service Offers); and

(g) Percentage of FIP and percentage of FOP for generation above LSL subject to the sum of the percentages not exceeding 100%.

(2) An Energy Offer Curve must be within the range of -$250.00 per MWh and either the DASWCAP or RTSWCAP, depending on the timing of the submission, in dollars per MWh.

(3) The minimum amount per Resource for each Energy Offer Curve that may be offered is one MW.

4.4.9.3.3 Energy Offer Curve Caps for Make-Whole Calculation Purposes

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| ***[NPRR971: Replace Section 4.4.9.3.3 above with the following upon system implementation:]******4.4.9.3.3 Energy Offer Curve Cost Caps*** |

(1) The following Energy Offer Curve Caps must be used for the purpose of make-whole Settlements:

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| --- |
| ***[NPRR971: Replace paragraph (1) above with the following upon system implementation:]***(1) The following Energy Offer Curve Cost Caps must be used for the purpose of make-whole Settlements, Real-Time High Dispatch Limit Override Energy Payments, and Voltage Support Service Payments: |

(a) Nuclear = $15.00/MWh;

(b) Coal and Lignite = $18.00/MWh;

(c) Combined Cycle greater than 90 MW = 9 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(d) Combined Cycle less than or equal to 90 MW = 10 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(e) Gas - Steam Supercritical Boiler = 10.5 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(f) Gas Steam Reheat Boiler = 11.5 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(g) Gas Steam Non-reheat or boiler without air-preheater = 14.5 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(h) Simple Cycle greater than 90 MW = 14 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(i) Simple Cycle less than or equal to 90 MW = 15 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(j) Reciprocating Engines = 16 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Energy Offer Curve;

(k) Hydro = $10.00/MWh;

(l) Other = DASWCAP or RTSWCAP;

(m) RMR Resource = RMR contract price Energy Offer Curve;

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| ***[NPRR971: Replace item (m) above with the following upon system implementation:]***(m) RMR Resource = SWCAP; |

(n) Wind Generation Resources = $0.00/MWh; and

(o) PhotoVoltaic Generation Resource (PVGR) = $0.00/MWh.

(2) ERCOT shall produce an annual report each April that provides the amount of DAM and RUC Make-Whole Payments during the previous calendar year for Resources categorized as Other, per item (1)(l) above, as a percentage of the total amount of DAM and RUC Make-Whole Payments made during the previous calendar year. The report shall be based on final Settlements and include the total number of Resources classified as Other. ERCOT shall present this report annually to the appropriate Technical Advisory Committee (TAC) subcommittee. If there are no Make-Whole Payments for Resources categorized as Other for a given calendar year, then ERCOT will not be required to produce the annual report.

(3) Items in paragraphs (1)(c) and (d) above are determined by capacity of largest simple-cycle combustion turbine in the train selected.

(4) The FIP and FOP used to calculate the Energy Offer Curve Cap for Make-Whole Payment calculation purposes shall be the FIP or FOP for the Operating Day. In the event the Energy Offer Curve Cap for Make-Whole Payment calculation purposes must be calculated before the FIP or FOP is available for the particular Operating Day, the FIP and FOP for the most recent preceding Operating Day shall be used. Once the FIP and FOP are available for a particular Operating Day, those values shall be used in the calculations. If the percentage fuel mix is not specified or if no Energy Offer Curve exists, then the minimum of FIP or FOP shall be used.

4.4.9.4.1 Mitigated Offer Cap

(1) Energy Offer Curves may be subject to mitigation in Real-Time operations under Section 6.5.7.3, Security Constrained Economic Dispatch, using a Mitigated Offer Cap (MOC). ERCOT shall construct an incremental MOC curve in accordance with Section 6.5.7.3 such that each point on the MOC curve is calculated as follows:

MOC *q, r, h* = Max [GIHR *q, r* \* Max(FIP, WAFP *q, r, h*), (IHR *q, r* \* FPRC *q, r* + OM *q, r*) \* CFMLT *q, r*]

Where,

If a QSE has submitted an Energy Offer Curve on behalf of a Generation Resource and the Generation Resource has approved verifiable costs, then

FPRC *q, r* = Max(WAFP *q, r, h*, FIP + FA *q, r*) \* RTPERFIP *q, r* / 100 + FOP \* RTPERFOP *q, r* / 100

If a QSE has not submitted an Energy Offer Curve on behalf of a Generation Resource and the Generation Resource has approved verifiable costs, then

FPRC *q, r* = Max(WAFP *q, r, h*, FIP + FA *q, r*) \* GASPEROL *q, r* / 100 + FOP \* OILPEROL *q, r* / 100 + (SFP + FA *q, r*) \* SFPEROL *q, r* / 100

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| MOC *q, r, h* | $/MWh | *Mitigated Offer Cap per Resource*—The MOC for Resource *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| GIHR *q, r* | MMBtu/MWh | *Generic Incremental Heat Rate*—The generic, single-value, incremental heat rate. For Generation Resources with a Commercial Operations Date on or before January 1, 2004, the generic incremental heat rate shall be set to 10.5. For Generation Resources that have a Commercial Operations Date after January 1, 2004, this value shall be set to 14.5. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| IHR *q, r* | MMBtu/MWh | *Verifiable Incremental Heat Rate per Resource*—The verifiable incremental heat rate curve for Resource *r,* as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| FIP | $/MMBtu | *Fuel Index Price*—The natural gas index price as defined in Section 2.1, Definitions. |
| RTPERFIP *q, r* | none | *Fuel Index Price Percentage*—The percentage of natural gas used by Resource *r* to operate above LSL, as submitted with the energy offer curve. |
| FOP | $/MMBtu | *Fuel Oil Price*—The fuel oil index price as defined in Section 2.1. |
| RTPERFOP *q, r* | none | *Fuel Oil Price Percentage*—The percentage of fuel oil used by Resource *r* to operate above LSL, as submitted with the energy offer curve. |
| SFP | $/MMBtu | *Solid Fuel Price—*The solid fuel index price is $1.50.  |
| FPRC *q, r* | $/MMBtu | *Fuel Price Calculated per Resource*—The calculated index price for fuel for the Resource based on the Resources fuel mix. Where for a Combined Cycle Train, the Resource r is a Combined Cycle Generation Resource within the Combined Cycle Train.  |
| GASPEROL *q, r* | none | *Percent of Natural Gas to Operate Above LSL*—The percentage of natural gas used by Resource *r* to operate above LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource r is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| OILPEROL *q, r* | none | *Percent of Oil to Operate Above LSL*—The percentage of fuel oil used by Resource *r* to operate above LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource r is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| SFPEROL *q, r* | none | *Percent of Solid Fuel to Operate Above LSL*—The percentage of solid fuel used by Resource *r* to operate above LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource r is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| FA *q, r* | $/MMBtu | *Fuel Adder*—The fuel adder is the average cost above the index price Resource *r* has paid to obtain fuel. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. See the Verifiable Cost Manual for additional information. |
| OM *q, r* | $/MWh | *Variable Operations and Maintenance Cost above LSL*—The O&M cost for Resource *r* to operate above LSL, including an adjustment for emissions costs, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource r is a Combined Cycle Generation Resource within the Combined Cycle Train. See the Verifiable Cost Manual for additional information. |
| CFMLT *q, r* | none | *Capacity Factor Multiplier*—A multiplier based on the corresponding monthly capacity factor as described in paragraph (1)(d) below.  |
| WAFP *q, r, h* | $/MMBtu | *Weighted Average Fuel Price*—The volume-weighted average intraday, same-day and spot price of fuel submitted to ERCOT during the Adjustment Period for a specific Resource and specific hour within the Operating Day, as described in paragraph (1)(f) below.  |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |
| *h* | none | The Operating Hour.  |

(a) For a Resource contracted by ERCOT under paragraph (2) of Section 6.5.1.1, ERCOT Control Area Authority, ERCOT shall increase the O&M cost such that every point on the MOC curve is greater than the RTSWCAP in $/MWh.

(b) The MOC for Energy Storage Resources shall be calculated in accordance with Verifiable Cost Manual Appendix 10, Procedures for Evaluating Costs and Caps for Energy Storage Resources.

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| ***[NPRR986: Replace paragraph (b) above with the following upon system implementation:]***(b) Notwithstanding the MOC calculation described in paragraph (1) above, the MOC for ESRs shall be set at the SWCAP. No later than December 31, 2023, ERCOT and stakeholders shall submit a report to TAC that includes a recommendation to continue the existing approach or a proposal to implement an alternative approach to determine the MOC for ESRs. |

(c) For Quick Start Generation Resources (QSGRs) the MOC shall be adjusted in accordance with Verifiable Cost Manual Appendix 7, Calculation of the Variable O&M Value and Incremental Heat Rate used in Real Time Mitigation for Quick Start Generation Resources (QSGRs).

(d) For On-line hydro Generation Resource not operating in Synchronous Condenser Fast-Response mode, the MOC shall be adjusted in accordance with Verifiable Cost Manual Appendix X, Calculation of the Variable O&M Value and Incremental Heat Rate used in Real Time Mitigation for On-Line Hydro Generation Resource not operating in Synchronous Condenser Fast-Response mode.

(e) The multipliers for the MOC calculation above are as follows:

(i) 1.10 for Resources running at a ≥ 50% capacity factor for the previous 12 months;

(ii) 1.15 for Resources running at a ≥ 30 and < 50% capacity factor for the previous 12 months;

(iii) 1.20 for Resources running at a ≥ 20 and < 30% capacity factor for the previous 12 months;

(iv) 1.25 for Resources running at a ≥ 10 and < 20% capacity factor for the previous 12 months;

(v) 1.30 for Resources running at a ≥ 5 and < 10% capacity factor for the previous 12 months;

(vi) 1.40 for Resources running at a ≥ 1 and < 5% capacity factor for the previous 12 months; and

(vii) 1.50 for Resources running at a less than 1% capacity factor for the previous 12 months.

(f) The previous 12 months’ capacity factor must be updated by ERCOT by the 20th day of each month using the most recent data for use in the next month. ERCOT shall post to the MIS Secure Area the capacity factor for each Resource before the start of the effective month.

(g) During the Adjustment Period, a QSE representing a Resource may submit Exceptional Fuel Cost as a volume-weighted average fuel price for use in the MOC calculation for that Resource. To qualify as Exceptional Fuel Cost, the submission must meet the following conditions:

(i) For all Resources, the weighted average fuel price must exceed FIP for the applicable Operating Day, plus a threshold parameter value of $1/MMBtu, plus the applicable fuel adder. For Resources without approved verifiable costs, the fuel adder will be set to the default value assigned to Resources with approved verifiable costs, as defined in the Verifiable Cost Manual. The threshold parameter value in this paragraph shall be recommended by the Wholesale Market Subcommittee (WMS) and approved by the Technical Advisory Committee (TAC). ERCOT shall update the threshold value on the first day of the month following TAC approval unless otherwise directed by the TAC. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value.

(ii) Fixed cost (fees, penalties and similar non-gas costs) may not be included in the calculation of the weighted average fuel price.

(iii) All intra-day, same day, and spot fuel purchases must be included in the calculation of the weighted average fuel price in paragraph (1) above. These must account for at least 10% of the total fuel volume burned by the applicable Resource for the hour for which the weighted average fuel price is computed. As noted in paragraph (l) below, the methodology used in the allocation of the cost and volume of purchased fuel to the Resource for the hour is subject to validation by ERCOT.

(iv) Weighted average fuel prices must be submitted individually for each Operating Hour for which they are applicable. Values submitted outside of the Adjustment Period will be rejected and not used in the calculation of the MOC for the designated Operating Hour.

(h) ERCOT may notify the Independent Market Monitor (IMM) if a QSE submits an Exceptional Fuel Cost.

(i) No later than five Business Days after an Operating Day for which an Exceptional Fuel Cost is submitted, ERCOT shall issue a Market Notice indicating the affected Operating Hours and the number of Resources for which a QSE submitted Exceptional Fuel Cost for a particular Operating Day.

(j) No later than 1700 Central Prevailing Time (CPT) on the 15th day following an Exceptional Fuel Cost submission, the submitting QSE shall provide ERCOT with the calculation of the weighted average fuel price, intraday or same-day fuel purchases, and any available supporting documentation. Such information may include, but is not be limited to, documents of the following nature: relevant contracts between the QSE or Resource Entity and fuel supplier, trade logs, transportation, storage, balancing and distribution agreements, calculation of the weighted average fuel price, or any other documentation necessary to support the Exceptional Fuel Cost price and volume for the applicable period(s).

(k) No later than 1700 Central Prevailing Time (CPT) on the 60th day following an Exceptional Fuel Cost submission, the submitting QSE shall provide ERCOT with all supporting documentation not previously provided to ERCOT. No supporting documentation will be accepted after the 60th day.

(l) The accuracy of submitted Exceptional Fuel Cost and the need for purchasing intraday or same-day gas must be attested to by a duly authorized officer or agent of the QSE representing the Resource. The attestation must be provided in a standardized format acceptable to ERCOT and submitted with the other documentation described in paragraph (i) above.

(m) ERCOT will use the supporting documentation to validate the Exceptional Fuel Cost for the applicable period. Validation will include, but not be limited to, the cost and the quantity of purchased fuel, Resource-specific heat rates, and the methodology used in the allocation of the cost and volume of purchased fuel to the Resource for the applicable hour used in the weighted average fuel price calculation. In connection with the validation process ERCOT may request additional documentation or clarification of previously submitted documentation. Such requests must be honored within ten Business Days.

(n) At ERCOT’s sole discretion, submission and follow-up information deadlines may be extended on a case-by-case basis.

4.4.9.5.1 DAM Energy-Only Offer Curve Criteria

(1) Each DAM Energy-Only Offer Curve must be reported by a QSE and must include the following information:

(a) The selling QSE;

(b) The Settlement Point;

(c) The fixed quantity block, variable quantity block, or curve indicator for the offer;

(i) If a fixed quantity block, the single price (in $/MWh) and single quantity (in MW) for all hours offered in that block , which may clear at a Settlement Point Price less than the offer price for that block;

(ii) If a variable quantity block, the single price (in $/MWh) and single “up to” quantity (in MW) contingent on the purchase of all hours offered in that block; and

(iii) If a curve, a monotonically increasing energy offer curve for both price (in $/MWh) and quantity (in MW) with no more than ten price/quantity pairs;

(d) The first and last hour of the offer; and

(e) The expiration time and date of the offer.

(2) A DAM Energy-Only Offer Curve must be within the range of -$250.00 per MWh and the DASWCAP in dollars per MWh.

(3) The minimum amount for each DAM Energy-Only Offer Curve that may be offered is one MW.

(4) DAM Energy-Only Offers, DAM Energy Bids, and/or PTP Obligation bids shall not be submitted in combination to create the net effect of a single PTP Obligation containing a source Settlement Point and a sink Settlement Point that are Electrically Similar Settlement Points for the QSE or for any combination of QSEs within the same Counter-Party.

4.4.10 Credit Requirement for DAM Bids and Offers

(1) Each QSE’s ability to bid and offer in the DAM is subject to credit exposure from the QSE’s bids and offers being within the credit limit for DAM participation established for the entire Counter-Party of which the QSE is part, as specified in item (1) of Section 16.11.4.6.2, Credit Requirements for DAM Participation, and taking into account the credit exposure of accepted DAM bid and offers of the Counter-Party’s other QSEs.

(2) DAM bids and offers of all QSEs of the Counter-Party are accepted in the order submitted while ensuring that the credit exposure from accepted bids and offers do not exceed the Counter-Party’s credit limit for DAM participation.

(3) ERCOT shall reject the QSE’s individual bids and offers whose credit exposure, as calculated in item (6) below, exceeds the Counter-Party’s credit limit for DAM participation as described in items (1) and (2) above, and shall notify the QSE through the MIS Certified Area as soon as practicable.

(4) The QSE may revise and resubmit such rejected bids and offers described in item (3) above, provided that the resubmitted bids and offers are valid and within the Counter-Party’s credit limit for DAM participation adjusted for all accepted DAM bids and offers of the Counter-Party’s QSE’s limit and that such resubmission occurs prior to 1000 of the Operating Day.

(5) The DAM shall use the Counter-Party’s credit limit for DAM participation provided and adjusted for accepted bids and offers for DAM transactions cleared, until a new credit limit for DAM participation is available.

(6) ERCOT shall calculate credit exposure for bids and offers in the DAM as follows:

(a) For a DAM Energy Bid, the credit exposure shall be calculated as the quantity of the bid multiplied by a bid exposure price that is calculated as follows:

(i) If the price of the DAM Energy Bid is less than or equal to zero, the bid exposure price for that quantity will equal zero.

(ii) If the price of the DAM Energy Bid is greater than zero, the bid exposure price for that quantity will equal the greater of zero or the sum of (A) and (B):

(A) The lesser of:

(1) The *d*th percentile of the Day-Ahead Settlement Point Price (DASPP) for the hour over the previous 30 days; and

(2) The bid price.

(B) The value *e1* multiplied by (bid price minus (A)) when the bid price is greater than (A).

(1) The value *e1* is computed as the *ep1*th percentile of Ratio1 for the 30 days prior to the Operating Day, where Ratio1 is calculated daily as follows:

Ratio1 = Min[1, Max[0, (∑h=1,24 (Qcleared Bids\*PDAM - Qcleared Offers\*PDAM))/ (∑ h=1,24 Qcleared Bids\*PDAM)]]

except Ratio1 = 1 when ∑ h=1,24 Qcleared Bids\*PDAM = 0

(2) ERCOT may adjust *e1* by changing the quantity of bids or offers to the values reported by the Counter-Party in paragraph (8) below or based on information available to ERCOT.

(iii) For DAM Energy Bids of curve quantity type, the credit exposure shall be the credit exposure, as calculated above, at the price and MW quantity of the bid curve that produces the maximum credit exposure for the DAM Energy Bid.

(b) For each MW portion of a DAM Energy-Only Offer:

(i) That has an offer price that is less than or equal to the *a*th percentile of the DASPP for the hour over the previous 30 days, the sum of (A) and (B) shall apply.

(A) Credit exposure will be:

(1) Reduced (when the *b*th percentile Settlement Point Price for the hour is positive). The reduction shall be the quantity of the offer multiplied by the *b*th percentile of the DASPP for the hour over the previous 30 days multiplied by the value *e2.*

(a) The value *e2* is computed as the *ep2*th percentile of Ratio2 for the 30 days prior to the Operating Day, where Ratio2 is calculated daily as follows:

Ratio2 = 1 -Max[0, (∑h=1,24 (Qcleared Offers - Qcleared-Bids))/(∑ h=1,24 (Qcleared Offers))]

except Ratio2 = 0 when ∑ h=1,24 Qcleared Offers = 0

(b) ERCOT may adjust the value of *e2* by changing the quantity of bids or offers to the values reported by the Counter-Party in paragraph (7) below or based on information available to ERCOT; or

(2) Increased (when the *b*th percentile Settlement Point Price for the hour is negative). The increase shall be the quantity of the offer multiplied by the *b*th percentile of the DASPP for the hour over the previous 30 days.

(B) Credit exposure will be increased by the product of the quantity of the offer multiplied by the *dp*th percentile of any positive hourly difference of Real-Time Settlement Point Price and DASPP over the previous 30 days for the hour multiplied by *e3*.

(ii) That has an offer price that is greater than the *a*th percentile of the DASPP for the hour over the previous 30 days, credit exposure will be increased by the product of the quantity of the offer multiplied by the *dp*th percentile of any positive hourly difference of Real-Time Settlement Point Price and DASPP over the previous 30 days for the hour multiplied by *e3*.

(iii) ERCOT may, in its sole discretion, use a percentile other than the *dp*th percentile of any positive hourly difference of Real-Time Settlement Point Price and DASPP over the previous 30 days of the hour in determining credit exposure per this paragraph (6)(b) in evaluating DAM Energy-Only Offers.

(c) For each MW portion of the Energy Offer Curve of a Three-Part Supply Offer:

(i) That has an offer price that is less than or equal to the *y*th percentile of the DASPP for the hour over the previous 30 days, credit exposure will be reduced (when the *z*th percentile Settlement Point Price is positive) or increased (when the *z*th percentile Settlement Point Price is negative) by the quantity of the offer multiplied by the *z*th percentile of the DASPP for the hour over the previous 30 days.

(ii) That has an offer price that is greater than the *y*th percentile of the DASPP for the hour over the previous 30 days, the credit exposure will be zero.

(iii) For a Combined Cycle Generation Resource with Three-Part Supply Offers for multiple generator configurations, the reduction in credit exposure will be the maximum credit exposure reduction created by the individual Three-Part Supply Offers’ Offer Curves (when the *z*th percentile Settlement Point Price is positive). If the Three-Part Supply Offer causes a credit increase (when the *z*th percentile Settlement Point Price is negative), the increase in credit exposure will be the maximum credit exposure increase created by the individual Three-Part Supply Offers.

(d) For PTP Obligation Bids:

(i) That have a bid price greater than zero, the sum of the quantity of the bid multiplied by the bid price, plus the *u*th percentile of the hourly positive price difference between the source Real-Time Settlement Point Price minus the sink Real-Time Settlement Point Price over the previous 30 days multiplied by the quantity of the bid.

(ii) That have a bid price less than or equal to zero, the *u*th percentile of the hourly positive price difference between the source Real-Time Settlement Point Price minus the sink Real-Time Settlement Point Price over the previous 30 days multiplied by the quantity of the bid.

(iii) Each tenth of a MW quantity (0.1 MW) of an expiring CRR for a Counter-Party can provide credit reduction for only one-tenth of a MW (0.1 MW) of a PTP Obligation bid for that Counter-Party.

(A) The QSE must submit the PTP Obligation bid at the same source and sink pair for the same hour, for the same operating date where the QSE submitting the PTP Obligation bid is represented by the same Counter-Party as the CRR Account Holder that is the owner of record for an expiring CRR, or group of CRRs.

(B) A portion or all of the PTP Obligation bid quantity must be less than or equal to the total of the quantity of all expiring CRRs at the specified source and sink pair and delivery period, less all valid previously submitted PTP Obligation bids at the specified source and sink pair and delivery period.

(iv) For qualified PTP Obligation bids with a bid price greater than zero, ERCOT shall reduce the credit exposure in paragraph (6)(d)(i) above as follows:

Credit Reduction = Reduction Factor \* min[PTP bid quantity, remaining expiring CRR MWs] \* bid price.

The Reduction Factor is *bd*%. The factor can be adjusted up or down at ERCOT’s sole discretion with at least two Bank Business Days notice. ERCOT may adjust this factor up with less notice, if needed. The expiring CRR may be PTP Options and/or PTP Obligations. If a QSE later cancels the PTP Obligation bid then the amount of exposure credited back to the Counter-Party will be treated as though this PTP Obligation bid was previously offset by expiring CRRs if a matching CRR source and sink pair exists up to the maximum expiring CRR quantity. If a QSE updates the PTP Obligation bid then it will be treated as a cancel followed by a new submission for purposes of credit exposure calculation. Outcome of this calculation is dependent of the sequence of submittals for updates and cancels.

(e) For PTP Obligation bids with Links to an Option with a bid price greater than zero:

Credit Reduction = (1- Reduction Factor *bd*) \* (bid quantity \* bid price)

(f) For Ancillary Service Obligations not self-arranged, the product of the quantity of Ancillary Service Obligation not self-arranged multiplied by the *t*th percentile of the hourly MCPC for that Ancillary Service over the previous 30 days for that hour. For negative Self-Arranged Ancillary Service Quantities, the absolute value of the product of the quantity of the negative Self-Arranged Ancillary Service Quantity times the *t*th percentile of the hourly MCPC for that Ancillary Service over the previous 30 days for that hour.

(g) For Ancillary Service Only Offers credit exposure will be increased by the sum of the quantity of the Ancillary Service Only Offer multiplied by the *dp*th percentile of the positive hourly difference for that Ancillary Service between RTMCPC and DAMCPC for that Ancillary Service over the previous 30 days for that Operating Hour.

(h) Values *e1*, *e2*, or *e3*, which are applicable to items (a) and (b) above, under conditions described below, will be determined and applied at ERCOT’s sole discretion. Within the application parameters identified below, ERCOT shall establish values for *e1*, *e2*, and *e3* and provide notice to an affected Counter-Party of any changes to *e1*, *e2*, or *e3* before 0900 generally two Bank Business Days prior to the normally scheduled DAM 1000 by a minimum of two of these methods: written, electronic, posting to the MIS Certified Area or telephonic. However, ERCOT may adjust any DAM credit parameter immediately if, in its sole discretion, ERCOT determines that the parameter(s) set for a Counter-Party do not adequately match the financial risk created by that Counter-Party’s activities in the market. ERCOT shall review the values for *e1*, *e2*, or *e3* for each Counter-Party no less than once every two weeks. ERCOT shall provide written or electronic notice to the Counter-Party of the basis for ERCOT’s assessment, or change of assessment, of the exposure adjustment variable established for the Counter-Party and the impact of the adjustment.

(i) The value of each exposure adjustment *e1*, *e2*, and *e3* is a value between zero and one, rounded to the nearest hundredth decimal place, set by ERCOT by Counter-Party. The values ERCOT establishes for *e1*, *e2*, and *e3* for a Counter-Party shall be applied equally to the portfolio of all QSEs represented by such Counter-Party.

(h) ERCOT must re-examine DAM credit parameters immediately if Counter-Party exceeds 90% of its Available Credit Limit (ACL) available to DAM.

(7) A Counter-Party may request more favorable parameters from ERCOT by agreeing to all of the conditions below:

1. The Counter-Party shall notify ERCOT of any expected changes to Ratio1 or Ratio2, due to change in activity, as described below, and the likely duration of such change as soon as practicable, but no later than two Business Days in advance of the change:
2. If Ratio1 as defined in paragraph (6)(a)(ii)(B) above is likely to be greater than the Counter-Party's currently assigned value of *e1* for particular day(s), then the estimated daily values of Ratio1 specifying the day(s) along with the daily DAM Energy Bid, Energy-Only Offer, and Three-Part Supply Offer quantity assumptions used to arrive at those values; and
3. If Ratio2 as defined in paragraph (6)(b)(i)(A)(1) above is likely to be lower than the Counter-Party's currently assigned value of *e2* for particular day(s), then the estimated daily values of Ratio2 specifying the day(s) along with the daily DAM Energy Bid, Energy-Only Offer, and Three-Part Supply Offer quantity assumption used to arrive at those values.
4. ERCOT, in its sole discretion, will determine the adequacy of the disclosures made in item (a) above and may require additional information as needed to evaluate whether a Counter- Party is eligible for favorable treatment.
5. ERCOT may change the requirements for providing information, as described in item (a) above, to ensure that reasonable information is obtained from Counter-Parties.
6. ERCOT may, but is not required, to use information provided by a Counter-Party to re-evaluate DAM credit parameters and may take other information into consideration as needed.

1. If ERCOT determines that information provided to ERCOT is erroneous or that ERCOT has not been notified of required changes, ERCOT may set all parameters for the Counter-Party to the default values with a possible adder on the *e1* variable, at ERCOT's sole discretion, for a period of not less than seven days and until ERCOT is satisfied that the Counter-Party has and will comply with the conditions set forth in this Section. In no case shall the adder result in an *e1* value greater than one.

(8) Beginning no later than 0800 and ending at 0945 each Business Day, ERCOT shall post to the MIS Certified Area, approximately every 15 minutes, each active Counter-Party’s remaining Available Credit Limit (ACL) for that day’s DAM and the time at which the report was run.

(9) After the DAM results are posted, ERCOT shall post once each Business Day on the MIS Certified Area each active Counter-Party’s calculated aggregate DAM credit exposure and its aggregate DAM credit exposure per transaction type, to the extent available, as it pertains to the most recent DAM Operating Day. The transaction types are:

(a) DAM Energy Bids;

(b) DAM Energy Only Offers;

(c) PTP Obligation Bids;

(d) Three-Part Supply Offers;

(e) Ancillary Services related to Self-Arranged quantities; and

(f) Ancillary Service Only Offers.

(10) The parameters in this Section are defined as follows:

1. The default values of the parameters are:

| Parameter | Unit | Current Value\* |
| --- | --- | --- |
| *d* | percentile | 85 |
| *ep1* | percentile | 95 |
| *a* | percentile | 50 |
| *b* | percentile | 45 |
| *dp* | percentile | 90 |
| *ep2* | percentile | 0 |
| *e3* | value | 1 |
| *y* | percentile | 45 |
| *z* | percentile | 50 |
| *u* | percentile | 90 |
| *bd* | % | 90 |
| *t* | percentile | 50 |
| \* The current value for the parameters referenced in this table above will be recommended by TAC and approved by the ERCOT Board. ERCOT shall update parameter values on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. |

1. The values of the parameters for Entities that meet the requirements in paragraph (7) above for more favorable treatment are:

| Parameter | Unit | Current Value |
| --- | --- | --- |
| *d* | percentile | 85 |
| *ep1* | percentile | 75 |
| *a* | percentile | 50 |
| *b* | percentile | 45 |
| *dp* | percentile | 90 |
| *ep2* | percentile | 25 |
| *e3* | value | 1 |
| *y* | percentile | 45 |
| *z* | percentile | 50 |
| *u* | percentile | 90 |
| *t* | percentile | 50 |
| \* The current value for the parameters referenced in this table above will be recommended by TAC and approved by the ERCOT Board. ERCOT shall update parameter values on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. |

4.4.11 Day-Ahead and Real-Time System-Wide Offer Caps

(1) The DASWCAP and RTSWCAP shall be determined in accordance with the Public Utility Commission of Texas (PUCT) Substantive Rules. The methodology for determining the DASWCAP and RTSWCAP is as follows:

(a) The Low System-Wide Offer Cap (LCAP) is set at $2,000 per MWh for energy and $2,000 per MW per hour for Ancillary Services.

(b) At the beginning of each annual Resource adequacy cycle described in Section 4.4.11.1, Scarcity Pricing Mechanism, the DASWCAP and RTSWCAP shall be set equal to the respective High System-Wide Offer Cap (HCAP) and maintained at this level as long as the Peaker Net Margin (PNM) during an annual Resource adequacy cycle is less than or equal to PNM threshold per MW-year. Additionally, the Value of Lost Load (VOLL) used to determine the ASDCs for DAM and RTM shall be set to the HCAP for DAM. If the PNM exceeds PNM threshold per MW-year, the DASWCAP and the VOLL used to determine the ASDCs for DAM and RTM shall be reset per the schedule in Section 4.4.11.1, Scarcity Pricing Mechanism.

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| ***[NPRR978: Replace paragraph (b) above with the following upon system implementation:]***(b) At the beginning of each year, the DASWCAP and RTSWCAP shall be set equal to the respective High System-Wide Offer Cap (HCAP) and maintained at this level as long as the Peaker Net Margin (PNM) during a year is less than or equal to PNM threshold per MW-year. Additionally, the Value of Lost Load (VOLL) used to determine the ASDCs for DAM and RTM shall be set to the HCAP for DAM. If the PNM exceeds PNM threshold per MW-year the DASWCAP and the VOLL used to determine the ASDCs for DAM and RTM shall be reset per the schedule in Section 4.4.11.1, Scarcity Pricing Mechanism. |

(c) ERCOT shall set the PNM threshold at three times the cost of new entry of new generation plants.

The above parameters are defined as follows.

| Parameter | Unit | Current Value\* |
| --- | --- | --- |
| HCAP – DAM (DASWCAP) | $/MWh | 9,000 |
| HCAP – RTM (RTSWCAP) | $/MWh | 2,000 |
| PNM threshold | $/MW-year | 315,000 |
| \* The current value for the parameters referenced in this table above will be recommended by TAC and approved by the ERCOT Board. ERCOT shall update parameter values on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. |

(2) Any offers that exceed the current respective SWCAP shall be rejected by ERCOT.

4.4.11.1 Scarcity Pricing Mechanism

(1) ERCOT shall operate the scarcity pricing mechanism in accordance with the PUCT Substantive Rules. The methodology for determining the scarcity pricing mechanism is as follows:

(a) The scarcity pricing mechanism operates on an annual Resource adequacy cycle, starting on January 1 and ending on December 31 of each year.

(b) For each day of the annual Resource adequacy cycle, the Peaking Operating Cost (POC) shall be ten times the effective daily FIP. The POC is calculated in dollars per MWh.

(c) For the purpose of this Section, the Real-Time Energy Price (RTEP) shall be measured as the ERCOT Hub Average 345 kV Hub price.

(d) For the current annual Resource adequacy cycle, the PNM shall be calculated in dollars per MW on a cumulative basis for all past intervals in the annual Resource adequacy cycle as follows:

**∑((RTEP – POC) \* (0.25)) for each Settlement Interval where (RTEP – POC) > 0**

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| ***[NPRR978: Replace paragraph (1) above with the following upon system implementation:]***(1) ERCOT shall operate the scarcity pricing mechanism in accordance with the PUCT Substantive Rules. The methodology for determining the scarcity pricing mechanism is as follows: (a) The scarcity pricing mechanism operates on a calendar year basis.(b) For each day of the year, the Peaking Operating Cost (POC) shall be ten times the effective daily FIP. The POC is calculated in dollars per MWh.(c) For the purpose of this Section, the Real-Time Energy Price (RTEP) shall be measured as the ERCOT Hub Average 345 kV Hub price.(d) For the current year, the PNM shall be calculated in dollars per MW on a cumulative basis for all past intervals in the year as follows:**∑((RTEP – POC) \* (0.25)) for each Settlement Interval where (RTEP – POC) > 0** |

(2) By the end of the next Business Day following the applicable Operating Day, ERCOT shall post the updated value of the PNM and the current DASWCAP on the MIS Public Area.

(3) When the calculated PNM exceeds PNM threshold per MW-year, the DASWCAP and the VOLL used to determine the ASDCs for DAM and RTM shall both be changed to the LCAP for the remainder of the calendar year, in the following manner:

(a) On the Operating Day that the PNM exceeds the PNM threshold, the HCAP will remain in effect for the balance of the day and for the Operating Day thereafter (Days 1 and 2).

(b) On the Operating Day after the PNM exceeds the PNM threshold (Day 2) prior to the execution of DAM, ERCOT shall send a Market Notice that the DASWCAP and the VOLL used to determine the ASDCs for DAM and RTM will both be changed to LCAP, effective for the following Operating Day (Day 3).

(c) For the Operating Day two days after the PNM threshold is exceeded (Day 3) and through the end of the calendar year, DAM and RTM will use the LCAP and ASDCs reflecting the updated VOLL.

(d) On December 31, for Operating Day January 1, DASWCAP and the VOLL used to determine the ASDCs for the DAM and RTM will be reset to the HCAP for DAM for the new Resource adequacy cycle.

4.4.12 Determination of Ancillary Service Demand Curves

(1) This Section describes the process for determining Ancillary Service Demand Curves (ASDCs) for Regulation Up Service (Reg-Up), Regulation Down Service (Reg-Down), Responsive Reserve (RRS), ERCOT Contingency Reserve Service (ECRS), and Non-Spinning Reserve (Non-Spin) for the Day-Ahead Market (DAM) and Real-Time Market (RTM).

(2) To determine the individual ASDCs for Reg-Up, RRS, ECRS, and Non-Spin, an Aggregate ORDC (AORDC) will be created and then disaggregated into individual curves for the different Ancillary Services.

(3) The DAM shall use the same ASDCs as the RTM, as an initial condition. Specific to the DAM, the ASDCs will be adjusted, as needed, to account for negative Self-Arranged Ancillary Service Quantities.

(4) For Reg-Down, the ASDC shall be a constant value equal to VOLL for the full range of the Ancillary Service Plan for Reg-Down.

(5) ERCOT shall develop the AORDC from historical data as follows:

(a) For all SCED intervals where the sum of RTOLCAP and RTOFFCAP is less than 10,000 MW, use the RTOLCAP and RTOFFCAP values to calculate the AORDC as follows:

(b) To account for lower reserve level areas where there are no historical observations for RTOLCAP and RTOFFCAP, if applicable, create a single point using the following assumptions:

(i) RTOFFCAP = 0, RTOLCAP = 2,000 MW; and

(ii) Set System Lambda equal to the average of System Lambda, with the historical values capped at $250/MWh, during SCED timestamps with less than or equal to 4,000 MW of total reserves.

(c) Using the results of steps (a) and (b) above, use regression methods to fit a curve to the average reserve pricing outcomes for the various MW reserve levels.

(d) Calculate points on the regression curve in 1 MW increments for any observed reserve level >= 2,000 MW and price >$0.01/MWh. These points form the AORDC.

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RTOLCAP | MWh | *Real-Time On-Line Reserve Capacity –* The Real-Time reserve capacity of On-Line Resources available for the SCED intervals beginning June 1, 2014 through December 31, 2023 |
| RTOFFCAP | MWh | *Real-Time Off-Line Reserve Capacity –* The Real-Time reserve capacity of Off-Line Resources available for the SCED intervals beginning June 1, 2014 through December 31, 2023. |
| μ | None | The median value of the historical reserve levels |
| σ | None | The standard deviation of the historical reserve levels |

(6) ERCOT shall disaggregate the AORDC developed pursuant to paragraph (5) above into individual ASDCs for each Ancillary Service product as follows:

(a) The ASDC for all Reg-Up in the Ancillary Service Plan shall use the highest price portion of the AORDC;

(b) The ASDC for all RRS in the Ancillary Service Plan shall use the highest price portion of the remaining AORDC after removing the portion of the AORDC that was used for the Reg-Up ASDC;

(c) The ASDC for all ECRS in the Ancillary Service Plan shall use the highest price portion of the remaining AORDC after removing the portions of the AORDC that were used for the Reg-Up and RRS ASDCs;

(d) The ASDC for Non-Spin shall use the remaining portion of the remaining AORDC after removing the portions of the AORDC that were used for the Reg-Up, RRS, and ECRS ASDCs; and

(7) Each ASDC will be represented by a 100-point linear approximation to the corresponding part of the AORDC.

(8) Should the PNM exceed the PNM threshold per MW-year, as described in Protocol Section 4.4.11.1, Scarcity Pricing Mechanism, the AORDC used in determining the individual ASDCs will be adjusted to reflect the updated value of VOLL for the remainder of the annual Resource adequacy cycle. The AORDC will be reset to use the HCAP for DAM at the start of the next calendar year.

4.5.1 DAM Clearing Process

(1) At 1000 in the Day-Ahead, ERCOT shall start the Day-Ahead Market (DAM) clearing process. If the processing of DAM bids and offers after 0900 is significantly delayed or impacted by a failure of ERCOT software or systems that directly impacts the DAM, ERCOT shall post a Notice as soon as practicable on the Market Information System (MIS) Public Area, in accordance with paragraph (1) of Section 4.1.2, Day-Ahead Process and Timing Deviations, extending the start time of the execution of the DAM clearing process by an amount of time at least as long as the duration of the processing delay plus ten minutes. In no event shall the extension exceed more than one hour from when the processing delay is resolved.

(2) ERCOT shall complete a Day-Ahead Simultaneous Feasibility Test (SFT). This test uses the Day-Ahead Updated Network Model topology and evaluates all Congestion Revenue Rights (CRRs) for feasibility to determine hourly oversold quantities.

(3) The purpose of the DAM is to economically and simultaneously clear offers and bids described in Section 4.4, Inputs into DAM and Other Trades.

(4) The DAM uses a multi-hour mixed integer programming algorithm to maximize bid-based revenues, including revenues based on Ancillary Service Demand Curves (ASDCs), minus the offer-based costs over the Operating Day, subject to security and other constraints.

(a) The bid-based revenues include revenues from ASDCs, DAM Energy Bids, and Point-to-Point (PTP) Obligation bids.

(b) The offer-based costs include costs from the Startup Offer, Minimum Energy Offer, and Energy Offer Curve of any Resource that submitted a Three-Part Supply Offer, DAM Energy-Only Offers, and Ancillary Service Offers.

(c) Security constraints specified to prevent DAM solutions that would overload the elements of the ERCOT Transmission Grid include the following:

(i) Transmission constraints – transfer limits on energy flows through the ERCOT Transmission Grid, e.g., thermal or stability limits. These limits must be satisfied by the intact network and for certain specified contingencies. These constraints may represent:

(A) Thermal constraints – protect Transmission Facilities against thermal overload.

(B) Generic constraints – protect the ERCOT Transmission Grid against transient instability, dynamic stability or voltage collapse.

(C) Power flow constraints – the energy balance at required Electrical Buses in the ERCOT Transmission Grid must be maintained.

(ii) Resource constraints – the physical and security limits on Resources that submit Three-Part Supply Offers:

(A) Resource output constraints – the Low Sustained Limit (LSL) and High Sustained Limit (HSL) of each Resource; and

(B) Resource operational constraints – includes minimum run time, minimum down time, and configuration constraints.

(iii) Other constraints –

(A) Linked offers – the DAM may not select any one part of that Resource capacity to provide more than one Ancillary Service or to provide both energy and an Ancillary Service in the same Operating Hour. The DAM may, however, select part of that Resource capacity to provide one Ancillary Service and another part of that capacity to provide a different Ancillary Service or energy in the same Operating Hour, provided that linked Energy and Off-Line Non-Spinning Reserve (Non-Spin) Resource-Specific Ancillary Service Offers are not awarded in the same Operating Hour.

(B) The sum of the awarded Resource-Specific Ancillary Service Offer capacities for each Resource must be within the Resource limits specified in the Current Operating Plan (COP) and Section 3.18, Resource Limits in Providing Ancillary Service, and the Resource Parameters as described in Section 3.7, Resource Parameters.

(C) Block Resource-Specific Ancillary Service Offers for a Load Resource – blocks will not be cleared unless the entire quantity block can be awarded. Because block Resource-Specific Ancillary Service Offers cannot set the Market Clearing Price for Capacity (MCPC), a block Ancillary Service Offer may clear below the Ancillary Service Offer price for that block.

(D) Block DAM Energy Bids, DAM Energy-Only Offers, and PTP Obligation bids – blocks will not be cleared unless the entire time and/or quantity block can be awarded. Because quantity block bids and offers cannot set the Settlement Point Price, a quantity block bid or offer may clear in a manner inconsistent with the bid or offer price for that block.

(E) Combined Cycle Generation Resources – The DAM may commit a Combined Cycle Generation Resource in a time period that includes the last hour of the Operating Day only if that Combined Cycle Generation Resource can transition to a shutdown condition in the DAM Operating Day.

(d) Ancillary Service needs will be reflected in ASDCs for each Ancillary Service, which serve as a proxy for the bid-based revenues for Ancillary Service. Self-Arranged Ancillary Service Quantities will first be used to meet the ASDCs, and the remaining Ancillary Service needs are met from Ancillary Service Offers, as long as the costs do not exceed the ASDC value. ERCOT may not buy more of one Ancillary Service in place of the quantity of a different service.

(5) ERCOT shall determine the appropriate Load distribution factors to allocate offers, bids, and source and sink of CRRs at a Load Zone across the energized power flow buses that are modeled with Load in that Load Zone. The non-Private Use Network Load distribution factors are based on historical State Estimator (SE) hourly distribution using a proxy day methodology representing anticipated weather conditions. The Private Use Network Load distribution factors are based on an estimated Load value considering historical net consumption at all Private Use Networks. If ERCOT decides, in its sole discretion, to change the Load distribution factors for reasons such as anticipated weather events or holidays, ERCOT shall select an SE hourly distribution from a proxy day reasonably reflecting the anticipated Load in the Operating Day. ERCOT may also modify the Load distribution factors to account for predicted differences in network topology between the proxy day and Operating Day. ERCOT shall develop a methodology, subject to Technical Advisory Committee (TAC) approval, to describe the modification of the proxy day bus-load distribution for this purpose.

(6) ERCOT shall allocate offers, bids, and source and sink of CRRs at a Hub using the distribution factors specified in the definition of that Hub in Section 3.5.2, Hub Definitions.

(7) A Resource that has a Three-Part Supply Offer cleared in the DAM may be eligible for Make-Whole Payment of the Startup Offer and Minimum Energy Offer submitted by the Qualified Scheduling Entity (QSE) representing the Resource under Section 4.6, DAM Settlement.

(8) The DAM Settlement is based on hourly MW awards and on Day-Ahead hourly Settlement Point Prices. All PTP Options settled in the DAM are settled based on the Day-Ahead Settlement Point Prices (DASPPs). ERCOT shall assign a Locational Marginal Price (LMP) to de-energized Electrical Buses for use in the calculation of the DASPPs by using heuristic rules applied in the following order:

(a) Use an appropriate LMP predetermined by ERCOT as applicable to a specific Electrical Bus; or if not so specified

(b) Use the following rules in order:

(i) Use average LMP for Electrical Buses within the same station having the same voltage level as the de-energized Electrical Bus, if any exist.

(ii) Use average LMP for all Electrical Buses within the same station, if any exist.

(iii) Use System Lambda.

(9) The Day-Ahead MCPC for each hour for each Ancillary Service is the Shadow Price for that Ancillary Service for the hour as determined by the DAM algorithm.

(10) If the DASPPs cannot be calculated by ERCOT, all CRRs shall be settled based on Real-Time prices. Settlements for all CRRs shall be reflected on the Real-Time Settlement Statement.

(11) Constraints can exist between the generator’s Resource Connectivity Node and the Resource Node, in which case the awarded quantity of energy may be inconsistent with the clearing price when the constraint between the Resource Connectivity Node and the Resource Node is binding.

(12) PTP Obligation bids shall not be awarded where the DAM clearing price for the PTP Obligation is greater than the PTP Obligation bid price plus $0.01/MW per hour.

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4.5.3 Communicating DAM Results

(1) As soon as practicable, but no later than 1330 in the Day-Ahead, ERCOT shall notify the parties to each cleared DAM transaction (e.g., the buyer and the seller) of the results of the DAM as follows:

(a) Awarded Resource-Specific Ancillary Service Offers, specifying Resource, MW, Ancillary Service type, and price, for each hour of the awarded offer;

(b) Awarded Ancillary Service Only Offers, specifying MW, Ancillary Service type, and price, for each hour of the awarded offer;

(c) Awarded energy offers from Three-Part Supply Offers and from DAM Energy-Only Offers, specifying Resource (except for DAM Energy-Only Offers), MWh, Settlement Point, and Settlement Point Price, for each hour of the awarded offer;

(d) Awarded DAM Energy Bids, specifying MWh, Settlement Point, and Settlement Point Price for each hour of the awarded bid; and

(e) Awarded PTP Obligation Bids, number of PTP Obligations in MW, source and sink Settlement Points, and price for each Settlement Interval of the awarded bid.

(2) As soon as practicable, but no later than 1330, ERCOT shall post on the MIS Public Area the hourly:

(a) Day-Ahead MCPC for each type of Ancillary Service for each hour of the Operating Day;

(b) DASPPs for each Settlement Point for each hour of the Operating Day;

(c) Day-Ahead hourly LMPs for each Electrical Bus for each hour of the Operating Day;

(d) Shadow Prices for every binding constraint for each hour of the Operating Day;

(e) Energy bought in the DAM consisting of the following:

(i) The total quantity of awarded DAM Energy Bids (in MWh) bought in the DAM at each Settlement Point for each hour of the Operating Day; and

(ii) The total quantity of awarded PTP Obligation Bids (in MWh) cleared in the DAM that sink at each Settlement Point for each hour of the Operating Day.

(f) Energy sold in the DAM consisting of the following:

(i) The total quantity of awarded DAM Energy Offers (in MWh), from Three-Part Supply Offers and DAM Energy Only Offers, bought in the DAM at each Settlement Point for each hour of the Operating Day; and

(ii) The total quantity of awarded PTP Obligation Bids (in MWh) cleared in the DAM that source at each Settlement Point for each hour of the Operating Day.

(g) Aggregated Ancillary Service Offer Curve of all Ancillary Service Offers (including both Resource-Specific Ancillary Service Offers and Ancillary Service Only Offers) for each type of Ancillary Service for each hour of the Operating Day;

(h) Electrically Similar Settlement Points used during the DAM clearing process; and

(i) Settlement Points that were de-energized in the base case;

(j) System Lambda; and

(k) Ancillary Services sold in the DAM consisting of the total quantity of awarded Resource-Specific Ancillary Service Offers and Ancillary Service Only Offers, for each Ancillary Service for each hour of the Operating Day.

(3) ERCOT shall monitor Day-Ahead MCPCs and Day-Ahead hourly LMPs for errors and if there are conditions that cause the price to be questionable, ERCOT shall notify all Market Participants that the DAM prices are under investigation as soon as practicable.

(4) ERCOT shall correct prices when: (i) a market solution is determined to be invalid or (ii) invalid prices are identified in an otherwise valid market solution, unless accurate prices cannot be determined. The following are some reasons that may cause these conditions.

(a) Data Input error: Missing, incomplete, or incorrect versions of one or more data elements input to the DAM application may result in an invalid market solution and/or prices.

(b) Software error: Pricing errors may occur due to software implementation errors in DAM pre-processing, DAM clearing process, and/or DAM post processing.

(c) Inconsistency with these Protocols or the Public Utility Commission of Texas (PUCT) Substantive Rules: Pricing errors may occur when specific circumstances result in prices that are in conflict with such Protocol language or the PUCT Substantive Rules.

(5) All DAM LMPs, MCPCs, and Settlement Point Prices are final at 1000 of the second Business Day after the Operating Day.

(a) However, after DAM LMPs, MCPCs, and Settlement Point Prices are final, if ERCOT determines that prices are in need of correction and seeks ERCOT Board review of such prices, it shall notify Market Participants and describe the need for such correction as soon as practicable but no later than 30 days after the Operating Day. Failure to notify Market Participants within this timeline precludes the ERCOT Board from reviewing such prices. However, nothing in this section shall be understood to limit or otherwise inhibit any of the following:

(i) ERCOT’s duty to inform the PUCT of potential or actual violations of the ERCOT Protocols or PUCT Rules and its right to request that the PUCT authorize correction of any prices that may have been affected by such potential or actual violations;

(ii) The PUCT’s authority to order price corrections when permitted to do so under other law; or

(iii) ERCOT’s authority to grant relief to a Market Participant pursuant to the timelines specified in Section 20, Alternative Dispute Resolution Procedure.

(b) The ERCOT Board may review and change DAM LMPs, MCPCs, or Settlement Point Prices if ERCOT gave timely notice to Market Participants and the ERCOT Board finds that such prices are significantly affected by an error.

(c) In review of DAM LMPs, MCPCs, or Settlement Point Prices, the ERCOT Board may rely on the same reasons identified in paragraph (4) above to find that the prices are significantly affected by an error.

(6) As soon as practicable, but no later than 1330, ERCOT shall make available the Day-Ahead Shift Factors for binding constraints in the DAM and post to the MIS Secure Area.

4.6.2.3.1 Day-Ahead Make-Whole Payment

(1) ERCOT shall pay the QSE a Day-Ahead Make-Whole Payment for an eligible Resource for each Operating Hour in a DAM-commitment period.

(2) Any Resource-Specific Ancillary Service Offer cleared for the same Operating Hour, QSE, and Generation Resource as a Three-Part Supply Offer cleared in the DAM shall be included in the calculation of the Day-Ahead Make-Whole Payment.

(3) The guaranteed cost, energy revenue, and Ancillary Service revenue calculated for each Combined Cycle Generation Resource are each summed for the Combined Cycle Train, and the the Day-Ahead Make-Whole Amount is calculated for the Combined Cycle Train.

(4) For an Aggregate Generation Resource (AGR), Startup Cost shall be scaled according to the ratio of the maximum number of its generators online during a contiguous block of DAM-committed Intervals, as indicated by telemetry, compared to the total number of generators registered to the AGR and used in the approved verifiable cost for the AGR.

(5) The Day-Ahead Make-Whole Payment to each QSE for each DAM-committed Generation Resource is calculated as follows:

DAMWAMT *q, p, r, h* = (-1) \* Max (0, DAMGCOST *q, p, r* + DAEREV *q, p, r, h* + DAASREV *q, r, h*) \* DAESR *q, p, r, h* / (DAESR *q, p, r, h*)

(6) The Day-Ahead Make-Whole Guaranteed Costs are calculated for each eligible DAM-Committed Generation Resource as follows:

**For non-Combined Cycle Trains,**

DAMGCOST *q, p, r* = Min(DASUO *q, p, r* , DASUCAP *q, p, r*) + (Min(DAMEO *q, p, r, h* , DAMECAP *p ,q, r ,h* )\* DALSL *q, p, r, h*) + (DAAIEC *q, p, r, h* \* (DAESR *q, p, r, h* – DALSL *q, p, r, h*))

**For a Resource which is not an AGR,**

If ERCOT has approved verifiable Startup Costs and minimum-energy costs for the Resource,

Then: DASUCAP *p,q, r* = verifiable Startup Costs *q, r, s*

 DAMECAP *p,q,r,h* = verifiable minimum-energy costs *q, r, i*

Otherwise: DASUCAP *p,q, r* = Resource Category Startup Offer Generic Cap (RCGSC)

DAMECAP *p,q, r, h* = Resource Category Minimum-Energy Generic Cap (RCGMEC)

**For an AGR,**

DAMGCOST *q, p, r* = DASUPR *q, p, r* + (Min(DAMEO*q, p, r, h,* DAMECAP *p,q,r,h*) \* DALSL *q, p, r, h*) + (DAAIEC *q, p, r, h* \* (DAESR *q, p, r, h* – DALSL *q, p, r, h*))

Where:

DASUPR *q, p, r* = Min(DASUO *q, p, r*, DASUCAP *q, p, r*)

If ERCOT has approved verifiable Startup Costs

Then: DASUCAP *q, p, r* = Maxc(AGRRATIO *q, p, r* ) \* verifiable Startup Costs *q, r*

Where: AGRRATIO *q, p, r* = AGRMAXON *q, p, r* / AGRTOT *q, p, r*

Otherwise: DASUCAP *q, p, r* = Max*c*(AGGRATIO *q,p,r*) \* RCGSC

**For Combined Cycle Trains,**

DAMGCOST *q, p, r* = Min(DASUO *q, p, r* , DASUCAP*q, p, r*) +  (Min(DAMEO *q, p, r, h* , DAMECAP *q, p, r,h*) \* DALSL*q, p, r, h*) + (Max(0, Min(DASUO *afterCCGR* , DASUCAP*afterCCGR*) – Min(DASUO *beforeCCGR* , DASUCAP*beforeCCGR*)) +  (DAAIEC *q, p, r, h* \* (DAESR *q, p, r, h* – DALSL *q, p, r, h*))

 (7) The Day-Ahead Make-Whole Revenue is calculated for each DAM-Committed Generation Resource as follows:

DAEREV *q, p, r, h*  = (-1) \* DASPP *p, h* \* DAESR *q, p, r, h*

DAASREV *q, r, h* = ((-1) \* MCPCRU *DAM, h* \* PCRUR *r, q, DAM, h*)

 + ((-1) \* MCPCRD *DAM, h*  \* PCRDR *r, q,DAM, h*)

 + ((-1) \* MCPCRR *DAM, h*  \* PCRRR *r, q,DAM, h*)

 +((-1) \* MCPCNS *DAM, h*  \* PCNSR *r, q,DAM, h*)

|  |
| --- |
| ***[NPRR863: Replace the formula “DAASREV q, r, h” above with the following upon system implementation:]***DAASREV *q, r, h* = ((-1) \* MCPCRU *DAM, h* \* PCRUR *r, q, DAM, h*)  + ((-1) \* MCPCRD *DAM, h*  \* PCRDR *r, q, DAM, h*)  + ((-1) \* MCPCECR *DAM, h*  \* PCECRR *r, q, DAM, h*)  + ((-1) \* MCPCNS *DAM, h*  \* PCNSR *r, q, DAM, h*)  + ((-1) \* MCPCRR *DAM, h*  \* PCRRR *r, q, DAM, h*) |

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| DAMWAMT *q, p, r, h* | $ | *Day-Ahead Make-Whole Payment per QSE per Settlement Point per Resource per hour*⎯The payment to QSE *q* to make-whole the Startup Cost and energy cost of Resource *r* committed in the DAM at Resource Node *p* for the hour *h*. When a Combined Cycle Generation Resource is committed in the DAM, payment is made to the Combined Cycle Train for the DAM-committed Combined Cycle Generation Resource. |
| DAMGCOST *q, p, r* | $ | *Day-Ahead Market Guaranteed Amount per QSE per Settlement Point per Resource*⎯The sum of the Startup Cost and the operating energy costs of the DAM-committed Resource *r* at Resource Node *p* represented by QSE *q*, for the DAM-commitment period. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.  |
| DAEREV *q, p, r, h* | $ | *Day-Ahead Energy Revenue per QSE per Settlement Point per Resource by hour*⎯The revenue received in the DAM for Resource *r* at Resource Node *p* represented by QSE *q*, based on the DAM Settlement Point Price, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| DAASREV *q, r, h* | $ | *Day-Ahead Ancillary Service Revenue per QSE per Resource by hour*⎯The revenue received in the DAM for Resource *r* represented by QSE *q*, based on the Market Clearing Price for Capacity (MCPC) for each Ancillary Service in the DAM, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| DASPP *p, h* | $/MWh | *Day-Ahead Settlement Point Price by Settlement Point by hour*⎯The DAM Settlement Point Price at Resource Node *p* for the hour *h*. |
| DAESR *q, p, r, h* | MW | *Day-Ahead Energy Sale from Resource per QSE by Settlement Point per Resource by hour*⎯The amount of energy cleared through Three-Part Supply Offers in the DAM for Resource *r* at Resource Node *p* represented by QSE *q* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| DASUPR*q, p, r* | $/MWh | *Day-Ahead Startup Price per QSE per Settlement Point per Resource*—The derived Startup Price for an AGR *r* at Resource Node *p* represented by QSE *q*, for the first hour of the DAM-commitment period. |
| DASUCAP *q, p, r,* | $/start | *Day-Ahead Startup Cap per QSE per Settlement Point per Resource*—The amount used for AGR *r* or Resource *r* as Startup Costs. The cap is the Resource Category Startup Offer Generic Cap (RCGSC) unless ERCOT has approved verifiable unit-specific Startup Costs for that Resource, in which case the startup cap is the scaled verifiable unit-specific Startup Cost for the AGR or the verifiable unit-specific Startup Cost for non-AGR Resources. See Section 5.6.1, Verifiable Costs, for more information on verifiable costs. |
| DAMECAP *p,q,r,h* | $/MWh | *Day-Ahead Minimum-Energy Cap* —The amount used for Resource *r* for minimum-energy costs. The minimum cost is the Resource Category Minimum-Energy Generic Cap (RCGMEC) unless ERCOT has approved verifiable unit-specific minimum energy costs for that Resource, in which case the minimum energy cap is the verifiable unit-specific minimum energy cost. See Section 5.6.1 for more information on verifiable costs. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RCGSC | $/Start | *Resource Category Generic Startup Cost*—The Resource Category Generic Startup Cost cap for the category of the Resource, according to Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, for the Operating Day. |
| PCRUR *r, q, DAM, h* | MW | *Procured Capacity for Reg-Up from Resource per Resource per QSE per hour in DAM*—The Regulation Up (Reg-Up) capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MCPCRU *DAM, h* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Up per hour in DAM*—The DAM MCPC for Reg-Up for the hour *h*. |
| PCRDR *r, q, DAM, h* | MW | *Procured Capacity for Reg-Down from Resource per Resource per QSE per hour in DAM*—The Regulation Down (Reg-Down) capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MCPCRD *DAM, h* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Down per hour in DAM*—The DAM MCPC for Reg-Down for the hour *h*. |
| PCRRR *r, q, DAM, h* | MW | *Procured Capacity for Responsive Reserve from Resource per Resource per QSE per hour in DAM*—The Responsive Reserve (RRS) capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MCPCRR *DAM, h* | $/MW per hour | *Market Clearing Price for Capacity for Responsive Reserve per hour in DAM*—The DAM MCPC for RRS for the hour *h*. |
|

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR863: Insert the variables “PCECRR r, q, DAM, h” and “MCPCECR DAM, h” below upon system implementation:]***

|  |  |  |
| --- | --- | --- |
| PCECRR *r, q, DAM, h* | MW | *Procured Capacity for ERCOT Contingency Reserve Service from Resource per Resource per QSE per hour in DAM*—The ERCOT Contingency Reserve Service (ECRS) capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MCPCECR *DAM, h* | $/MW per hour | *Market Clearing Price for Capacity for ERCOT Contingency Reserve Service per hour in DAM*—The DAM MCPC for ECRS for the hour *h*. |

 |

 |
| PCNSR *r, q, DAM, h* | MW | *Procured Capacity for Non-Spin from Resource per Resource per QSE per hour in DAM*—The Non-Spinning Reserve (Non-Spin) capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MCPCNS *DAM, h* | $/MW per hour | *Market Clearing Price for Capacity for Non-Spin per hour*—The DAM MCPC for Non-Spin for the hour *h*. |
| DASUO *q, p, r* | $/start | *Day-Ahead Startup Offer per QSE per Settlement Point per Resource*—The Startup Offer included in the Three-Part Supply Offer submitted in the DAM associated with Resource *r* at Resource Node *p* represented by QSE *q*, for the first hour of the DAM-commitment period. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| AGRRATIO *q, p, r* | none | *Aggregate Generation Resource Ratio per QSE per Settlement Point per Aggregate Generation Resource*—A value which represents the ratio of the maximum number of generators online in an hour, as indicated by telemetry, compared to the total number of generators registered to the AGR and used in the approved verifiable cost for the AGR. The value is only applicable if the Resource is an AGR. |
| AGRMAXON *q, p, r* | none | *Aggregate Generation Resource Maximum Online per QSE per Settlement Point per Aggregate Generation Resource*—The maximum number of generators online during an hour, as indicated by telemetry. The value is only applicable if the Resource is an AGR. |
| AGRTOT *q, p, r* | none | *Aggregate Generation Resource Total per QSE per Settlement Point per Aggregate Generation Resource*—The total number of generators registered to the AGR and used in the approved verifiable cost for the AGR. The value is only applicable if the Resource is an AGR. |
| DAMEO *q, p, r, h* | $/MWh | *Day-Ahead Minimum-Energy Offer per QSE per Settlement Point per Resource per hour*—The Minimum-Energy Offer included in the Three-Part Supply Offer submitted in the DAM associated with Resource *r* at Resource Node *p* represented by QSE *q*, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| DALSL *q, p, r, h* | MW | *Day-Ahead Low Sustained Limit per QSE per Settlement Point per Resource per hour*⎯The Low Sustained Limit (LSL) of Resource *r* at Resource Node *p* represented by QSE *q*, for the hour *h* as seen in the 1000 Day-Ahead snapshot. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| DAAIEC *q, p, r h* | $/MWh | *Day-Ahead Average Incremental Energy Cost per QSE per Settlement Point per Resource per hour*⎯The average incremental energy cost, calculated according to the Energy Offer Curve capped by the generic energy price, for the output levels between the DAESR and the LSL of Resource *r* at Resource Node *p* represented by QSE *q*, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *q* | none | A QSE. |
| *p* | none | A Resource Node Settlement Point. |
| *r* | none | A DAM-committed Generation Resource. |
| *h* | none | An hour in the DAM-commitment period. |
| *c* | none | A contiguous block of DAM-committed hours. |
| *afterCCGR* | none | The Combined Cycle Generation Resource to which a Combined Cycle Train transitions. |
| *beforeCCGR* | none | The Combined Cycle Generation Resource from which a Combined Cycle Train transitions. |

 (8) The calculation of the Day-Ahead Average Incremental Energy Cost for each Resource for each hour is illustrated with the picture below, where Pcap is the Energy Offer Curve Cap. The method to calculate such cost is described in Section 4.6.5, Calculation of “Average Incremental Energy Cost” (AIEC).

$/

MWh

DASPP

P cap

P3

P2

P1

 Q (P1) Q (P2) Q (P3) Q (P cap) Q cleared MW

 [LSL] [DAESR]

Energy Offer Curve

The area under the capped Energy Offer Curve equals (DAAIEC \* (DAESR – LSL))

(9) The total of the Day-Ahead Make-Whole Payments to each QSE for Generation Resources for a given hour is calculated as follows:

DAMWAMTQSETOT *q* = DAMWAMT *q, p, r*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| DAMWAMTQSETOT *q* | $ | *Day-Ahead Make-Whole Payment QSE Total per QSE*⎯The total of the Day-Ahead Make-Whole Payments to QSE *q* for the DAM-committed Generation Resources represented by this QSE for the hour. |
| DAMWAMT *q, p, r* | $ | *Day-Ahead Make-Whole Payment per QSE per Settlement Point per Resource*⎯The payment to QSE *q* to make-whole the Startup Cost and energy cost of Resource *r* committed in the DAM at Resource Node *p* for the hour. When a Combined Cycle Generation Resource is committed in the DAM, payment is made to the Combined Cycle Train for the DAM-committed Combined Cycle Generation Resource. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *r* | none | A DAM-committed Generation Resource. |

4.6.4.1.1 Regulation Up Service Payment

(1) ERCOT shall pay each QSE whose Resource-Specific Ancillary Service Offers to provide Reg-Up to ERCOT were cleared in the DAM, for each hour as follows:

PCRUAMT *q* = (-1) \* MCPCRU *DAM* \* PCRU *q*

Where:

 PCRU *q*  =PCRUR *r, q, DAM*

(2) ERCOT shall pay each QSE whose Ancillary Service Only Offers to provide Reg-Up to ERCOT were cleared in the DAM, for each hour as follows:

 DAPCRUOAMT *q* = (-1) \* MCPCRU *DAM* \*DARUOAWD *q* The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| PCRUAMT *q*  | $ | *Procured Capacity for Reg-Up Amount per QSE in DAM*—The DAM Reg-Up payment for QSE *q* for the hour. |
| DAPCRUOAMT *q* | $ | *Day-Ahead Procured Capacity for Reg-Up Only Amount per QSE*—The payment to QSE *q* for all Reg-Up only awards in DAM for the hour. |
| PCRU *q*  | MW | *Procured Capacity for Reg-Up per QSE in DAM*—The total Reg-Up Service capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by this QSE for the hour. |
| PCRUR *r, q, DAM* | MW | *Procured Capacity for Reg-Up from Resource per Resource per QSE in DAM*—The Reg-Up capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MCPCRU *DAM* | $/MW  | *Market Clearing Price for Capacity for Reg-Up in DAM*—The DAM MCPC for Reg-Up for the hour. |
| DARUOAWD *q* | MW | *Day-Ahead Reg-Up Only Award for the QSE* —The Reg-Up Only capacity quantity awarded in DAM to QSE *q* for the hour. |
| *r* | none | A Resource. |
| *q* | none | A QSE. |

4.6.4.1.2 Regulation Down Service Payment

 (1) ERCOT shall pay each QSE whose Resource-Specific Ancillary Service Offers to provide Reg-Down to ERCOT were cleared in the DAM, for each hour as follows:

PCRDAMT *q* = (-1) \* MCPCRD *DAM* \* PCRD *q*

Where:

 PCRD *q* =PCRDR *r, q, DAM*

(2) ERCOT shall pay each QSE whose Ancillary Service Only Offers to provide Reg-Down to ERCOT were cleared in the DAM, for each hour as follows:

 DAPCRDOAMT *q* = (-1) \* MCPCRD *DAM* \* DARDOAWD *q*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| PCRDAMT *q* | $ | *Procured Capacity for Reg-Down Amount per QSE in DAM*—The DAM Reg-Down payment for QSE *q* for the hour. |
| DAPCRDOAMT *q* | $ | *Day-Ahead Procured Capacity for Reg-Down Only Awards per QSE*— The payment to QSE *q* for all Reg-Down only awards in DAM for the hour. |
| PCRD *q* | MW | *Procured Capacity for Reg-Down per QSE in DAM*—The total Reg-Down Service capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by this QSE for the hour. |
| PCRDR *r, q, DAM* | MW | *Procured Capacity for Reg-Down from Resource per Resource per QSE in DAM*—The Reg-Down capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MCPCRD *DAM* | $/MW  | *Market Clearing Price for Capacity for Reg-Down in DAM*—The DAM MCPC for Reg-Down for the hour. |
| DARDOAWD *q* | MW | *Day-Ahead Reg-Down Only Award for the QSE* —The Reg-Down only capacity quantity awarded in DAM to QSE *q* for the hour. |
| *r* | none | A Resource. |
| *q* | none | A QSE. |

 4.6.4.1.3 Responsive Reserve Payment

(1) ERCOT shall pay each QSE whose Resource-Specific Ancillary Service Offers to provide RRS to ERCOT were cleared in the DAM, for each hour as follows:

PCRRAMT *q* = (-1) \* MCPCRR *DAM* \* PCRR *q*

Where:

PCRR *q* = PCRRR *r, q, DAM*

(2) ERCOT shall pay each QSE whose Ancillary Service Only Offers to provide RRS to ERCOT were cleared in the DAM, for each hour as follows:

 DAPCRROAMT *q* = (-1) \* MCPCRR *DAM* *\** DARROAWD *q*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Definition** |
| PCRRAMT *q* | $ | *Procured Capacity for Responsive Reserve Amount per QSE in DAM*—The DAM RRS payment for QSE *q* for the hour. |
| DAPCRROAMT *q* | $ | *Day-Ahead Procured Capacity for Responsive Reserve Only Awards per QSE*— The payment to QSE *q* for all RRS only awards in DAM for the hour. |
| PCRR *q*  | MW | *Procured Capacity for Responsive Reserve per QSE in DAM*—The total RRS capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by this QSE for the hour. |
| PCRRR *r, q, DAM* | MW | *Procured Capacity for Responsive Reserve from Resource per Resource per QSE in DAM*—The RRS capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MCPCRR *DAM* | $/MW per hour | *Market Clearing Price for Capacity for Responsive Reserve in DAM*—The DAM MCPC for RRS for the hour. |
| DARROAWD *q* | MW | *Day-Ahead Responsive Reserve Only Award for the QSE* —The RRS only capacity quantity awarded in DAM to QSE *q* for the hour. |
| *r* | none | A Resource. |
| *q* | none | A QSE. |

4.6.4.1.4 Non-Spinning Reserve Service Payment

(1) ERCOT shall pay each QSE whose Resource-Specific Ancillary Service Offers to provide Non-Spin to ERCOT were cleared in the DAM, for each hour as follows:

PCNSAMT *q* = (-1) \* MCPCNS *DAM* \* PCNS *q*

Where:

 PCNS *q* = PCNSR *r, q, DAM*

(2) ERCOT shall pay each QSE whose Ancillary Service Only Offers to provide Non-Spin to ERCOT were cleared in the DAM, for each hour as follows:

 DAPCNSOAMT *q* = (-1) \* MCPCNS *DAM* *\** DANSOAWD *q*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| PCNSAMT *q* | $ | *Procured Capacity for Non-Spin Amount per QSE in DAM*—The DAM Non-Spin payment for QSE *q* for the hour. |
| DAPCNSOAMT *q* | $ | *Day-Ahead Procured Capacity for Non-Spin Only Awards per QSE*— The payment to QSE *q* for all Non-Spin only awards in DAM for the hour. |
| PCNS *q* | MW | *Procured Capacity for Non-Spin per QSE in DAM*—The total Non-Spin Service capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by this QSE for the hour. |
| PCNSR *r, q, DAM* | MW | *Procured Capacity for Non-Spin from Resource per Resource per QSE in DAM*—The Non-Spin capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MCPCNS *DAM* | $/MW  | *Market Clearing Price for Capacity for Non-Spin in DAM*—The DAM MCPC for Non-Spin for the hour. |
| DANSOAWD *q* | MW | *Day-Ahead Non-Spin Only Award for the QSE* —The Non-Spin only capacity quantity awarded in DAM to QSE *q* for the hour. |
| *r* | none | A Resource. |
| *q* | none | A QSE. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| ***[NPRR863: Insert Section 4.6.4.1.5 below upon system implementation:]******4.6.4.1.5***  ***ERCOT Contingency Reserve Service Payment***(1) ERCOT shall pay each QSE whose Resource-Specific Ancillary Service Offers to provide ECRS to ERCOT were cleared in the DAM, for each hour as follows:PCECRAMT *q* = (-1) \* MCPCECR *DAM* \* PCECR *q*Where:PCECR *q* = PCECRR *r, q, DAM*(2) ERCOT shall pay each QSE whose Ancillary Service Only Offers to provide ECRS to ERCOT were cleared in the DAM, for each hour as follows:DAPCECROAMT *q* = (-1) \* MCPCECR *DAM* *\** DAECROAWD *q*The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Definition** |
| PCECRAMT *q* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount per QSE in DAM*—The DAM ECRS payment for QSE *q* for the hour. |
| DAPCECROAMT *q* | $ | *Day-Ahead Procured Capacity for ERCOT Contingency Reserve Service Only Awards per QSE*— The payment to QSE *q* for all ECRS only awards in DAM for the hour. |
| PCECR *q*  | MW | *Procured Capacity for ERCOT Contingency Reserve Service per QSE in DAM*—The total ECRS capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by this QSE for the hour. |
| PCECRR *r, q, DAM* | MW | *Procured Capacity for ERCOT Contingency Reserve Service from Resource per Resource per QSE in DAM*—The ECRS capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MCPCECR *DAM* | $/MW  | *Market Clearing Price for Capacity for ERCOT Contingency Reserve Service in DAM*—The DAM MCPC for ECRS for the hour. |
| DAECROAWD *q* | MW | *Day-Ahead ERCOT Contingency Reserve Service Only Award for the QSE* —The ECRS only capacity quantity awarded in DAM to QSE *q* for the hour. |
| *r* | none | A Resource. |
| *q* | none | A QSE. |

 |

4.6.4.2.1 Regulation Up Service Charge

(1) Each QSE shall pay to ERCOT or be paid by ERCOT a Reg-Up Service charge for each hour as follows:

DARUAMT *q* = DARUPR \* DARUQ *q*

Where:

DARUPR = (-1) \* DAPCRUAMTTOT / DARUQTOT

DAPCRUAMTTOT = (PCRUAMT *q* + DAPCRUOAMT *q*)

DARUQTOT = DARUQ *q*

DARUQ *q* = DARUO *q* – DASARUQ *q*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| DARUAMT *q* | $ | *Day-Ahead Reg-Up Amount per QSE*—QSE *q*’s share of the DAM cost for Reg-Up, for the hour. |
| DARUPR | $/MW  | *Day-Ahead Reg-Up Price*—The Day-Ahead Reg-Up price for the hour. |
| DARUQ *q* | MW | *Day-Ahead Reg-Up Quantity per QSE*—The QSE *q*’s Day-Ahead Ancillary Service Obligation minus its self-arranged Reg-Up quantity for the hour. |
| DAPCRUAMTTOT  | $ | *Day-Ahead Procured Capacity for Reg-Up Amount Total* —The total of the DAM Reg-Up payments for all QSEs for the hour. |
| PCRUAMT *q* | $ | *Procured Capacity for Reg-Up Amount per QSE in DAM*—The DAM Reg-Up payment for QSE *q* for the hour. |
| DAPCRUOAMT *q* | $ | *Day-Ahead Procured Capacity for Reg-Up Only Amount per QSE*—The payment to QSE *q* for all Reg-Up only awards in DAM for the hour. |
| DARUQTOT | MW | *Day-Ahead Reg-Up Quantity Total*—The sum of every QSE’s Day-Ahead Ancillary Service Obligation minus its self-arranged Reg-Up quantity for the hour. |
| DARUO *q* | MW | *Day-Ahead Reg-Up Obligation per QSE*—The Reg-Up capacity obligation for QSE *q* for the DAM for the hour.  |
| DASARUQ *q* | MW | *Day-Ahead Self-Arranged Reg-Up Quantity per QSE*—The self-arranged Reg-Up quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| *q* | none | A QSE. |

4.6.4.2.2 Regulation Down Service Charge

(1) Each QSE shall pay to ERCOT or be paid by ERCOT a Reg-Down Service charge for each hour as follows:

DARDAMT *q* = DARDPR \* DARDQ *q*

Where:

DARDPR = (-1) \* DAPCRDAMTTOT / DARDQTOT

DAPCRDAMTTOT = (PCRDAMT *q*+ DAPCRDOAMT *q*)

DARDQTOT = DARDQ *q*

DARDQ *q* = DARDO *q* – DASARDQ *q*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| DARDAMT *q* | $ | *Day-Ahead Reg-Down Amount per QSE*—QSE *q*’s share of the DAM cost for Reg-Down, for the hour. |
| DARDPR | $/MW  | *Day-Ahead Reg-Down Price*—The Day-Ahead Reg-Down price for the hour. |
| DARDQ *q* | MW | *Day-Ahead Reg-Down Quantity per QSE*—The QSE *q*’s Day-Ahead Ancillary Service Obligation minus its self-arranged Reg-Down quantity for the hour. |
| DAPCRDAMTTOT | $ | *Day-Ahead Procured Capacity for Reg-Down Amount Total*—The total of the DAM Reg-Down payments for all QSEs for the hour. |
| PCRDAMT *q* | $ | *Procured Capacity for Reg-Down Amount per QSE in DAM*—The DAM Reg-Down payment for QSE *q* for the hour. |
| DAPCRDOAMT *q* | $ | *Day-Ahead Procured Capacity for Reg-Down Only Awards per QSE*— The payment to QSE *q* for all Reg-Down only awards in DAM for the hour. |
| DARDQTOT | MW | *Day-Ahead Reg-Down Quantity Total*—The sum of every QSE’s Day-Ahead Ancillary Service Obligation minus its self-arranged Reg-Down quantity for the hour. |
| DARDO *q* | MW | *Day-Ahead Reg-Down Obligation per QSE*—The Reg-Down capacity obligation for QSE *q* for the DAM for the hour.  |
| DASARDQ *q* | MW | *Day-Ahead Self-Arranged Reg-Down Quantity per QSE*—The self-arranged Reg-Down quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| *q* | none | A QSE. |

4.6.4.2.3 Responsive Reserve Charge

(1) Each QSE shall pay to ERCOT or be paid by ERCOT an RRS charge for each hour as follows:

DARRAMT *q* = DARRPR \* DARRQ *q*

Where:

DARRPR = (-1) \* DAPCRRAMTTOT / DARRQTOT

DAPCRRAMTTOT = (PCRRAMT *q* + DAPCRROAMT *q*)

DARRQTOT = DARRQ *q*

DARRQ *q* = DARRO *q* – DASARRQ *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| DARRAMT *q* | $ | *Day-Ahead Responsive Reserve Amount per QSE*—QSE *q*’s share of the DAM cost for RRS, for the hour. |
| DARRPR | $/MW  | *Day-Ahead Responsive Reserve Price*—The Day-Ahead RRS price for the hour. |
| DARRQ *q* | MW | *Day-Ahead Responsive Reserve Quantity per QSE*—The QSE *q*’s Day-Ahead Ancillary Service Obligation minus its self-arranged RRS quantity for the hour. |
| DAPCRRAMTTOT  | $ | *Day-Ahead Procured Capacity for Responsive Reserve Amount Total*—The total of the DAM RRS payments for all QSEs for the hour. |
| PCRRAMT *q* | $ | *Procured Capacity for Responsive Reserve Amount per QSE for DAM*—The DAM RRS payment for QSE *q* for the hour. |
| DAPCRROAMT *q*  | $ | *Day-Ahead Procured Capacity for Responsive Reserve Only Awards per QSE*— The payment to QSE *q* for all RRS only awards in DAM for the hour. |
| DARRQTOT | MW | *Day-Ahead Responsive Reserve Quantity Total*—The sum of every QSE’s Day-Ahead Ancillary Service Obligation minus its self-arranged RRS quantity for the hour. |
| DARRO *q* | MW | *Day-Ahead Responsive Reserve Obligation per QSE*—The RRS capacity obligation for QSE *q* for the DAM for the hour.  |
| DASARRQ *q* | MW | *Day-Ahead Self-Arranged Responsive Reserve Quantity per QSE*—The self-arranged RRS quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| *q* | none | A QSE. |

4.6.4.2.4 Non-Spinning Reserve Service Charge

(1) Each QSE shall pay to ERCOT or be paid by ERCOT a Non-Spin Service charge for each hour as follows:

DANSAMT *q* = DANSPR \* DANSQ *q*

Where:

DANSPR = (-1) \* DAPCNSAMTTOT / DANSQTOT

DAPCNSAMTTOT = (PCNSAMT *q* + DAPCNSOAMT *q*)

DANSQTOT = DANSQ *q*

DANSQ *q* = DANSO *q* – DASANSQ *q*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| DANSAMT *q* | $ | *Day-Ahead Non-Spin Amount per QSE*—QSE *q*’s share of the DAM cost for Non-Spin, for the hour. |
| DANSPR | $/MW per hour | *Day-Ahead Non-Spin Price*—The Day-Ahead Non-Spin price for the hour. |
| DANSQ *q* | MW | *Day-Ahead Non-Spin Quantity per QSE*—The QSE *q*’s Day-Ahead Ancillary Service Obligation minus its self-arranged Non-Spin quantity for the hour. |
| DAPCNSAMTTOT  | $ | *Day-Ahead Procured Capacity for Non-Spin Amount Total*—The total of the DAM Non-Spin payments for all QSEs for the hour. |
| PCNSAMT *q* | $ | *Procured Capacity for Non-Spin Amount per QSE in DAM*—The DAM Non-Spin payment for QSE *q* for the hour. |
| DAPCNSOAMT *q* | $ | *Day-Ahead Procured Capacity for Non-Spin Only Awards per QSE*— The payment to QSE *q* for all Non-Spin only awards in DAM for the hour. |
| DANSQTOT | MW | *Day-Ahead Non-Spin Quantity Total*—The sum of every QSE’s Day-Ahead Ancillary Service Obligation minus its self-arranged Non-Spin quantity for the hour. |
| DANSO *q* | MW | *Day-Ahead Non-Spin Obligation per QSE*—The Non-Spin capacity obligation for QSE *q* for the DAM for the hour.  |
| DASANSQ *q* | MW | *Day-Ahead Self-Arranged Non-Spin Quantity per QSE*—The self-arranged Non-Spin quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| *q* | none | A QSE. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| ***[NPRR863: Insert Section 4.6.4.2.5 below upon system implementation:]******4.6.4.2.5***  ***ERCOT Contingency Reserve Service Charge***(1) Each QSE shall pay to ERCOT or be paid by ERCOT an ECRS charge for each hour as follows:DAECRAMT *q* = DAECRPR \* DAECRQ *q*Where:DAECRPR = (-1) \* DAPCECRAMTTOT / DAECRQTOTDAPCECRAMTTOT = (PCECRAMT *q* + DAPCECROAMT *q*)DAECRQTOT = DAECRQ *q*DAECRQ *q* = DAECRO *q* – DASAECRQ *q*The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| DAECRAMT *q* | $ | *Day-Ahead ERCOT Contingency Reserve Amount per QSE*—QSE *q*’s share of the DAM cost for ECRS, for the hour. |
| DAECRPR | $/MW  | *Day-Ahead ERCOT Contingency Reserve Price*—The Day-Ahead ECRS price for the hour. |
| DAECRQ *q* | MW | *Day-Ahead ERCOT Contingency Reserve Quantity per QSE*—The QSE *q*’s Day-Ahead Ancillary Service Obligation minus its self-arranged ECRS quantity for the hour. |
| DAPCECRAMTTOT  | $ | *Day-Ahead Procured Capacity for ERCOT Contingency Reserve Amount Total*—The total of the DAM ECRS payments for all QSEs for the hour. |
| PCECRAMT *q* | $ | *Procured Capacity for ERCOT Contingency Reserve Amount per QSE for DAM*—The DAM ECRS payment for QSE *q* for the hour. |
| DAPCECROAMT *q*  | $ | *Day-Ahead Procured Capacity for ERCOT Contingency Reserve Service Only Awards per QSE*— The payment to QSE *q* for all ECRS only awards in DAM for the hour. |
| DAECRQTOT | MW | *Day-Ahead ERCOT Contingency Reserve Quantity Total*—The sum of every QSE’s Day-Ahead Ancillary Service Obligation minus its self-arranged ECRS quantity for the hour. |
| DAECRO *q* | MW | *Day-Ahead ERCOT Contingency Reserve Obligation per QSE*—The ECRS capacity obligation for QSE *q* for the DAM for the hour.  |
| DASAECRQ *q* | MW | *Day-Ahead Self-Arranged ERCOT Contingency Reserve Quantity per QSE*—The self-arranged ECRS quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| *q* | none | A QSE. |

 |