**ERCOT Nodal Protocols**

**Section 4: Day-Ahead Operations**

**November 1, 2021**

[4 Day-Ahead Operations 4-1](#_Toc68164990)

[4.1 Introduction 4-1](#_Toc68164991)

[4.1.1 Day-Ahead Timeline Summary 4-1](#_Toc68164992)

[4.1.2 Day-Ahead Process and Timing Deviations 4-3](#_Toc68164993)

[4.2 ERCOT Activities in the Day-Ahead 4-5](#_Toc68164994)

[4.2.1 Ancillary Service Plan and Ancillary Service Obligation 4-5](#_Toc68164995)

[4.2.1.1 Ancillary Service Plan 4-5](#_Toc68164996)

[4.2.1.2 Ancillary Service Obligation Assignment and Notice 4-6](#_Toc68164997)

[4.2.2 Wind-Powered Generation Resource Production Potential 4-8](#_Toc68164999)

[4.2.3 PhotoVoltaic Generation Resource Production Potential 4-10](#_Toc68165000)

[4.2.4 Posting Secure Forecasted ERCOT System Conditions 4-13](#_Toc68165001)

[4.2.4.1 Posting Public Forecasted ERCOT System Conditions 4-15](#_Toc68165002)

[4.2.5 Notice of New Types of Forecasts 4-15](#_Toc68165003)

[4.2.6 ERCOT Notice of Validation Rules for the Day-Ahead 4-15](#_Toc68165004)

[4.3 QSE Activities and Responsibilities in the Day-Ahead 4-16](#_Toc68165005)

[4.4 Inputs into DAM and Other Trades 4-16](#_Toc68165006)

[4.4.1 Capacity Trades 4-16](#_Toc68165007)

[4.4.1.1 Capacity Trade Criteria 4-17](#_Toc68165008)

[4.4.1.2 Capacity Trade Validation 4-17](#_Toc68165009)

[4.4.2 Energy Trades 4-18](#_Toc68165010)

[4.4.2.1 Energy Trade Criteria 4-18](#_Toc68165011)

[4.4.2.2 Energy Trade Validation 4-18](#_Toc68165012)

[4.4.3 Self-Schedules 4-19](#_Toc68165013)

[4.4.3.1 Self-Schedule Criteria 4-19](#_Toc68165014)

[4.4.3.2 Self-Schedule Validation 4-20](#_Toc68165015)

[4.4.4 DC Tie Schedules 4-20](#_Toc68165016)

[4.4.4.1 DC Tie Schedule Criteria 4-24](#_Toc68165017)

[4.4.5 [RESERVED] 4-25](#_Toc68165020)

[4.4.6 PTP Obligation Bids 4-25](#_Toc68165021)

[4.4.6.1 PTP Obligation Bid Criteria 4-25](#_Toc68165022)

[4.4.6.2 PTP Obligation Bid Validation 4-27](#_Toc68165023)

[4.4.6.3 PTP Obligations with Links to an Option DAM Award Eligibility 4-28](#_Toc68165024)

[4.4.7 Ancillary Service Supplied and Traded 4-29](#_Toc68165025)

[4.4.7.1 Self-Arranged Ancillary Service Quantities 4-29](#_Toc68165026)

[4.4.7.1.1 Negative Self-Arranged Ancillary Service Quantities 4-32](#_Toc68165027)

[4.4.7.2 Ancillary Service Offers 4-33](#_Toc68165028)

[4.4.7.2.1 Ancillary Service Offer Criteria 4-37](#_Toc68165029)

[4.4.7.2.2 Ancillary Service Offer Validation 4-40](#_Toc68165031)

[4.4.7.3 Ancillary Service Trades 4-41](#_Toc68165033)

[4.4.7.3.1 Ancillary Service Trade Criteria 4-44](#_Toc68165034)

[4.4.7.3.2 Ancillary Service Trade Validation 4-45](#_Toc68165035)

[4.4.7.4 Ancillary Service Supply Responsibility 4-46](#_Toc68165036)

[4.4.8 RMR Offers 4-47](#_Toc68165037)

[4.4.9 Energy Offers and Bids 4-48](#_Toc68165038)

[4.4.9.1 Three-Part Supply Offers 4-48](#_Toc68165039)

[4.4.9.2 Startup Offer and Minimum-Energy Offer 4-49](#_Toc68165040)

[4.4.9.2.1 Startup Offer and Minimum-Energy Offer Criteria 4-49](#_Toc68165041)

[4.4.9.2.2 Startup Offer and Minimum-Energy Offer Validation 4-50](#_Toc68165042)

[4.4.9.2.3 Startup Offer and Minimum-Energy Offer Generic Caps 4-50](#_Toc68165043)

[4.4.9.2.4 Verifiable Startup Offer and Minimum-Energy Offer Caps 4-52](#_Toc68165044)

[4.4.9.3 Energy Offer Curve 4-52](#_Toc68165045)

[4.4.9.3.1 Energy Offer Curve Criteria 4-54](#_Toc68165046)

[4.4.9.3.2 Energy Offer Curve Validation 4-55](#_Toc68165047)

[4.4.9.3.3 Energy Offer Curve Cost Caps 4-55](#_Toc68165048)

[4.4.9.4 Mitigated Offer Cap and Mitigated Offer Floor 4-57](#_Toc68165049)

[4.4.9.4.1 Mitigated Offer Cap 4-57](#_Toc68165050)

[4.4.9.4.2 Mitigated Offer Floor 4-62](#_Toc68165051)

[4.4.9.4.3 Mitigated Offer Cap for RMR Resources 4-63](#_Toc68165052)

[4.4.9.5 DAM Energy-Only Offer Curves 4-64](#_Toc68165053)

[4.4.9.5.1 DAM Energy-Only Offer Curve Criteria 4-65](#_Toc68165054)

[4.4.9.5.2 DAM Energy-Only Offer Validation 4-66](#_Toc68165055)

[4.4.9.6 DAM Energy Bids 4-66](#_Toc68165056)

[4.4.9.6.1 DAM Energy Bid Criteria 4-66](#_Toc68165057)

[4.4.9.6.2 DAM Energy Bid Validation 4-67](#_Toc68165058)

[4.4.9.7 Energy Bid/Offer Curve 4-67](#_Toc68165059)

[4.4.9.7.1 Energy Bid/Offer Curve Criteria 4-68](#_Toc68165060)

[4.4.9.7.2 Energy Bid/Offer Curve Validation 4-69](#_Toc68165061)

[4.4.10 Credit Requirement for DAM Bids and Offers 4-69](#_Toc68165062)

[4.4.11 System-Wide Offer Caps 4-79](#_Toc68165063)

[4.4.11.1 Scarcity Pricing Mechanism 4-81](#_Toc68165065)

[4.4.12 Determination of Ancillary Service Demand Curves for the Day-Ahead Market and Real-Time Market 4-82](#_Toc68165066)

[4.5 DAM Execution and Results 4-84](#_Toc68165067)

[4.5.1 DAM Clearing Process 4-84](#_Toc68165068)

[4.5.2 Ancillary Service Insufficiency 4-91](#_Toc68165069)

[4.5.3 Communicating DAM Results 4-92](#_Toc68165070)

[4.6 DAM Settlement 4-97](#_Toc68165071)

[4.6.1 Day-Ahead Settlement Point Prices 4-97](#_Toc68165072)

[4.6.1.1 Day-Ahead Settlement Point Prices for Resource Nodes 4-97](#_Toc68165073)

[4.6.1.2 Day-Ahead Settlement Point Prices for Load Zones 4-97](#_Toc68165074)

[4.6.1.3 Day-Ahead Settlement Point Prices for Hubs 4-98](#_Toc68165075)

[4.6.1.4 Day-Ahead Settlement Point Prices at the Logical Resource Node for a Combined Cycle Generation Resource 4-98](#_Toc68165076)

[4.6.2 Day-Ahead Energy and Make-Whole Settlement 4-100](#_Toc68165077)

[4.6.2.1 Day-Ahead Energy Payment 4-100](#_Toc68165078)

[4.6.2.2 Day-Ahead Energy Charge 4-101](#_Toc68165079)

[4.6.2.3 Day-Ahead Make-Whole Settlements 4-103](#_Toc68165080)

[4.6.2.3.1 Day-Ahead Make-Whole Payment 4-104](#_Toc68165081)

[4.6.2.3.2 Day-Ahead Make-Whole Charge 4-111](#_Toc68165082)

[4.6.3 Settlement for PTP Obligations Bought in DAM 4-113](#_Toc68165083)

[4.6.4 Settlement of Ancillary Services Procured in the DAM 4-116](#_Toc68165084)

[4.6.4.1 Payments for Ancillary Services Procured in the DAM 4-116](#_Toc68165085)

[4.6.4.1.1 Regulation Up Service Payment 4-116](#_Toc68165086)

[4.6.4.1.2 Regulation Down Service Payment 4-117](#_Toc68165087)

[4.6.4.1.3 Responsive Reserve Payment 4-119](#_Toc68165088)

[4.6.4.1.4 Non-Spinning Reserve Service Payment 4-120](#_Toc68165089)

[4.6.4.1.5 ERCOT Contingency Reserve Service Payment 4-122](#_Toc68165090)

[4.6.4.2 Charges for Ancillary Services Procurement in the DAM 4-123](#_Toc68165091)

[4.6.4.2.1 Regulation Up Service Charge 4-123](#_Toc68165092)

[4.6.4.2.2 Regulation Down Service Charge 4-124](#_Toc68165093)

[4.6.4.2.3 Responsive Reserve Charge 4-126](#_Toc68165094)

[4.6.4.2.4 Non-Spinning Reserve Service Charge 4-128](#_Toc68165095)

[4.6.4.2.5 ERCOT Contingency Reserve Service Charge 4-130](#_Toc68165096)

[4.6.5 Calculation of “Average Incremental Energy Cost” (AIEC) 4-131](#_Toc68165097)

# Day-Ahead Operations

4.1 Introduction

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

|  |
| --- |
| ***[NPRR1008: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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:

****

|  |
| --- |
| ***[NPRR1008: Replace the figure above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]*** |

4.1.2 Day-Ahead Process and Timing Deviations

(1) ERCOT may temporarily revise the DAM transaction deadline or the time for communicating DAM results when necessary to ensure, to the greatest extent practicable, that the DAM clearing process completes. In such an event, ERCOT shall immediately issue an Advisory and notify all Qualified Scheduling Entities (QSEs) of the following:

(a) Details of the affected timing and procedures;

(b) Details of interim requirements, if any exist;

(c) An estimate of the period for which the interim requirements apply; and

(d) Reasons for the temporary variation.

(2) Subject to the principles set forth in paragraph (3) below, ERCOT may omit any procedure or take any manual action necessary to ensure, to the greatest extent practicable, that the DAM clearing process completes by 1900 in the Day-Ahead. Should ERCOT omit any such procedure or take any such manual action, ERCOT will issue a Market Notice no later than 1700 Central Prevailing Time (CPT) on the next Business Day that details the omitted procedures or manual actions taken by ERCOT and ERCOT’s explanation as to why they were necessary. If the manual action taken by ERCOT requires ERCOT to omit bids or offers submitted by a particular QSE, ERCOT will provide notification to that QSE prior to taking the manual action, so long as providing such notice will not delay completion of the DAM beyond 1900 in the Day-Ahead.

(3) When omitting a procedure or taking a manual action under paragraph (2) above, ERCOT will act in accordance with the following principles:

(a) ERCOT will only act in cases in which it reasonably believes that intervention is necessary in order to complete DAM by 1900;

(b) ERCOT will seek to minimize impacts to Market Participants and will only remove transactions from the DAM as a last resort; when ERCOT believes a QSE’s transactions need to be removed, either in whole or in part, in order to complete the DAM clearing process, ERCOT will prioritize the removal in reverse order based on submittal time, where the QSE’s most recently submitted transactions are prioritized before the removal of the earliest submitted transactions; however, the number of transactions removed will be at ERCOT’s discretion, subject to the principles set forth in this paragraph;

(c) Approval to act will be obtained from the applicable ERCOT executive or designee; and

(d) ERCOT will not publish a DAM in which no transmission constraints are evaluated.

(4) Should ERCOT omit a procedure or take manual action pursuant to paragraph (2) above, and a Market Participant is directly impacted by such ERCOT action or omission, the Market Participant may seek relief as specifically provided for under Section 9.14.10, Settlement for Market Participants Impacted by Omitted Procedures or Manual Actions to Resolve the DAM. A Market Participant will only be entitled relief upon ERCOT’s determination that ERCOT’s action or omission pursuant to paragraph (2) above was the sole cause of the Market Participant’s injury, and the monetary value of the direct impact can be accurately determined by ERCOT.  Such relief is not available in the case that ERCOT aborts all or part of the Day-Ahead process. A Market Participant may only seek relief due to ERCOT’s omission of a procedure or manual action under paragraph (2) above in the following circumstances:

(a) ERCOT removed the Market Participant’s bid(s) or offer(s);

(b) ERCOT failed to award the Market Participant’s bid(s) or offer(s); or

(c) ERCOT de-energized the Market Participant’s Resource(s) in the base case.

(5) If ERCOT is unable to execute the Day-Ahead process prior to 1900 in the Day-Ahead, ERCOT may abort all or part of the Day-Ahead process and require all schedules and trades to be submitted in the Adjustment Period. In that event, ERCOT shall issue a Watch and notify all QSEs of the following:

(a) Details of the affected timing and procedures;

(b) Details of any interim requirements, including the requirements described in Section 5.2.2.2, RUC Process Timeline After an Aborted Day-Ahead Market;

(c) An estimate of the period for which the interim requirements apply; and

|  |
| --- |
| ***[NPRR1008: Delete items (b) and (c) above upon system implementation of the Real-Time Co-Optimization (RTC) project and renumber accordingly.]*** |

(d) Reasons for the temporary variation.

(6) If ERCOT is unable to operate the Adjustment Period process, then ERCOT may abort the Adjustment Period process and operate under its Operating Period procedures.

4.2 ERCOT Activities in the Day-Ahead

4.2.1 Ancillary Service Plan and Ancillary Service Obligation

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 ERCOT website 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 ERCOT website by 0600 of the Day-Ahead.

|  |
| --- |
| ***[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 ERCOT website 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 ERCOT website, Ancillary Service quantity requirements for an Operating Day may not be decreased.

|  |
| --- |
| ***[NPRR1008: Insert paragraph (6) below upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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 ERCOT website 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 reflecting the change to the Ancillary Service Plan will be posted to the ERCOT website. |

4.2.1.2 Ancillary Service Obligation Assignment and Notice

(1) ERCOT shall assign part of the Ancillary Service Plan quantity, 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) 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 Ancillary Service Obligation for each service and for each hour of the Operating Day.

(3) By 0600 of the Day-Ahead, ERCOT shall post on the Market Information System (MIS) Certified Area each QSE’s LRS used for the Ancillary Service Obligation calculation.

|  |
| --- |
| ***[NPRR1008: Replace Section 4.2.1.2 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  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) 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.  (3) By 0600 of the Day-Ahead, ERCOT shall post on the Market Information System (MIS) Certified Area each QSE’s LRS used for both the advisory and final Ancillary Service Obligation calculations.  (4) The minimum Ancillary Service Obligation quantity will be 0.1 MW and will apply to both advisory and final values.  (5) 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. |

4.2.2 Wind-Powered Generation Resource Production Potential

(1) ERCOT shall produce and update hourly a Short-Term Wind Power Forecast (STWPF) that provides a rolling 168-hour hourly forecast of wind production potential for each Wind-powered Generation Resource (WGR). ERCOT shall produce and post to the ERCOT website every five minutes an Intra-Hour Wind Power Forecast (IHWPF) by wind region that provides a forecast of ERCOT-wide wind production potential for each five-minute interval over the next two hours from each forecast model. The posting shall indicate which forecast model was being used by ERCOT for Generation To Be Dispatched (GTBD) calculation purposes. ERCOT shall produce and update an hourly Total ERCOT Wind Power Forecast (TEWPF) providing a probability distribution of the hourly production potential from all wind-power in ERCOT for each of the next 168 hours. Each Generation Entity that owns a WGR shall install and telemeter to ERCOT the site-specific meteorological information that ERCOT determines is necessary to produce the STWPF and TEWPF forecasts. ERCOT shall establish procedures specifying the accuracy requirements of WGR meteorological information telemetry.

|  |
| --- |
| ***[NPRR1029: Replace paragraph (1) above with the following upon system implementation:]***  (1) ERCOT shall produce and update hourly a Short-Term Wind Power Forecast (STWPF) that provides a rolling 168-hour hourly forecast of wind production potential for each Wind-powered Generation Resource (WGR) and for each wind generation component of a DC-Coupled Resource. ERCOT shall produce and post to the ERCOT website every five minutes an Intra-Hour Wind Power Forecast (IHWPF) by wind region that provides a forecast of ERCOT-wide wind production potential for each five-minute interval over the next two hours from each forecast model. The posting shall indicate which forecast model was being used by ERCOT for Generation To Be Dispatched (GTBD) calculation purposes. ERCOT shall produce and update an hourly Total ERCOT Wind Power Forecast (TEWPF) providing a probability distribution of the hourly production potential from all wind-power in ERCOT for each of the next 168 hours. A Resource Entity with a WGR or DC-Coupled Resource that has a wind generation component shall install equipment to enable telemetry of site-specific meteorological information that ERCOT determines is necessary to produce the STWPF and TEWPF forecasts, and the Resource Entity’s QSE shall telemeter such information and Resource status information to ERCOT. ERCOT shall establish procedures specifying the accuracy requirements of meteorological information telemetry for WGRs and DC-Coupled Resources with a wind generation component. |

(2) ERCOT shall use the probabilistic TEWPF and select the forecast that the actual total ERCOT WGR production is expected to exceed 50% of the time (50% probability of exceedance forecast). To produce the STWPF, ERCOT will allocate the TEWPF 50% probability of exceedance forecast to each WGR such that the sum of the individual STWPF forecasts equal the TEWPF forecast. The updated STWPF forecasts for each hour for each WGR are to be used as input into each Reliability Unit Commitment (RUC) process as per Section 5, Transmission Security Analysis and Reliability Unit Commitment.

|  |
| --- |
| ***[NPRR1029: Replace paragraph (2) above with the following upon system implementation:]***  (2) ERCOT shall use the probabilistic TEWPF and select the forecast that the actual total ERCOT production of WGRs and the wind generation components of all DC-Coupled Resources is expected to exceed 50% of the time (50% probability of exceedance forecast). To produce the STWPF, ERCOT will allocate the TEWPF 50% probability of exceedance forecast to each WGR and each wind generation component of a DC-Coupled Resource such that the sum of the individual STWPF forecasts equal the TEWPF forecast. The updated STWPF forecasts for each hour for each WGR and each wind generation component of a DC-Coupled Resource are to be used as input into each Reliability Unit Commitment (RUC) process as per Section 5, Transmission Security Analysis and Reliability Unit Commitment. |

(3) ERCOT shall produce the Wind-powered Generation Resource Production Potential (WGRPP) forecasts using the information provided by WGR owners including WGR availability, meteorological information, and Supervisory Control and Data Acquisition (SCADA).

|  |
| --- |
| ***[NPRR1029: Replace paragraph (3) above with the following upon system implementation:]***  (3) ERCOT shall produce the Wind-powered Generation Resource Production Potential (WGRPP) forecasts using the information provided by Resource Entities and QSEs representing WGRs and DC-Coupled Resources with wind generation components, including Resource availability, meteorological information, and Supervisory Control and Data Acquisition (SCADA). |

(4) Each hour, ERCOT shall provide, through the Messaging System, the STWPF and WGRPP forecasts for each WGR to the QSE that represents that WGR and shall post each STWPF and WGRPP forecast on the MIS Certified Area.

|  |
| --- |
| ***[NPRR1029: Replace paragraph (4) above with the following upon system implementation:]***  (4) Each hour, ERCOT shall provide, through the Messaging System, the STWPF and WGRPP forecasts for each WGR and each wind generation component of a DC-Coupled Resource to the QSE that represents that WGR or DC-Coupled Resource and shall post each STWPF and WGRPP forecast on the MIS Certified Area. |

(5) Each hour, ERCOT shall post to the ERCOT website, on a system-wide and regional basis the hourly actual wind power production, STWPF, WGRPP, and aggregate Current Operating Plan (COP) High Sustained Limits (HSLs) for On-Line WGRs for a rolling historical 48-hour period. The system-wide and regional STWPF, WGRPP, and aggregate COP HSLs for On-Line WGRs will also be posted for the rolling future 168-hour period. ERCOT shall retain the STWPF and WGRPP for each hour.

|  |
| --- |
| ***[NPRR1029: Replace paragraph (5) above with the following upon system implementation:]***  (5) Each hour, ERCOT shall post to the ERCOT website, on a system-wide and regional basis the hourly actual wind power production, STWPF, WGRPP, and aggregate Current Operating Plan (COP) High Sustained Limits (HSLs) for On-Line WGRs and the wind generation components of DC-Coupled Resources for a rolling historical 48-hour period. The system-wide and regional STWPF, WGRPP, and aggregate COP HSLs for On-Line WGRs and the wind generation components of DC-Coupled Resources will also be posted for the rolling future 168-hour period. ERCOT shall retain the STWPF and WGRPP for each hour. |

(6) Each hour, ERCOT shall post to the ERCOT website the hourly system-wide and regional STWPF and WGRPP values produced by each forecast model for On-Line WGRs for the rolling historical 48-hour period and the rolling future 168-hour period. ERCOT’s posting shall also indicate which forecast model it is using for each region to populate COPs.

|  |
| --- |
| ***[NPRR1029: Replace paragraph (6) above with the following upon system implementation:]***  (6) Each hour, ERCOT shall post to the ERCOT website the hourly system-wide and regional STWPF and WGRPP values produced by each forecast model for On-Line WGRs and the wind generation components of DC-Coupled Resources for the rolling historical 48-hour period and the rolling future 168-hour period. ERCOT’s posting shall also indicate which forecast model it is using for each region to populate COPs. |

(7) Every five minutes, ERCOT shall post to the ERCOT website, on a system-wide and regional basis, five-minute actual wind power production for a rolling historical 60-minute period.

4.2.3 PhotoVoltaic Generation Resource Production Potential

(1) ERCOT shall produce and update hourly a Short-Term PhotoVoltaic Power Forecast (STPPF) that provides a rolling 168-hour hourly forecast of PhotoVoltaic production potential for each PhotoVoltaic Generation Resource (PVGR). ERCOT shall produce and update an hourly Total ERCOT PhotoVoltaic Power Forecast (TEPPF) providing a probability distribution of the hourly production potential from all PhotoVoltaic Generation Resources in ERCOT for each of the next 168 hours. Each Generation Entity that owns a PVGR shall install and telemeter to ERCOT the site-specific meteorological information that ERCOT determines is necessary to produce the STPPF and TEPPF forecasts. ERCOT shall establish procedures specifying the accuracy requirements of PVGR meteorological information telemetry.

|  |
| --- |
| ***[NPRR935 and NPRR1029: Replace applicable portions of paragraph (1) above with the following upon system implementation:]***  (1) ERCOT shall produce and update hourly a Short-Term PhotoVoltaic Power Forecast (STPPF) that provides a rolling 168-hour hourly forecast of PhotoVoltaic (PV) production potential for each PhotoVoltaic Generation Resource (PVGR) and for the PV component of each DC-Coupled Resource. ERCOT shall produce and post to the ERCOT website every five minutes an Intra-Hour PhotoVoltaic Power Forecast (IHPPF) by PhotoVoltaic region that provides a forecast of ERCOT-wide PhotoVoltaic production potential for each five-minute interval over the next two hours from each forecast model. The posting shall indicate which forecast model was being used by ERCOT for GTBD calculation purposes. ERCOT shall produce and update an hourly Total ERCOT PhotoVoltaic Power Forecast (TEPPF) providing a probability distribution of the hourly production potential from all PhotoVoltaic Generation Resources and the PV components of all DC-Coupled Resources in ERCOT for each of the next 168 hours. A Resource Entity with a PVGR or DC-Coupled Resource that has a PV component shall install equipment to enable telemetry of site-specific meteorological information that ERCOT determines is necessary to produce the STPPF and TEPPF forecasts, and the Resource Entity’s QSE shall telemeter such information and Resource status information to ERCOT. ERCOT shall establish procedures specifying the accuracy requirements of meteorological information telemetry for PVGRs and DC-Coupled Resources with a PV component. |

(2) ERCOT shall use the probabilistic TEPPF and select the forecast that the actual total ERCOT PVGR production is expected to exceed 50% of the time (50% probability of exceedance forecast). To produce the STPPF, ERCOT will allocate the TEPPF 50% probability of exceedance forecast to each PVGR such that the sum of the individual STPPF forecasts equal the TEPPF forecast. The updated STPPF forecasts for each hour for each PVGR are to be used as input into each RUC process as per Section 5, Transmission Security Analysis and Reliability Unit Commitment.

|  |
| --- |
| ***[NPRR1029: Replace paragraph (2) above with the following upon system implementation:]***  (2) ERCOT shall use the probabilistic TEPPF and select the forecast that the actual total ERCOT production of PVGRs and the PV components of DC-Coupled Resources is expected to exceed 50% of the time (50% probability of exceedance forecast). To produce the STPPF, ERCOT will allocate the TEPPF 50% probability of exceedance forecast to each PVGR and each PV component of a DC-Coupled Resource such that the sum of the individual STPPF forecasts equal the TEPPF forecast. The updated STPPF forecasts for each hour for each PVGR and each PV component of a DC-Coupled Resource are to be used as input into each RUC process as per Section 5, Transmission Security Analysis and Reliability Unit Commitment. |

(3) ERCOT shall produce the PhotoVoltaic Generation Resource Production Potential (PVGRPP) forecasts using the information provided by PVGR owners including PVGR availability, meteorological information, and SCADA.

|  |
| --- |
| ***[NPRR1029: Replace paragraph (3) above with the following upon system implementation:]***  (3) ERCOT shall produce the PhotoVoltaic Generation Resource Production Potential (PVGRPP) forecasts using the information provided by owners of PVGRs and DC-Coupled Resources with a PV component including Resource availability, meteorological information, and SCADA. |

(4) Each hour, ERCOT shall provide, through the Messaging System, the STPPF and PVGRPP forecasts for each PVGR to the QSE that represents that PVGR and shall post each STPPF and PVGRPP forecast on the MIS Certified Area.

|  |
| --- |
| ***[NPRR1029: Replace paragraph (4) above with the following upon system implementation:]***  (4) Each hour, ERCOT shall provide, through the Messaging System, the STPPF and PVGRPP forecasts for each PVGR and each DC-Coupled Resource with a PV component to the QSE that represents that PVGR or DC-Coupled Resource and shall post each STPPF and PVGRPP forecast on the MIS Certified Area. |

(5) After the aggregated ERCOT PVGR capacity reaches one GW and the maximum PVGR capacity ratio of a single PVGR over the total ERCOT installed PVGR capacity is at or below 60%, each hour ERCOT shall post to the ERCOT website, on a system-wide basis the hourly actual PhotoVoltaic (PV) power production, STPPF, PVGRPP, and aggregate COP HSLs for On-Line PVGRs for a rolling historical 48-hour period. The system-wide STPPF, PVGRPP, and aggregate COP HSLs for On-Line PVGRs will also be posted for the rolling future 168-hour period. ERCOT shall retain the STPPF and PVGRPP for each hour. However, ERCOT shall post this information no later than June 1, 2016.

|  |
| --- |
| ***[NPRR1029: Replace paragraph (5) above with the following upon system implementation:]***  (5) Each hour ERCOT shall post to the ERCOT website, on a system-wide basis the hourly actual PhotoVoltaic (PV) power production, STPPF, PVGRPP, and aggregate COP HSLs for On-Line PVGRs and PV components of DC-Coupled Resources for a rolling historical 48-hour period. The system-wide STPPF, PVGRPP, and aggregate COP HSLs for On-Line PVGRs and PV components of DC-Coupled Resources shall also be posted for the rolling future 168-hour period. |

|  |
| --- |
| ***[NPRR935 and NPRR1029: Insert applicable portions of paragraph (6) below upon system implementation and renumber accordingly:]***  (6) Each hour, ERCOT shall post to the ERCOT website the hourly system-wide and regional STPPF and PVGRPP values produced by each forecast model for On-Line PVGRs and DC-Coupled Resources with a PV component for the rolling historical 48-hour period and the rolling future 168-hour period. ERCOT’s posting shall also indicate which forecast model it is using for each region to populate COPs. |

(6) After the aggregated ERCOT PVGR capacity reaches one GW and the maximum PVGR capacity ratio of a single PVGR over the total ERCOT installed PVGR capacity is at or below 60%, every five minutes, ERCOT shall post to the ERCOT website, on a system-wide basis, five-minute actual PV power production for a rolling historical 60-minute period. However, ERCOT shall post this information no later than June 1, 2016.

|  |
| --- |
| ***[NPRR1029: Replace paragraph (6) above with the following upon system implementation:]***  (6) Every five minutes, ERCOT shall post to the ERCOT website, on a system-wide basis, five-minute actual PV power production from all PVGRs and PV components of DC-Coupled Resources for a rolling historical 60-minute period. |

4.2.4 Posting Secure Forecasted ERCOT System Conditions

(1) No later than 0600 in the Day-Ahead, ERCOT shall post on the MIS Secure Area, and make available for download, the following information for the Operating Day:

(a) For each update of the Network Operations Model, the Redacted Network Operations Model in the Common Information Model (CIM) format and the companion version of Network Operations Model (unredacted) will be posted to the MIS Certified Area for Transmission Service Providers (TSPs) as described in paragraph (9) of Section 3.10.4, ERCOT Responsibilities;

(b) For each update of the Network Operations Model, differences between the posted Redacted Network Operations Model and the previous Redacted Network Operations Model as described in paragraph (4) of Section 3.10.4;

(c) Load Profiles for non-Interval Data Recorder (IDR) metered Customers;

(d) Distribution Loss Factors (DLFs) and forecasted ERCOT-wide Transmission Loss Factors (TLFs), as described in Section 13.3, Distribution Losses, and Section 13.2, Transmission Losses, for each Settlement Interval of the Operating Day;

(e) A current list of Electrically Similar Settlement Points produced from the 0600 Day-Ahead Market (DAM) study that support that creation of Power System Simulator for Engineering (PSS/E) files;

(f) A daily version of the Network Operations Model in a PSS/E format that has been exported from the Market Management System prior to 0600 representing the next Operating Day in hourly files, inclusive of:

(i) Outages from the Outage Scheduler implemented in the hourly PSS/E files;

(ii) All bus shunt MW and MVAr set to zero;

(iii) All Load MW and MVAr set to zero;

(iv) All generation MW and MVAr set to zero; and

(v) Slack bus used in the DAM shall be represented at the same bus in each case; and

(g) A daily version of supporting files for the PSS/E files supporting the Network Operations Model that has been exported from the Market Management System prior to 0600, inclusive of:

(i) Contingency definition corresponding to each hourly PSS/E file;

(ii) Generator mapping data corresponding to each hourly PSS/E file;

(iii) Mapping of all Resource Nodes and DC Tie Load Zone to the hourly PSS/E file including Private Use Network Settlement Points. This file of hourly data will also include the base case energization status of Resource Node and DC Tie Load Zone reflecting Settlement Points available for DAM clearing process;

(iv) Load mapping data corresponding to each hourly PSS/E case necessary to model all Load Zone energy transactions in the DAM;

(v) Transmission line mapping data corresponding to each hourly PSS/E files;

(vi) Transformer mapping data corresponding to each hourly PSS/E files; and

(vii) Hub mapping data corresponding to each hourly PSS/E case necessary to model all Hub energy transactions in the DAM.

4.2.4.1 Posting Public Forecasted ERCOT System Conditions

(1) No later than 0600 in the Day-Ahead, ERCOT shall post on the ERCOT website, and make available for download, the following information for the Operating Day:

(a) Weather assumptions used by ERCOT to forecast ERCOT System conditions and used in the Dynamic Rating Processor;

(b) ERCOT System, Weather Zone, Load Zone, and Study Area Load forecasts for the next seven days, by hour, and a message on update indicating any changes to the forecasts by means of the Messaging System;

(c) A current list of all Settlement Points that may be used for market processes and transactions;

(d) A mapping of Settlement Points to Electrical Buses in the Network Operations Model;

(e) A list of transmission constraints that have a high probability of binding in the Security-Constrained Economic Dispatch (SCED) or DAM; and

(f) A mapping of any Electrical Bus to another Electrical Bus for purposes of heuristic pricing as described in paragraph (8) of Section 4.5.1, DAM Clearing Process, and Section 6.6.1, Real-Time Settlement Point Prices.

4.2.5 Notice of New Types of Forecasts

(1) Before using any new type of forecast for any operational purpose, ERCOT shall issue a Market Notice stating ERCOT’s intention to use that new type of forecast and shall sponsor a Nodal Protocol Revision Request (NPRR) to propose requirements for posting data for the new type of forecast.

4.2.6 ERCOT Notice of Validation Rules for the Day-Ahead

(1) ERCOT shall provide each QSE with the information necessary to pre-validate its data for DAM, including publishing validation rules for offers, bids, and trades.

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 Tie (DC Tie) Schedules, Ancillary Service Offers, Ancillary Service Trades, Self-Arranged Ancillary Service Quantities, and Point-to-Point (PTP) Obligation bids as specified in this Section.

|  |
| --- |
| ***[NPRR1008 and NPRR1014: Replace applicable portions of paragraph (b) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014:]***  (b) May submit Three-Part Supply Offers, Day-Ahead Market (DAM) Energy-Only Offers, DAM Energy Bids, Energy Bid/Offer Curves, Energy Trades, Self-Schedules, Capacity Trades, Direct Current Tie (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 Inputs into DAM and Other Trades

4.4.1 Capacity Trades

(1) A Capacity Trade is the information for a Qualified Scheduling Entity (QSE)-to-QSE transaction that transfers financial responsibility for capacity between a buyer and a seller.

(2) A Capacity Trade for hours in the Operating Day that is reported to ERCOT before 1430 in the Day-Ahead creates:

(a) A capacity supply in the Day-Ahead Reliability Unit Commitment (DRUC) process for the buyer; and

(b) A capacity obligation in the DRUC process for the seller.

(3) A Capacity Trade submitted at or after 1430 in the Day-Ahead for the Operating Day creates a capacity supply or obligation in any Hourly Reliability Unit Commitment (HRUC) processes executed after the Capacity Trade is reported to ERCOT. Capacity Trades submitted after the DRUC snapshot are considered in the Adjustment Period snapshot.

(4) As soon as practicable, ERCOT shall notify each QSE through the Messaging System of any of its Capacity Trades that are invalid Capacity Trades. The QSE may correct and resubmit any invalid Capacity Trade within the appropriate market timeline.

4.4.1.1 Capacity Trade Criteria

(1) A Capacity Trade must be submitted by a QSE and must include the following:

(a) The buying QSE;

(b) The selling QSE;

(c) The quantity in MW; and

(d) The first hour and last hour of the trade.

(2) A Capacity Trade must be confirmed by both the buyer and seller to be considered valid.

4.4.1.2 Capacity Trade Validation

(1) A validated Capacity Trade is a Capacity Trade that ERCOT has determined meets the criteria listed in Section 4.4.1.1, Capacity Trade Criteria. Only one confirmed Capacity Trade is allowed for the same buying and selling QSEs for each hour.

(2) When a Capacity Trade is reported to ERCOT, ERCOT shall notify both the buying and selling QSEs by using the Messaging System, if available, and on the Market Information System (MIS) Certified Area. ERCOT shall also post to the MIS Certified Area any unconfirmed Capacity Trades for QSEs on an hourly basis for all remaining hours of the current Operating Day and all hours of the next Operating Day.

(3) ERCOT shall continuously validate Capacity Trades and continuously display on the MIS Certified Area information that allows any QSE named in a Capacity Trade to view confirmed and unconfirmed Capacity Trades.

(4) The QSE that first reports the Capacity Trade to ERCOT is deemed to have confirmed the Capacity Trade unless it subsequently affirmatively rejects it. The QSE that first reports a Capacity Trade may reject, edit, or delete a Capacity Trade that its counterpart has not confirmed. The counterpart is deemed to have confirmed the Capacity Trade when it submits to ERCOT an identical Capacity Trade. After both the buyer and seller have confirmed a Capacity Trade, either party may reject it at any time, but the rejection is effective only for any ERCOT Settlement process for which the deadline for reporting Capacity Trades has not yet passed.

4.4.2 Energy Trades

(1) An Energy Trade is the information for a QSE-to-QSE transaction that transfers financial responsibility for energy at a Settlement Point between a buyer and a seller.

(2) An Energy Trade for hours in the Operating Day that is reported to ERCOT before 1430 in the Day-Ahead creates a capacity supply or obligation in the DRUC process. Energy Trades submitted after 1430 in the Day-Ahead for the Operating Day create a capacity supply or obligation in any HRUC processes executed after the Energy Trade is reported to ERCOT. Energy Trades submitted after the DRUC snapshot are considered in the Adjustment Period.

(3) An Energy Trade may be submitted for any Settlement Interval within an Operating Day before 1430 of the following day.

(4) As soon as practicable, ERCOT shall notify each QSE through the Messaging System of any of its Energy Trades that are invalid Energy Trades. The QSE may correct and resubmit any invalid Energy Trade within the appropriate market timeline.

4.4.2.1 Energy Trade Criteria

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

(a) The buying QSE;

(b) The selling QSE;

(c) The quantity of MW for each 15-minute Settlement Interval of the trade;

(d) The first and last 15-minute Settlement Intervals of the trade; and

(e) The Settlement Point of the trade.

(2) An Energy Trade must be confirmed by both the buyer and seller to be considered valid.

4.4.2.2 Energy Trade Validation

(1) A validated Energy Trade is an Energy Trade that ERCOT has determined meets the criteria listed in Section 4.4.2.1, Energy Trade Criteria. Only one confirmed Energy Trade is allowed for the same buying and selling QSEs at the same Settlement Point for each 15-minute Settlement Interval.

(2) When an Energy Trade is reported to ERCOT, ERCOT shall notify both the buying and selling QSEs by using the Messaging System, if available, and the MIS Certified Area. ERCOT shall also post to the MIS Certified Area any unconfirmed Energy Trades for QSEs on an hourly basis for all remaining hours of the current Operating Day and all hours of the next Operating Day.

(3) ERCOT shall continuously validate Energy Trades and continuously display on the MIS Certified Area information that allows any QSE named in an Energy Trade to view confirmed and unconfirmed Energy Trades.

(4) The QSE that first reports the Energy Trade to ERCOT is considered to have confirmed the Energy Trade unless it subsequently affirmatively rejects it. The QSE that first reports an Energy Trade may reject, edit, or delete an Energy Trade that its counterpart has not confirmed. The counterpart is deemed to have confirmed the Energy Trade when it submits an identical Energy Trade. After both the buyer and seller have confirmed an Energy Trade, either party may reject it at any time, but the rejection is effective only for any ERCOT process for which the deadline for reporting Energy Trades has not yet passed.

4.4.3 Self-Schedules

(1) A Self-Schedule is the information that a QSE submits for Real-Time Settlement that specifies the amount of the QSE’s energy supply at a specified source Settlement Point to be used to meet the QSE’s energy obligation at a specified sink Settlement Point.

(2) A Self-Schedule may be submitted for any Settlement Interval before the end of the Adjustment Period for that Settlement Interval.

(3) As soon as practicable, ERCOT shall notify the QSE through the Messaging System of any of its Self-Schedules that are invalid Self-Schedules. The QSE may correct and resubmit any invalid Self-Schedule within the appropriate market timeline.

4.4.3.1 Self-Schedule Criteria

(1) Each Self-Schedule must be reported by a QSE and must include the following information:

(a) The name of the QSE;

(b) The quantity of MW for each 15-minute Settlement Interval of the schedule;

(c) The first and last 15-minute Settlement Intervals of the schedule;

(d) The source Settlement Point of the schedule; and

(e) The sink Settlement Point of the schedule.

4.4.3.2 Self-Schedule Validation

(1) A validated Self-Schedule is a Self-Schedule that ERCOT has determined meets the criteria listed in Section 4.4.3.1, Self-Schedule Criteria.

(2) ERCOT shall continuously validate Self-Schedules and continuously display on the MIS Secure Area information that allows the QSE named in a Self-Schedule to view validated Self-Schedules.

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).

|  |
| --- |
| ***[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.

(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 ERCOT website and issuing a Market Notice.

|  |
| --- |
| ***[NPRR999: Replace paragraph (5) above with the following upon project implementation of the Intra-Hour Variability (iCAT) Tool:]***  (5) ERCOT shall approve any e-Tag that does not exceed the available physical capacity of the DC Tie, system ramping capability, and any limits supplied by 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; otherwise, ERCOT shall deny the e-Tag. 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 ERCOT website 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

|  |
| --- |
| ***[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, High Ancillary Service Limit (HASL) and LSL must be set appropriately, considering the resulting net import.

|  |
| --- |
| ***[NPRR1008: Replace paragraph (7) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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.

|  |
| --- |
| ***[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 ERCOT website 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 DC Tie Curtailment Notice to the ERCOT website 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 ERCOT website 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.

|  |
| --- |
| ***[NPRR1034: Insert paragraph (17) below upon system implementation and renumber accordingly:]***  (17) ERCOT may curtail DC Tie Schedules on a DC Tie on a last-in-first-out basis when ERCOT determines that one or more DC Tie Schedules on that DC Tie would exceed a limit established pursuant to paragraph (1) of Section 4.4.4.4, Frequency-Based Limits on DC Tie Imports or Exports. |

(17) Market Participants shall not engage in DC Tie export transactions that are reasonably expected to be uneconomic in consideration of all costs and revenues associated with the transaction, excluding Congestion Revenue Right (CRR) Auction Revenue Distribution (CARD) and CRR Balancing Account (CRRBA) allocations.

|  |
| --- |
| ***[NPRR1030: Delete paragraph (17) above upon system implementation.]*** |

4.4.4.1 DC Tie Schedule Criteria

(1) Each DC Tie Schedule must correspond to an implemented e-Tag and include the following information:

(a) The QSE ERCOT identifier or non-ERCOT Control Area buying the energy;

(b) The QSE ERCOT identifier or non-ERCOT Control Area selling the energy;

(c) The DC Tie Settlement Point name;

(d) The quantity in MW for each 15-minute Settlement Interval of the schedule;

(e) The first and last 15-minute Settlement Intervals of the schedule; and

(f) The e-Tag name.

|  |
| --- |
| ***[NPRR999: Insert Section 4.4.4.2 below upon project implementation of the Intra-Hour Variability (iCAT) Tool:]***  4.4.4.2 Management of DC Tie Schedules due to Ramp Limitations  (1) If system conditions near or in Real-Time show insufficient ramp capability to meet the sum of all DC Ties’ scheduled ramp, taking into account the full ramping capability of all available Resources and preserving sufficient Physical Responsive Capability (PRC) to avoid EEA Level 1, and ERCOT determines that sufficient time exists, ERCOT may request that one or more e-Tags be resubmitted with an adjusted ramp duration that would conform with the system’s ramp capability. If ERCOT determines that insufficient time exists to request resubmission of e-Tags, or that an insufficient number of e-Tags have been resubmitted to conform with the system’s ramp capability, ERCOT shall curtail DC Tie Schedules on a last-in-first-out basis as necessary to conform with the system’s ramp capability and shall deny any additional e-Tags that cannot be accommodated within that ramp capability during the impacted intervals. |

|  |
| --- |
| ***[NPRR1034: Insert Section 4.4.4.3 below upon system implementation:]***  4.4.4.3 Frequency-Based Limits on DC Tie Imports or Exports  (1) ERCOT may establish import or export limits applicable to any DC Tie to mitigate the risk of significant frequency deviation due to the unexpected loss of that DC Tie. ERCOT shall identify the operating conditions and limits it would expect to use in a posting to the ERCOT website. |

4.4.5 [RESERVED]

4.4.6 PTP Obligation Bids

(1) A Point-to-Point (PTP) Obligation bid is a bid that specifies the source and sink, a range of hours, and a maximum price that the bidder is willing to pay (“Not-to-Exceed Price”).

(2) PTP Obligations that are bought in the Day-Ahead Market (DAM) must be settled based on the applicable Real-Time Settlement Point Prices.

(3) A PTP Obligation with Links to an Option is held to be reflective of the Non-Opt-In Entity’s (NOIE’s) PTP Option if the source and sink pairs on both the NOIE’s PTP Obligation and the NOIE’s PTP Option are the same, and the MWs of the NOIE’s PTP Obligations are less than or equal to the number of MWs of the NOIE’s PTP Option. There shall be no payment for PTP Obligations with Links to an Option acquired in the DAM.

4.4.6.1 PTP Obligation Bid Criteria

(1) A PTP Obligation bid must be submitted by a QSE and must include the following:

(a) The name of the QSE submitting the PTP Obligation bid;

(b) The source Settlement Point and the sink Settlement Point for the PTP Obligation or block of PTP Obligations being bid;

(c) NOIE peak Load forecast for the Operating Day, if the PTP Obligation bid is a PTP Obligation with Links to an Option;

(d) The first hour and the last hour for which the PTP Obligation or block of PTP Obligations is being bid;

(e) The quantity of PTP Obligations in MW for which the Not-to-Exceed Price is effective; and

(f) A dollars per MW per hour for the Not-to-Exceed Price.

|  |
| --- |
| [NPRR918: Replace paragraph (1) above with the following upon system implementation:]  (1) A PTP Obligation bid must be submitted by a QSE and must include the following:  (a) The name of the QSE submitting the PTP Obligation bid;  (b) The source Settlement Point and the sink Settlement Point for the PTP Obligation or block of PTP Obligations being bid;  (c) Hourly NOIE Load forecast for the Operating Day, if the PTP Obligation bid is a PTP Obligation with Links to an Option;  (d) The first hour and the last hour for which the PTP Obligation or block of PTP Obligations is being bid;  (e) The quantity of PTP Obligations in MW for which the Not-to-Exceed Price is effective; and  (f) A dollars per MW per hour for the Not-to-Exceed Price. |

(2) If the PTP Obligation bid is for more than one PTP Obligation (which is one MW for one hour), the block bid must:

(a) Include the same number of PTP Obligations in each hour of the block;

(b) Be for PTP Obligations that have the same source and sink Settlement Points; and

(c) Be for contiguous hours.

(3) A PTP Obligation bid shall not contain a source Settlement Point and a sink Settlement Point that are Electrically Similar Settlement Points.

(4) PTP Obligation bids shall not be submitted in combination with PTP Obligation bids or with DAM Energy-Only Offer Curves and DAM Energy Bids to create the net effect of a single PTP Obligation bid 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.

(5) For each NOIE or QSE representing NOIEs that designated PTP Obligations with Links to an Option, the total of each hourly MW quantity designated to be settled in Real-Time as a PTP Option may not exceed the lesser of:

(a) 110% of that NOIE’s peak Load forecast for the Operating Day; or

(b) 125% of the NOIE’s hourly Load forecast for the Operating Day.

|  |
| --- |
| [NPRR918: Replace paragraph (5) above with the following upon system implementation:]  (5) For each QSE representing NOIEs that designated PTP Obligations with Links to an Option, the total of each hourly MW quantity designated to be settled in Real-Time as a PTP Option may not exceed the lesser of:  (a) 110% of that NOIE’s peak Load forecast for the Operating Day; or  (b) 125% of the NOIE’s Load forecast for the Operating Hour. |

(6) PTP Obligations with Links to an Option shall be used for delivery of energy to a NOIE Load or a valid combination of Settlement Points that physically or contractually mitigates risk in supplying the NOIE Load. This applies to each NOIE or QSE representing NOIEs.

(7) In addition to the criteria above for other PTP Obligations, PTP Obligations with Links to an Option must further include the following:

(a) The name of the CRR Account Holder that owns the CRRs being offered; and

(b) The unique identifier for each CRR being offered.

(8) For PTP Obligations with Links to an Option, the CRR Account Holder for whom the PTP Obligations with Links to an Option are being submitted must be shown in the ERCOT CRR registration system as the owner of the CRRs being linked to the PTP Obligation.

(9) The minimum amount for each PTP Obligation with Links to an Option is one-tenth of one MW. The minimum amount for each PTP Obligation bid is one MW.

4.4.6.2 PTP Obligation Bid Validation

(1) A validated PTP Obligation bid is a bid that ERCOT has determined meets the criteria listed in Section 4.4.6.1, PTP Obligation Bid Criteria, with the exception of paragraphs (3), (4), (5) and (6). Bids that do not meet the criteria in paragraph (3) of Section 4.4.6.1 will not be awarded in the DAM.

|  |
| --- |
| [NPRR918: Replace paragraph (1) above with the following upon system implementation:]  (1) A validated PTP Obligation bid is a bid that ERCOT has determined meets the criteria listed in Section 4.4.6.1, PTP Obligation Bid Criteria, with the exception of paragraphs (3), (4), and (6). Bids that do not meet the criteria in paragraph (3) of Section 4.4.6.1 will not be awarded in the DAM. |

(2) ERCOT shall continuously display on the MIS Certified Area information that allows any QSE submitting a PTP Obligation bid to view its valid PTP Obligation bid.

(3) As soon as practicable, ERCOT shall notify each QSE through the Messaging System of any of its PTP Obligation bids that are invalid. The QSE may correct and resubmit any invalid PTP Obligation bid within the appropriate market timeline.

4.4.6.3 PTP Obligations with Links to an Option DAM Award Eligibility

(1) A bid for a PTP Obligation with Links to an Option will not be considered eligible for award for an Operating Hour if it sources at a Resource Node where the Generation Resource has a COP Resource Status of:

(a) OUT for an Operating Hour; or

(b) OFF for an Operating Hour; and

(i) The QSE representing the Resources has not submitted a valid Three-Part Supply Offer or Ancillary Service Offer to be considered by the DAM; and

(ii) The QSE representing the Resource has not submitted a valid Energy Only Offer at any Resource Node associated with the Resource.

(2) Where more than one Generation Resource is associated with a Resource Node, ERCOT will consider a PTP Obligation with Links to an Option bid eligible for award unless all Generation Resources associated with the Resource Node do not satisfy the COP Resource Status requirements in paragraph (1) above during the Operating Hour.

(3) In order for ERCOT to award a bid for a PTP Obligation with Links to an Option under this section for an upcoming year, by October 1 of the prior year a NOIE must have provided ERCOT with an attestation that the Generation Resource for the Resource Node where the bid is sourced is owned or controlled by the NOIE, or has a contractual commitment for capacity and/or energy with the NOIE. The attestation must be executed by an officer or executive with authority to bind the NOIE, and submitted to ERCOT. ERCOT shall rely exclusively on the attestation provided by a NOIE in determining eligibility for bid awards under this section. ERCOT shall issue a Market Notice by September 1 of each year reminding NOIEs of the October 1 deadline for submitting attestations for the upcoming year.

4.4.7 Ancillary Service Supplied and Traded

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 Ancillary Service Obligation allocated to it by ERCOT. QSEs may not self-arrange Regulation Service amounts that include Fast Responding Regulation Up Service (FRRS-Up) or Fast Responding Regulation Down Service (FRRS-Down) quantities. In addition, a QSE may self-arrange up to 100 MW of Responsive Reserve (RRS), 25 MW of Regulation Up Service (Reg-Up), 25 MW of Regulation Down Service (Reg-Down), and 100 MW of Non-Spinning Reserve (Non-Spin) in excess of its corresponding Ancillary Service Obligation, provided that the amount self-arranged from the QSE’s Resources for a given Ancillary Service shall not exceed the amount of the QSE’s Ancillary Services Obligation for that Ancillary Service. 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 Ancillary Service Obligation. Any Self-Arranged Ancillary Service Quantities in excess of a QSE’s Ancillary Service Obligation will be considered to be offered in the DAM or Supplemental Ancillary Service Market (SASM), as applicable, for $0/MWh.

|  |
| --- |
| ***[NPRR863 and NPRR1008: Replace applicable portions of paragraph (1) above with the following upon system implementation or upon system implementation of the Real-Time Co-Optimization project, respectively:]***  (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 respective Day-Ahead Ancillary Service price 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, needs to be obtained through the DAM.

|  |
| --- |
| ***[NPRR1008: Replace paragraph (2) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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 associated Ancillary Service Demand Curves (ASDCs). |

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

|  |
| --- |
| ***[NPRR1008: Replace paragraph (3) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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.

|  |
| --- |
| ***[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.

(7) The additional Self-Arranged Ancillary Service Quantity specified by the QSE in response to a SASM notice by ERCOT to obtain additional Ancillary Services in the Adjustment Period cannot be more than 100 MWs of RRS, 25 MWs of Reg-Up, 25 MWs of Reg-Down, and 100 MWs of Non-Spin greater than the additional Ancillary Service amount allocated by ERCOT to that QSE, as stated in the SASM notice, and cannot be changed once committed to ERCOT.

|  |
| --- |
| ***[NPRR863: Replace paragraph (7) above with the following upon system implementation:]***  (7) The additional Self-Arranged Ancillary Service Quantity specified by the QSE in response to a SASM notice by ERCOT to obtain additional Ancillary Services in the Adjustment Period cannot be more than 100 MW of ECRS, 100 MW of RRS, 25 MW of Reg-Up, 25 MW of Reg-Down, and 50 MW of Non-Spin greater than the additional Ancillary Service amount allocated by ERCOT to that QSE, as stated in the SASM notice, and cannot be changed once committed to ERCOT. |

(8) If a QSE does not self-arrange all of its Ancillary Service Obligation, ERCOT shall procure the remaining amount of that QSE’s Ancillary Service Obligation.

|  |
| --- |
| ***[NPRR1008: Replace paragraphs (7) and (8) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project and renumber accordingly:]***  (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.

|  |
| --- |
| ***[NPRR863 and NPRR1015: Replace applicable portions of paragraph (9) above with the following upon system implementation:]***  (9) For self-arranged RRS, the QSE shall indicate the quantity of the service that is provided from:  (a) Resources providing Primary Frequency Response;  (b) Load Resources controlled by high-set under-frequency relays; and  (c) Fast Frequency Response (FFR) Resources.  (10) For self-arranged ECRS, the QSE shall indicate the quantity of the service that is provided from Resources that are manually dispatched and those that are SCED-dispatchable. |

***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.

|  |
| --- |
| ***[NPRR1008: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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 ASDC. |

(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.

|  |
| --- |
| ***[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. A QSE may also submit Ancillary Service Offers in a SASM. 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.

|  |
| --- |
| ***[NPRR1008 and NPRR1014: Replace applicable portions of paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014:]***  (1) By 1000 in the Day-Ahead, a QSE may submit Resource-Specific Ancillary Service Offers from Generation Resources and ESRs to ERCOT for the DAM and may offer the same Generation Resource or ESR capacity for any or all of the Ancillary Service products simultaneously with any Energy Offer Curves from that Generation Resource or Energy Bid/Offer Curves from that ESR 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. Offers of more than one Ancillary Service product from one ESR may be inclusive or exclusive of each other, 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.

|  |
| --- |
| ***[NPRR863, NPRR1008, and NPRR1014: Replace applicable portions of paragraph (2) above with the following upon system implementation for NPRR863 or NPRR1014; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008:]***  (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. |

|  |
| --- |
| ***[NPRR1008, NPRR1014, and NPRR1015: Insert applicable portions of paragraph (3) below upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014; or upon system implementation of NPRR863 for NPRR1015; and renumber accordingly:]***  (3) By 1000 in the Day-Ahead, a QSE may submit Resource-Specific Ancillary Service Offers to ERCOT for FFR Resources, and may offer the same capacity for any or all of the Ancillary Service products simultaneously with any Energy Offer Curves from that Resource in the DAM. Offers of more than one Ancillary Service product may be inclusive or exclusive of each other and of any Energy Offer Curves, as specified according to a procedure developed by ERCOT. |

|  |
| --- |
| ***[NPRR1008 and NPRR1014: Insert applicable portions of paragraph (3) below upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014; and renumber accordingly:]***  (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. |

(3) Ancillary Service Offers remain active for the offered period until:

(a) Selected by ERCOT;

(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.

|  |
| --- |
| ***[NPRR1008 and NPRR1014: Replace applicable portions of paragraph (3) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014:]***  (5) 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. |

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

|  |
| --- |
| ***[NPRR1008, NPRR1014, and NPRR1093: Replace applicable portions of paragraph (4) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014 or NPRR1093:]***  (6) A Load Resource that is not a Controllable Load Resource may specify whether its Resource-Specific Ancillary Service Offer for RRS or Non-Spin may only be procured by ERCOT as a block. |

|  |
| --- |
| ***[NPRR863 or NPRR1014: Insert applicable portions of paragraph (5) below upon system implementation and renumber accordingly:]***  (7) 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. |

(5) A QSE that submits an On-Line 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 an 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 Ancillary Service Offer submittal if:

(a) Its QSE submits an On-Line 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 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 Ancillary Service Offer for any other Combined Cycle Generation Resource within the Combined Cycled Train is submitted for that hour.

|  |
| --- |
| ***[NPRR1008 and NPRR1014: Replace applicable portions of paragraph (5) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014:]***  (8) 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. A QSE that submits an On-Line ESR-specific Ancillary Service Offer or Energy Bid/Offer Curve for the DAM will be considered to be On-Line. A QSE may not submit an Off-Line Ancillary Service Offer for an ESR. 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; however, for an ESR, the DAM will consider LSL and HSL. 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.  (9) 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 Ancillary Service Offer Criteria

(1) Each 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) An 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) An Ancillary Service Offer linked to other 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 Ancillary Service Offer price for that block, the single price (in $/MW) and single quantity (in MW) for all hours offered in that block; 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; and

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

(2) A valid Ancillary Service Offer in the DAM must be received before 1000 for the effective DAM. A valid Ancillary Service Offer in an SASM must be received before the applicable deadline for that SASM.

(3) No Ancillary Service Offer price may exceed the System-Wide Offer Cap (SWCAP) (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.

|  |
| --- |
| ***[NPRR863, NPRR1008, NPRR1014, and NPRR1093: Replace applicable portions of Section 4.4.7.2.1 above with the following upon system implementation for NPRR863, NPRR1014, or NPRR1093; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008:]***  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 or Energy Bid/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 that is not a Controllable Load Resource and that is offering to provide RRS, ECRS, or Non-Spin, 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, an ESR, 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) A Load Resource, that is not a Controllable Load Resource, may simultaneously offer RRS, ECRS, and Non-Spin in a DAM and be awarded RRS, ECRS, and Non-Spin for the same Operating Hour in the DAM, but will not be awarded Non-Spin and RRS on the same Load Resource simultaneously in Real-Time.  (7) Offers for Load Resources may be adjusted to reflect Distribution Losses in accordance with Section 8.1.1.2, General Capacity Testing Requirements.  (8) 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 Ancillary Service Offer Validation

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

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

(3) ERCOT shall notify the QSE submitting an 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.

|  |
| --- |
| ***[NPRR1008: Replace Section 4.4.7.2.2 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  ***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. |

|  |
| --- |
| ***[NPRR1008: Insert Section 4.4.7.2.3 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  ***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. |

|  |
| --- |
| ***[NPRR1008: Insert Section 4.4.7.2.4 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  ***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 between a buyer and a seller.

|  |
| --- |
| ***[NPRR1008: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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 changes the Ancillary Service Supply Responsibility of the buyer and seller in the DRUC process. An Ancillary Service Trade that is reported to ERCOT after 1430 in the Day-Ahead changes the Ancillary Service Supply Responsibility of the buyer and seller in any applicable HRUC process, the deadline for which is after the trade is submitted.

|  |
| --- |
| ***[NPRR1008: Replace paragraph (2) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (2) An Ancillary Service Trade that is reported to ERCOT by 1430 in the Day-Ahead changes the Ancillary Service Position of the buyer and seller in the DRUC process. An Ancillary Service Trade that is reported to ERCOT after 1430 in the Day-Ahead changes the Ancillary Service Position of the buyer and seller in 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.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR863, NPRR1008, and NPRR1015: Insert applicable portions of paragraphs (4)-(6) below upon system implementation of NPRR863 for NPRR863 and NPRR1015; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; and renumber accordingly:]***  (4) A QSE with an Ancillary Service Position for ECRS, originally designated to be provided by a Generation Resource, may transfer that portion of its Ancillary Service Position 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 that portion of its Ancillary Service Position 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** | **SCED-dispatchable ECRS** | **Manually dispatched ECRS** | | SCED-dispatchable ECRS | Yes | No | | Manually dispatched ECRS | 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 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1015: Replace paragraph (4) above with the following upon system implementation of NPRR863:]***  (4) The table below shows the RRS trades that are allowed for each type of original responsibility:   |  |  |  |  | | --- | --- | --- | --- | |  | **Allowable RRS Ancillary Service Trades** | | | | **Original Responsibility** | **Resource providing Primary Frequency Response** | **Resource providing FFR triggered at 59.85 Hz** | **Load Resource triggered at 59.7 Hz** | | Resource providing Primary Frequency Response | Yes | No | No | | Resource providing FFR triggered at 59.85 Hz | Yes | Yes | Yes | | Load Resource triggered at 59.7 Hz | Yes | No | Yes | |

4.4.7.3.1 Ancillary Service Trade Criteria

(1) Each Ancillary Service Trade must be reported by a QSE and must include the following information:

(a) The buying QSE;

(b) The selling QSE;

(c) The type of Ancillary Service;

(d) The quantity in MW; and

(e) The first and last hours of the trade.

(f) For RRS, the QSE shall indicate the quantity of the service that is provided from:

(i) Generation Resources;

(ii) Controllable Load Resources; and

(iii) Load Resources controlled by high-set under-frequency relays.

|  |
| --- |
| ***[NPRR1014 and NPRR1015: Replace applicable portions of paragraph (f) above with the following upon system implementation for NPRR1014; or upon system implementation of NPRR863 for NPRR1015:]***  (f) For RRS, the QSE shall indicate the quantity of the service that is provided from:  (i) Resources capable of providing Primary Frequency Response;  (ii) ESRs and Load Resources providing Fast Frequency Response (FFR); and  (iii) Load Resources controlled by high-set under-frequency relays. |

|  |
| --- |
| ***[NPRR1015: Insert paragraph (2) below upon system implementation of NPRR863 and renumber accordingly:]***  (2) For ECRS, the QSE shall indicate the quantity of the service that is provided from Resources that are manually dispatched and those that are SCED-dispatchable. |

(2) An Ancillary Service Trade must be confirmed by both the buying QSE and selling QSE to be considered valid and to be used in an ERCOT process.

4.4.7.3.2 Ancillary Service Trade Validation

(1) A valid Ancillary Service Trade is an Ancillary Service Trade that ERCOT has determined meets the criteria listed in Section 4.4.7.3.1, Ancillary Service Trade Criteria. Only one confirmed Ancillary Service Trade is allowed for the same buying and selling QSEs for each type of Ancillary Service for each hour.

(2) When an Ancillary Service Trade is reported to ERCOT, ERCOT shall notify both the buying and selling QSEs by using the Messaging System if available and the MIS Certified Area.

(3) ERCOT shall continuously validate Ancillary Service Trades and continuously display on the MIS Certified Area information that allows any QSE named in an Ancillary Service Trade to view its confirmed and unconfirmed Ancillary Service Trades. ERCOT shall also post to the MIS Certified Area any unconfirmed Ancillary Service Trades for QSEs on an hourly basis for all remaining hours of the current Operating Day and all hours of the next Operating Day.

(4) The QSE that first reports the Ancillary Service Trade to ERCOT is deemed to have confirmed the Ancillary Service Trade unless it subsequently affirmatively rejects it. The QSE that first reports an Ancillary Service Trade may reject, edit, or delete an Ancillary Service Trade that its counterpart has not confirmed. The counterpart is deemed to have confirmed the Ancillary Service Trade when it submits an identical Ancillary Service Trade. After both the buyer and seller have confirmed an Ancillary Service Trade, either party may reject it at any time, but the rejection is effective only for any ERCOT process for which the deadline for reporting Ancillary Service Trades has not yet passed.

4.4.7.4 Ancillary Service Supply Responsibility

(1) A QSE’s Ancillary Service Supply Responsibility is the net amount of Ancillary Service capacity that the QSE is obligated to deliver to ERCOT, by hour and service type, from Resources represented by the QSE. The Ancillary Service Supply Responsibility is the difference in MW, by hour and service type, between the amounts specified in items (a) and (b) defined as follows:

(a) The sum of:

(i) The QSE’s Self-Arranged Ancillary Service Quantity; plus

(ii) The total (in MW) of Ancillary Service Trades for which the QSE is the seller; plus

(iii) Awards to the QSE of Ancillary Service Offers in the DAM; plus

(iv) Awards to the QSE of Ancillary Service Offers in the SASM; plus

(v) RUC-committed Ancillary Service quantities to the QSE from its Resources committed by the RUC process to provide Ancillary Service; and

(b) The sum of:

(i) The total Ancillary Service Trades for which the QSE is the buyer; plus

(ii) The total Ancillary Service identified as to the QSE’s failure to provide as described in Section 6.4.9.1.3, Replacement of Ancillary Service Due to Failure to Provide; plus

(iii) The total Ancillary Service identified as the QSE’s infeasible Ancillary Service, as described in Section 6.4.9.1.2, Replacement of Infeasible Ancillary Service Due to Transmission Constraints; plus

(iv) The total Ancillary Service identified as the QSE’s reconfiguration amount as described in Section 6.4.9.2, Supplemental Ancillary Services Market.

(2) A QSE may only use a RUC-committed Resource during that Resource’s RUC-Committed Interval to meet the QSE’s Ancillary Service Supply Responsibility if the Resource has been committed by the RUC process to provide Ancillary Service. The QSE shall only provide from the RUC-committed Resource the exact amount and type of Ancillary Service for which it was committed by RUC.

(3) By 1430 in the Day-Ahead, the QSE must notify ERCOT, in the QSE’s COP, which Resources represented by the QSE will provide the Ancillary Service capacity necessary to meet the QSE’s Ancillary Service Supply Responsibility, specified by Resource, hour, and service type. The DAM Ancillary Service awards are Resource-specific; the QSE must include those DAM awards in its COP, and the QSE may not change that Resource-specific DAM award information until after 1600 under the conditions set out in Section 3.9, Current Operating Plan (COP).

(4) Section 6.4.9.1.3 specifies what happens if the QSE fails on its Ancillary Service Supply Responsibility.

|  |
| --- |
| ***[NPRR1008: Delete Section 4.4.7.4 above upon system implementation of the Real-Time Co-Optimization (RTC) project.]*** |

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 SWCAP 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.

|  |
| --- |
| ***[NPRR1008: Replace paragraph (b) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (b) ERCOT may submit Energy Offer Curves at the effective Value of Lost Load (VOLL) 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 Energy Offers and Bids

4.4.9.1 Three-Part Supply Offers

(1) A Three-Part Supply Offer consists of a Startup Offer, a Minimum-Energy Offer, and an Energy Offer Curve. ERCOT must validate each Startup Offer, Minimum-Energy Offer, and Energy Offer Curve before it can be used in any ERCOT process.

(2) The DAM uses all three parts of the Three-Part Supply Offer and also uses Energy Offer Curves submitted without a Startup Offer and without a Minimum-Energy Offer. The RUC only uses the Startup Offer and the Minimum-Energy Offer components for determining RUC commitments, but the Energy Offer Curve may be used in Settlement to claw back some or all of a RUC-committed Resource’s energy payments. The Energy Offer Curve may also be used by SCED in Real-Time Operations.

(3) A QSE may submit an Energy Offer Curve without also submitting a Startup Offer and a Minimum-Energy Offer for the DAM and during the Adjustment Period, but only Three-Part Supply Offers are used in the RUC process. A QSE that submits an Energy Offer Curve without also submitting a Startup Offer and a Minimum-Energy Offer is considered not to be offering the Resource into the RUC, but that does not prevent the Resource from being committed in the RUC process like any other Resource that does not submit an offer in the RUC.

(a) A QSE that submits an Energy Offer Curve without a Startup Offer and a Minimum-Energy Offer for the DAM for any given hour will be considered by the DAM to be self-committed for that hour, as long as an Ancillary Service Offer for Off-Line Non-Spin Service was not also submitted for that hour.

(b) A Combined Cycle Generation Resource will be considered by the DAM to be self-committed if:

(i) Its QSE submits an Energy Offer Curve without a Startup Offer and a Minimum-Energy Offer for the DAM for that Combined Cycle Generation Resource and no other Combined Cycle Generation Resource within the Combined Cycle Train; and

(ii) Its QSE submits no Ancillary Service Offer for Off-Line Non-Spin for any Combined Cycle Generation Resource within the Combined Cycle Train.

(c) 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.

(4) For any hours in which the Resource is not RUC-committed, ERCOT shall consider all Three-Part Supply Offers in the RUC process until:

(a) The QSE withdraws the offer; or

(b) The offer expires by its terms.

4.4.9.2 Startup Offer and Minimum-Energy Offer

(1) The Startup Offer component represents all costs incurred by a Generation Resource in starting up and reaching its LSL. The Minimum-Energy Offer component represents a proxy for the costs incurred by a Resource in producing energy at the Resource’s LSL.

|  |
| --- |
| ***[NPRR1014: Replace paragraph (1) above with the following upon system implementation:]***  (1) The Startup Offer component represents all costs incurred by a Generation Resource in starting up and reaching its LSL. The Minimum-Energy Offer component represents a proxy for the costs incurred by a Resource in producing energy at the Resource’s LSL. Startup Offers and Minimum-Energy Offers are not applicable to ESRs. |

4.4.9.2.1 Startup Offer and Minimum-Energy Offer Criteria

(1) Each Startup Offer and Minimum-Energy Offer 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) The Resource’s hot, intermediate, and cold Startup Offer in dollars;

(d) The Resource’s Minimum-Energy Offer in dollars per MWh;

(e) The first and last hour of the Startup and Minimum-Energy Offers

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

(g) Percentage of the Fuel Index Price (FIP) to the extent that the startup and minimum energy will be supplied by gas to determine the offer cap; and

(h) Percentage of the Fuel Oil Price (FOP) to the extent that the startup and minimum energy will be supplied by oil to determine the offer cap.

(2) Valid Startup Offers and Minimum-Energy Offers (which must be part of a Three-Part Supply Offer) must be received before 1000 for the effective DAM and DRUC.

(3) A QSE may update and submit a Startup Offer and/or Minimum-Energy Offer for a Resource during the Adjustment Period for any hours in which the Resource is not DAM- or RUC-committed before the offer is updated or submitted.

(4) The Resource’s Startup Offer must not be greater than 200% of the Resource Category Generic Startup Cost for that type of Resource listed in Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, unless ERCOT has approved verifiable Resource-specific startup costs for that Resource, under Section 4.4.9.2.4, Verifiable Startup Offer and Minimum-Energy Offer Caps, in which case the Resource’s Startup Offer must not be greater than 200% of those approved verifiable Resource-specific Startup Costs.

(5) The Resource’s Minimum-Energy Offer must not be greater than 200% of the Resource Category Generic Minimum-Energy Cost for that type of Resource listed in Section 4.4.9.2.3 unless ERCOT has approved verifiable Resource-specific minimum-energy costs for that Resource, under Section 4.4.9.2.4 in which case the Resource’s Minimum-Energy Offer must not be greater than 200% of those approved verifiable Resource-specific minimum-energy costs.

(6) Prior to 1000 for the effective DAM, a QSE may submit and update a Three-Part Supply Offer for a Resource for any hours which were Weekly Reliability Unit Commitment (WRUC)-instructed.

4.4.9.2.2 Startup Offer and Minimum-Energy Offer Validation

(1) A valid Startup Offer and Minimum-Energy Offer is an offer that ERCOT has determined meets the criteria listed in Section 4.4.9.2.1, Startup Offer and Minimum-Energy Offer Criteria, and that are part of a Three-Part Supply Offer for which the Energy Offer Curve has also been validated.

(2) ERCOT shall continuously display on the MIS Certified Area information that allows any QSE submitting a Startup Offer and Minimum-Energy Offer to view its valid Startup Offers and Minimum-Energy Offers.

(3) ERCOT shall notify the QSE submitting a Startup Offer and Minimum-Energy Offer (which must be part of a Three-Part Supply 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) Where a Split Generation Resource has submitted a Startup Offer and Minimum-Energy Offer, ERCOT shall validate the offers in accordance with Section 3.8, Special Considerations for Split Generation Meters, Combined Cycle Generation Resources, Quick Start Generation Resources, Hydro Generation Resources, and Energy Storage Resources.

4.4.9.2.3 Startup Offer and Minimum-Energy Offer Generic Caps

(1) The Resource Category Startup Offer Generic Cap, by applicable Resource category, is determined by the following Operations and Maintenance (O&M) costs by Resource category:

| **Resource Category** | **O&M Costs ($)** |
| --- | --- |
| Nuclear, coal, lignite and hydro | 7,200 |
| Combined Cycle Generation Resource with a combustion turbine ≥ 90 MW, as determined by the largest combustion turbine in the Combined Cycle Generation Resource and for each combustion turbine in the Combined Cycle Generation Resource | 6,810 |
| Combined Cycle Generation Resource with a combustion turbine < 90 MW, as determined by the largest combustion turbine in the Combined Cycle Generation Resource and for each combustion turbine in the Combined Cycle Generation Resource | 6,810 |
| Gas steam supercritical boiler | 4,800 |
| Gas steam reheat boiler | 3,000 |
| Gas steam non-reheat or boiler w/o air-preheater | 2,310 |
| Simple cycle greater than 90 MW | 5,000 |
| Simple cycle less than or equal to 90 MW | 2,300 |
| Reciprocating Engines | $58 /MW \* the average of the seasonal net max sustainable ratings |
| RMR Resource | Not Applicable |
| Wind generation Resources | 0 |
| PhotoVoltaic Generation Resources (PVGRs) | 0 |
| Any Resources not defined above | 0 |

(2) The Resource Category Minimum-Energy Generic Cap is the cost per MWh of energy for a Resource to produce energy at the Resource’s LSL and is as follows:

(a) Hydro = $10.00/MWh;

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

(c) Combined-cycle greater than 90 MW = 8 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in Minimum-Energy Offer;

(d) Combined-cycle less than or equal to 90 MW = 9 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in Minimum-Energy Offer;

(e) Gas steam supercritical boiler = 14 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in Minimum-Energy Offer;

(f) Gas steam reheat boiler = 14.5 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in Minimum-Energy Offer;

(g) Gas steam non-reheat or boiler without air-preheater = 16.0 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in Minimum-Energy Offer;

(h) Simple-cycle greater than 90 MW = 15.0 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in Minimum-Energy Offer;

(i) Simple-cycle less than or equal to 90 MW = 14.0 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in Minimum-Energy Offer;

(j) Reciprocating engines = 16.0 MMBtu/MWh \* ((Percentage of FIP \* FIP) + (Percentage of FOP \* FOP))/100, as specified in the Minimum-Energy Offer;

(k) RMR Resource = RMR contract estimated fuel cost using its contract I/O curve at its LSL times FIP;

(l) Nuclear = Not Applicable;

(m) Wind generation Resources = $0;

(n) PVGRs = $0; and

(o) Other Resources not defined above = $0.

(3) The FIP and FOP used to calculate the Resource Category Minimum-Energy Generic Cap shall be the FIP or FOP for the Operating Day. In the event the Resource Category Minimum-Energy Generic Cap 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 for Resource categories having the option to specify the fuel mix, then the minimum of FIP or FOP shall be used.

(4) Items (2)(c) and (2)(d) above are determined by capacity of largest simple-cycle combustion turbine in the train.

4.4.9.2.4 Verifiable Startup Offer and Minimum-Energy Offer Caps

(1) Once verifiable Resource-specific startup costs and minimum-energy costs are established and approved by ERCOT in accordance with Section 5.6.1, Verifiable Costs, then they are used in place of generic costs as described in Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps. A QSE may file verifiable unit-specific costs for a Resource at any time, but it is not required to file those costs only because of a DAM commitment. The most recent approved verifiable costs on file must be used going forward.

4.4.9.3 Energy Offer Curve

(1) The Energy Offer Curve represents the QSE’s willingness to sell energy at or above a certain price and at a certain quantity in the DAM or its willingness to be dispatched by SCED in Real-Time Operations.

(2) A QSE may submit Resource-specific Energy Offer Curves to ERCOT. Such Energy Offer Curves will be bounded in the DAM for each Operating Hour by the LSL and HSL of the Generation Resource specified in the COP, and bounded in SCED by the LSL and HSL of the Generation Resource as shown by telemetry.

(3) Energy Offer Curves remain active for the offered period until either:

(a) Selected by ERCOT; or

(b) Automatically inactivated by the software at the offer expiration time selected by the QSE.

(4) For any Operating Hour, the QSE for a Resource may submit or change Energy Offer Curves in the Adjustment Period and a QSE may withdraw an Energy Offer Curve if:

(a) An Output Schedule is submitted for all intervals for which an Energy Offer Curve is withdrawn; or

(b) The Resource is forced Off-Line and notifies ERCOT of the Forced Outage by changing the Resource Status appropriately and updating its COP.

(5) For any Operating Hour that is a RUC-Committed Interval or a DAM-Committed Interval for a Resource, a QSE for that Resource may not change a Startup Offer or Minimum-Energy Offer.

(6) If a valid Energy Offer Curve or an Output Schedule does not exist for a Resource that has a status of On-Line at the end of the Adjustment Period, then ERCOT shall notify the QSE and set the Output Schedule equal to the then current telemetered output of the Resource until an Output Schedule or Energy Offer Curve is submitted in a subsequent Adjustment Period.

(7) Notwithstanding any other provision in this subsection, a QSE representing an Energy Storage Resource (ESR) may submit or update its Energy Offer Curve for that ESR at any time prior to SCED execution, and SCED will use the latest updated Energy Offer Curve available in the system. If a new Energy Offer Curve is not deemed to be valid, then the most recent valid Energy Offer Curve available in the system at the time of SCED execution will be used and ERCOT will notify the QSE that the invalid Energy Offer Curve was rejected. Once an Operating Hour ends, an Energy Offer Curve for that hour cannot be submitted, updated, or canceled.

|  |
| --- |
| ***[NPRR1014: Delete paragraph (7) above upon system implementation.]*** |

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) List of Ancillary Service Offers from the same Resource;

(g) Inclusive or exclusive designation relative to other DAM offers; and

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

|  |
| --- |
| ***[NPRR1008: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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 the SWCAP in dollars per MWh. The software systems must be able to provide ERCOT with the ability to enter Resource-specific Energy Offer Curve floors and caps.

|  |
| --- |
| ***[NPRR1008: Replace paragraph (2) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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.

4.4.9.3.2 Energy Offer Curve Validation

(1) A valid Energy Offer Curve is an offer curve that ERCOT has determined meets the criteria listed in Section 4.4.9.3.1, Energy Offer Curve Criteria, and the Energy Offer Curve that is part of a Three-Part Supply Offer for which the Startup Offer and Minimum-Energy Offer has also been validated.

(2) ERCOT shall notify the QSE submitting an Energy Offer Curve by the Messaging System if the offer was rejected or was considered invalid for any reason. The QSE may then resubmit the offer within the appropriate market timeline.

(3) ERCOT shall continuously validate Energy Offer Curves and continuously display on the MIS Certified Area information that allows any QSE to view its valid Energy Offer Curves.

4.4.9.3.3 Energy Offer Curve Cost Caps

(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 = SWCAP;

|  |
| --- |
| ***[NPRR1008: Replace item (l) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (l) Other = DASWCAP or RTSWCAP; |

(m) RMR Resource = SWCAP;

|  |
| --- |
| ***[NPRR1008: Replace item (m) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (m) RMR Resource = effective Value of Lost Load (VOLL); |

(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 Mitigated Offer Cap and Mitigated Offer Floor

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:

|  |
| --- |
| ***[NPRR1014: Replace paragraph (1) above with the following upon system implementation:]***  (1) Energy Offer Curves and Energy Bid/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). For Generation Resources, 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 SWCAP in $/MWh.

|  |
| --- |
| ***[NPRR1008 and NPRR1014: Replace applicable portions of paragraph (a) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014:]***  (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 effective Value of Lost Load (VOLL) in $/MWh. |

(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.

|  |
| --- |
| ***[NPRR1008 and NPRR1014: Replace applicable portions of paragraph (b) above with the following upon the system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014:]***  (b) Notwithstanding the MOC calculation described in paragraph (1) above, the MOC for ESRs shall be set at the RTSWCAP. 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).

|  |
| --- |
| ***[NPRR1008 and NPRR1014: Insert applicable portions of paragraph (d) below upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014; and renumber accordingly:]***  (d) For On-line hydro Generation Resources not operating in Synchronous Condenser Fast-Response mode, the MOC shall be adjusted in accordance with Verifiable Cost Manual, Appendix 12, Calculation of the Variable O&M Value and Incremental Heat Rate used in Real Time Mitigation for On-Line Hydro Generation Resources not operating in Synchronous Condenser Fast-Response mode. |

(d) 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.

(e) 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.

(f) 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.

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

(h) 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.

(i) 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).

(j) 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.

(k) 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.

(l) 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.

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

4.4.9.4.2 Mitigated Offer Floor

(1) Energy Offer Curves may be subject to mitigation in the Real-Time Market (RTM) under Section 6.5.7.3, Security Constrained Economic Dispatch, using a Mitigated Offer Floor. The Mitigated Offer Floor is:

| Resource Category | Mitigated Offer Floor |
| --- | --- |
| Nuclear and Hydro | -$250/MWh |
| Coal and Lignite | -$20/MWh |
| Combined Cycle | -$20/MWh |
| Gas/Oil Steam and Combustion Turbine | -$20/MWh |
| Qualifying Facility (QF) | -$50/MWh |
| Wind | -$100/MWh |
| PhotoVoltaic (PV) | -$50/MWh |
| Other | -$50/MWh |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1014: Replace paragraph (1) above with the following upon system implementation:]***  (1) Energy Offer Curves and Energy Bid/Offer Curves may be subject to mitigation in the RTM under Section 6.5.7.3, Security Constrained Economic Dispatch, using a Mitigated Offer Floor. The Mitigated Offer Floor is:   | Resource Category | Mitigated Offer Floor | | --- | --- | | Nuclear and Hydro | -$250/MWh | | Coal and Lignite | -$20/MWh | | Combined Cycle | -$20/MWh | | Gas/Oil Steam and Combustion Turbine | -$20/MWh | | Qualifying Facility (QF) | -$50/MWh | | Wind | -$100/MWh | | PhotoVoltaic (PV) | -$50/MWh | | Energy Storage Resource (ESR) | -$250/MWh | | Other | -$50/MWh | |

|  |
| --- |
| ***[NPRR826: Insert Section 4.4.9.4.3 below upon system implementation:]***  4.4.9.4.3 Mitigated Offer Cap for RMR Resources  (1) For each Resource contracted by ERCOT under Section 3.14.1, Reliability Must Run, the Resource’s MOC curve for use in the SCED process is determined using the steps below when the Resource’s offer is subject to mitigation in accordance with Section 3.19, Constraint Competitiveness Tests. The single price ($/MWh) value determined below will be used as the MOC curve for the full operating range of the Resource. The calculations will occur between the first and second step within the SCED process as well as during the process for determining Real-Time On-Line Reliability Deployment Price Adder. This analysis will only be applied to active constraints for which the contracted Resource has a more than 2% unloading Shift Factor on the Transmission Facility(s), more than 5% unloading impact on the Transmission Facility(s) based on telemetered HSL, and if at least one other Resource not contracted by ERCOT under Section 3.14.1 has an unloading Shift Factor of 5% or more relative to the constraint(s). If this criteria is not met, the MOC curve for the Resource shall be calculated in accordance with Section 4.4.9.4.1, Mitigated Offer Cap, and Section 5.6.1, Verifiable Costs.  (a) For each Resource that is not a Resource contracted by ERCOT under Section 3.14.1 or paragraph (2) of Section 6.5.1.1 and that has an unloading Shift Factor of at least RMRSF percent relative to the constraint(s), determine the higher of zero or the difference between the price ($/MWh) at HSL from the Energy Offer Curves determined for use in SCED Step 2, which may or may not be mitigated, and system lambda from SCED Step 1 and divide that difference by the absolute value of that Resource’s Shift Factor for the corresponding constraint. The value of RMRSF will default to 5% until a different value is approved by TAC considering the analysis and data used by ERCOT to determine the need for the contracted Resource under Section 3.14.1. ERCOT shall post the current TAC-approved value(s) of RMRSF on the ERCOT website.  (b) For each constraint, identify the largest value that is less than maximum Shadow Price for the specific constraint.  (c) For each SCED interval for each constraint, determine a value equal to the minimum of:  (i) The value determined in paragraph (b) above plus $0.01/MWh; and  (ii) The maximum Shadow Price for the constraint minus $1/MWh.  (d) For each SCED interval for each constraint, multiply the resulting value from paragraph (c) above by the absolute value of the Shift Factor of the Resource contracted by ERCOT to the corresponding constraint. For SCED intervals in which there are multiple constraints which are being analyzed, the lowest value is used for the SCED interval.  (e) If the value from paragraph (b) above for any constraint analyzed is zero, the MOC curve for the RMR Resource shall be calculated in accordance with Section 4.4.9.4.1 and Section 5.6.1. If the value from paragraph (b) above for every constraint analyzed is greater than zero, the RMR Resource’s MOC curve for use in Step 2 of the SCED process is the sum of system lambda from Step 1 of SCED in the interval and the value from (d) above. |

4.4.9.5 DAM Energy-Only Offer Curves

(1) A QSE must submit any DAM Energy-Only Offer Curves by 1000 for the effective DAM.

(2) The DAM Energy-Only Offer Curve represents the QSE’s willingness to sell energy at or above a certain price and at a certain quantity at a specific Settlement Point in the DAM. A DAM Energy-Only Offer Curve may be offered only in the DAM.

(3) DAM Energy-Only Offer Curves are not Resource-specific.

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 SWCAP in dollars per MWh.

|  |
| --- |
| ***[NPRR1008: Replace paragraph (2) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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.

4.4.9.5.2 DAM Energy-Only Offer Validation

(1) A valid DAM Energy-Only Offer Curve is an offer that ERCOT has determined meets the criteria listed in Section 4.4.9.5.1, DAM Energy-Only Offer Curve Criteria.

(2) ERCOT shall notify the QSE submitting a DAM Energy-Only Offer Curve by the Messaging System if the offer was rejected or was considered invalid for any reason, with the exception of paragraph (4) of Section 4.4.9.5.1. The QSE may then resubmit the offer within the appropriate market timeline.

(3) ERCOT shall continuously validate DAM Energy-Only Offers and continuously display on the MIS Certified Area information that allows any QSE to view its valid DAM Energy-Only Offers.

4.4.9.6 DAM Energy Bids

(1) A QSE must submit any DAM Energy Bids by 1000 for the effective DAM.

(2) A DAM Energy Bid represents the QSE’s willingness to buy energy at or below a certain price and at a certain quantity at a specific Settlement Point in the DAM. A DAM Energy Bid may be made only in the DAM.

4.4.9.6.1 DAM Energy Bid Criteria

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

(a) The buying QSE;

(b) The Settlement Point;

(c) Fixed quantity block, variable quantity block, or curve indicator for the bid;

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

(iii) If a curve, a monotonically decreasing energy bid curve for price (in $/MWh) and monotonically increasing for quantity (in MW) with no more than 10 price/quantity pairs.

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

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

(2) The minimum amount for each DAM Energy Bid that may be bid is one MW.

(3) 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.

4.4.9.6.2 DAM Energy Bid Validation

(1) A valid DAM Energy Bid is a bid that ERCOT has determined meets the criteria listed in Section 4.4.9.6.1, DAM Energy Bid Criteria.

(2) ERCOT shall notify the QSE submitting a DAM Energy Bid by the Messaging System if the bid was rejected or was considered invalid for any reason, with the exception of paragraph (3) of Section 4.4.9.6.1. The QSE may then resubmit the bid within the appropriate market timeline.

(3) ERCOT shall continuously validate DAM Energy Bids and continuously display on the MIS Certified Area information that allows any QSE to view its valid DAM Energy Bids.

|  |
| --- |
| ***[NPRR1014: Insert Section 4.4.9.7 below upon system implementation:]***  **4.4.9.7 Energy Bid/Offer Curve**  (1) The Energy Bid/Offer Curve represents the willingness of a QSE representing an ESR to buy energy at or below a certain price and sell energy at or above a certain price and at a certain quantity in the DAM or its willingness to be dispatched by SCED in Real-Time Operations. ERCOT must validate each Energy Bid/Offer Curve in accordance with Section 4.4.9.7.2, Energy Bid/Offer Curve Validation, before it can be used in any ERCOT process.  (2) A QSE may submit Resource-Specific Energy Bid/Offer Curves to ERCOT. Such Energy Bid/Offer Curves will be bounded in the DAM for each Operating Hour by the LSL and HSL of the ESR specified in the COP, and bounded in SCED by the LSL and HSL of the ESR as shown by telemetry.  (3) In the DAM, ERCOT will not consider COP Resource Status when evaluating Energy Bid/Offer Curves. In the Real-Time Market (RTM), SCED will consider an ESR unavailable for SCED Dispatch when the ESR’s Resource Status is OUT.  (4) Energy Bid/Offer Curves remain active for the offered period until either:  (a) Selected by ERCOT; or  (b) Automatically inactivated by the software at the offer expiration time selected by the QSE.  (5) In the RTM, a QSE may submit or change an Energy Bid/Offer Curve at any time prior to SCED execution, and SCED will use the latest updated Energy Bid/Offer Curve available in the system. If a new Energy Bid/Offer Curve is not deemed to be valid, then the most recent valid Energy Bid/Offer Curve available in the system at the time of SCED execution will be used and ERCOT will notify the QSE that the invalid Energy Bid/Offer Curve was rejected. Once an Operating Hour ends, an Energy Bid/Offer Curve for that hour cannot be submitted, updated, or canceled.  (6) A QSE may withdraw an Energy Bid/Offer Curve if:  (a) An Output Schedule is submitted for all intervals for which an Energy Bid/Offer Curve is withdrawn; or  (b) The ESR is forced Off-Line and notifies ERCOT of the Forced Outage by changing the Resource Status appropriately and updating its COP.  (7) At the time of SCED execution, if a valid Energy Bid/Offer Curve or Output Schedule does not exist for an ESR that has a status of On-Line, then ERCOT shall notify the QSE and create a proxy Energy Bid/Offer Curve priced at -$250/MWh for the portion of the curve less than zero MW, and priced at the RTSWCAP for the portion of the curve greater than zero MW. |

|  |
| --- |
| ***[NPRR1014: Insert Section 4.4.9.7.1 below upon system implementation:]***  ***4.4.9.7.1 Energy Bid/Offer Curve Criteria***  (1) Each Energy Bid/Offer Curve must be reported by a QSE representing an ESR and must include the following information:  (a) The selling QSE;  (b) The ESR represented by the QSE from which the bid and offer would be provided;  (c) A monotonically non-decreasing curve for both price (in $/MWh) and quantity (in MW) with no more than ten price/quantity pairs. Negative MW values cover the charging MW range, and the positive MW values cover the discharging MW range. The price points corresponding to the charging MW range represent the not-to-exceed bid prices to consume energy, and the price points corresponding to the discharging MW range represent the offer prices to sell energy;  (d) The first and last hour of the offer;  (e) The expiration time and date of the offer;  (2) An Energy Bid/Offer Curve shall be bounded by -$250.00 per MWh and either the DASWCAP or RTSWCAP depending on the timing of the submission in dollars per MWh. The ERCOT systems must allow ERCOT to enter ESR-specific Energy Bid/Offer Curve floors and caps.  (3) In Day-Ahead Market (DAM) and Real-Time Market (RTM), an Energy Bid/Offer Curve shall be considered to be inclusive of Ancillary Service Offers. |

|  |
| --- |
| ***[NPRR1014: Insert Section 4.4.9.7.2 below upon system implementation:]***  ***4.4.9.7.2 Energy Bid/Offer Curve Validation***  (1) A valid Energy Bid/Offer Curve is a curve that ERCOT has determined meets the criteria listed in Section 4.4.9.7.1, Energy Bid/Offer Curve Criteria.  (2) ERCOT shall notify the QSE submitting an Energy Bid/Offer Curve by the Messaging System if the offer was rejected or was considered invalid for any reason. The QSE may then resubmit the Energy Bid/Offer Curve within the appropriate market timeline.  (3) ERCOT shall continuously validate Energy Bid/Offer Curves and continuously display on the MIS Certified Area information that allows any QSE to view its valid Energy Bid/Offer Curves. |

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.

|  |
| --- |
| ***[NPRR1014: Replace paragraph (a) above with the following upon system implementation:]***  (a) For a DAM Energy Bid or for each MW portion of the bid portion of an Energy Bid/Offer Curve, 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 or the price on the bid portion of an Energy Bid/Offer Curve 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 or the price on the bid portion of an Energy Bid/Offer Curve 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 or bid portions of Energy Bid/Offer Curves 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 or bid portions of Energy Bid/Offer Curves. |

(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:

|  |
| --- |
| ***[NPRR1014: Replace paragraph (c) above with the following upon system implementation:]***  (c) For each MW portion of the Energy Offer Curve of a Three-Part Supply Offer or for each MW portion of the offer portion of an Energy Bid/Offer Curve: |

(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.

|  |
| --- |
| ***[NPRR1008 and NPRR1014: Insert applicable portions of paragraph (g) below upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014; and renumber accordingly:]***  (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 the Operating Hour of the Ancillary Service Only Offer. |

(g) 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:

(a) 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:

(i) 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

(ii) 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.

|  |
| --- |
| ***[NPRR1014: Replace paragraph (a) above with the following upon system implementation:]***  (a) 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:  (i) 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, Energy Bid/Offer Curves, and Three-Part Supply Offer quantity assumptions used to arrive at those values; and  (ii) 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, Energy Bid/Offer Curves, and Three-Part Supply Offer quantity assumption used to arrive at those values. |

(b) 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.

(c) ERCOT may change the requirements for providing information, as described in item (a) above, to ensure that reasonable information is obtained from Counter-Parties.

(d) 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.

(e) 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; and

(e) Ancillary Services.

|  |
| --- |
| ***[NPRR1008 and NPRR1014: Replace applicable portions of item (e) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014; and renumber accordingly:]***  (e) Ancillary Services related to Self-Arranged Ancillary Service Quantities;  (f) Ancillary Service Only Offers;  (g) Energy Bid/Offer Curves. |

(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 System-Wide Offer Caps

(1) The SWCAP shall be determined in accordance with the Public Utility Commission of Texas (PUCT) Substantive Rules. The methodology for determining the SWCAP 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 year, the SWCAP shall be set equal to the 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 the PNM threshold per MW-year. If the PNM exceeds the PNM threshold per MW-year during a year, on the next Operating Day, the SWCAP shall be reset to the LCAP for the remainder of that year.

(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 | $/MWh | 9,000 |
| 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 SWCAP shall be rejected by ERCOT.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1008: Replace Section 4.4.11 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  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 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 the 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 the 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 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 SWCAP on the ERCOT website.

|  |
| --- |
| ***[NPRR1008: Replace paragraph (2) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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 ERCOT website. |

(3) When the calculated PNM exceeds PNM threshold per MW-year, the SWCAP shall be changed to the LCAP in the following manner:

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

(b) During the next Operating Day (Day 2), ERCOT shall send a Market Notice that the LCAP is going into effect for the following Operating Day (Day 3). At the end of Day 2 and following the last SCED interval at approximately 2355, the System Operator will approve the switchover from the HCAP to the LCAP.

(c) All SCED intervals for Day 3 and through the end of the calendar year will use the LCAP.

(d) On December 31 following the last SCED interval at approximately 2355, the System Operator will approve the switchover from the LCAP up to the HCAP for the next year.

|  |
| --- |
| ***[NPRR1008: Replace paragraph (3) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1008: Insert Section 4.4.12 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  4.4.12 Determination of Ancillary Service Demand Curves for the Day-Ahead Market and Real-Time Market  (1) This Section describes the process for determining 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). This section does not apply to ASDCs used in the Reliability Unit Commitment (RUC) process.  (2) 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.  (3) 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.  (4) 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.  (5) ERCOT shall develop the AORDC from historical data from the period of June 1, 2014 through December 31, 2023 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:  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 mean value of the shifted LOLP distribution as published for Fall 2024 | | *σ* | None | The standard deviation of the shifted LOLP distribution as published for Fall 2024 |   (b) Using the results of step (a) above, use regression methods to fit a curve to the average reserve pricing outcomes for the various MW reserve levels.  (c) 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.  (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.  (7) Each ASDC will be represented by a 100-point linear approximation to the corresponding part of the AORDC. Fewer points may be used for cases where it would not result in decreased accuracy in representing 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 DAM Execution and Results

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 ERCOT website, 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 minus the offer-based costs over the Operating Day, subject to security and other constraints, and ERCOT Ancillary Service procurement requirements.

(a) The bid-based revenues include revenues from 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) Ancillary Service Offers are not awarded in the same Operating Hour.

(B) The sum of the awarded Ancillary Service 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 Ancillary Service Offers for a Load Resource – blocks will not be cleared unless the entire quantity block can be awarded. Because block 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 for each Ancillary Service include the needs specified in the Ancillary Service Plan that are not part of the Self-Arranged Ancillary Service Quantity and that must be met from available DAM Ancillary Service Offers while co-optimizing with DAM Energy Offers. ERCOT may not buy more of one Ancillary Service in place of the quantity of a different service. See Section 4.5.2, Ancillary Service Insufficiency, for what happens if insufficient Ancillary Service Offers are received in the DAM.

|  |
| --- |
| ***[NPRR1008 and NPRR1014: Replace applicable portions of paragraph (4) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014:]***  (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, bid portions of Energy Bid/Offer Curves, 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, offer portions of Energy Bid/Offer Curves, Ancillary Service 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 or Energy Bid/Offer Curves:  (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.  (F) Energy Storage Resources (ESRs) – The energy cleared for an ESR may be negative, indicating purchase of energy, or positive, indicating sale of energy.  (d) Ancillary Service needs will be reflected in ASDCs for each 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 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 a State Estimator 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.

|  |
| --- |
| ***[NPRR1004: Replace paragraph (5) above with the following upon system implementation:]***  (5) ERCOT shall determine the appropriate Load distribution factors to allocate offers, bids, and source and sink of PTP Obligations at a Load Zone across the energized power flow buses that are modeled with Load in that Load Zone. ERCOT shall derive DAM Load distribution factors with the set of Load distribution factors constructed in accordance with the ERCOT Load distribution factor methodology specified in paragraph (c) of Section 3.12, Load Forecasting. In the event the Load distribution factors are not available, the Load distribution factors for the most recent preceding Operating Day will be used. |

(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) Day-Ahead MCPCs shall not exceed the System-Wide Offer Cap (SWCAP). Ancillary Service Offers higher than corresponding Ancillary Service penalty factors, as defined in Appendix 2, Day-Ahead Market Optimization Control Parameters, of the Other Binding Document titled “Methodology for Setting Maximum Shadow Prices for Network and Power Balance Constraints,” will not be awarded.

|  |
| --- |
| ***[NPRR1080: Delete paragraph (10) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014; and renumber accordingly.]*** |

(11) If the Day-Ahead MCPC cannot be calculated by ERCOT, the Day-Ahead MCPC for the particular Ancillary Service is equal to the Day-Ahead MCPC for that Ancillary Service in the same Settlement Interval of the preceding Operating Day.

|  |
| --- |
| ***[NPRR1008 and NPR1014: Delete paragraph (11) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014; and renumber accordingly.]*** |

(12) 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.

(13) 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.

|  |
| --- |
| ***[NPRR1014: Replace paragraph (13) above with the following upon system implementation:]***  (13) Constraints can exist between a Resource’s Resource Connectivity Node and its 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. |

(14) 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.

4.5.2 Ancillary Service Insufficiency

(1) ERCOT shall determine if there is an insufficiency in Ancillary Service Offers. If ERCOT receives insufficient Ancillary Service Offers in the DAM to procure one or more required Ancillary Service such that the Ancillary Service Plan is deficient and system security and reliability is threatened:

(a) ERCOT shall declare an Ancillary Service insufficiency and issue a Watch under Section 6.5.9.3.3, Watch.

(b) ERCOT shall request additional Ancillary Service Offers.

(i) A QSE may resubmit an offer for an Ancillary Service that it submitted before the Watch for the same Ancillary Service quantity block, but the resubmitted offer must meet the following criteria to be considered a valid offer:

(A) The offer quantity may not be less than the offer quantity submitted before the Watch, unless the resubmitted offer quantity is priced lower than the offer quantity submitted before the Watch; and

(B) For the amount of the offer quantity that is equal to or greater than the offer quantity submitted before the Watch, the offer must be priced equal to or less than the price of the offer submitted before the Watch.

(ii) A QSE may submit an offer for an additional Ancillary Service quantity block that was not submitted before the Watch. The incremental amount of the offer may be submitted at a price subject to the offer cap, provided the offer quantity of the Ancillary Service block from paragraph (i) above is not less than the offer quantity submitted before the Watch.

(iii) A QSE that did not submit an Ancillary Service Offer prior to the Watch may submit a new Ancillary Service Offer at a price subject to the offer cap.

(c) ERCOT shall not begin executing the DAM sooner than 30 minutes after issuing the Watch. If the additional Ancillary Service Offers are still insufficient to supply the Ancillary Service required in the Day-Ahead Ancillary Service Plan, then ERCOT shall run the DAM by reducing the Ancillary Service Plan quantities only for purposes of the DAM by the amount of insufficiency.

(d) When ERCOT must reduce the Ancillary Service Plan for purposes of the DAM due to insufficient Ancillary Service Offers, ERCOT shall preserve the Ancillary Service Plan in the DAM in the following order of priority:

(i) Regulation Up (Reg-Up);

(ii) Regulation Down (Reg-Down);

(iii) Responsive Reserve (RRS); and

|  |
| --- |
| ***[NPRR863: Insert paragraph (iv) below upon system implementation and renumber accordingly:]***  (iv) ERCOT Contingency Reserve Service (ECRS); and |

(iv) Non-Spin.

(2) ERCOT shall procure the difference in capacity between the Day-Ahead Ancillary Service Plan and the DAM-reduced Ancillary Service Plan amounts using the Supplemental Ancillary Service Market (SASM) process in accordance with Section 6.4.9.2.2, SASM Clearing Process. If the SASM process is insufficient, then ERCOT may acquire the insufficient amount of Ancillary Services from Hourly Reliability Unit Commitment (HRUC) Resources that are qualified to provide the needed Ancillary Service. ERCOT may also issue a Watch and procure Ancillary Services in accordance with Section 6.5.9.3.3.

|  |
| --- |
| ***[NPRR1008: Delete Section 4.5.2 above upon system implementation of the Real-Time Co-Optimization (RTC) project.]*** |

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 Ancillary Service Offers, specifying Resource, MW, Ancillary Service type, and price, for each hour of the awarded offer;

(b) 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;

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

(d) 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.

|  |
| --- |
| ***[NPRR1008 and NPRR1014: Replace applicable portions of paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014:]***  (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;  (e) Awarded Energy Bid/Offer Curves, specifying Resource, MWh, Settlement Point, and Settlement Point Price, for each hour of the awarded bid/offer; and  (f) 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 ERCOT website 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) Quantity of total Ancillary Service Offers received in the DAM, in MW by Ancillary Service type for each hour of the Operating Day;

(f) 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.

(g) 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.

(h) Aggregated Ancillary Service Offer Curve of all Ancillary Service Offers for each type of Ancillary Service for each hour of the Operating Day;

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

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

(k) System Lambda.

|  |
| --- |
| ***[NPRR1008 and NPRR1014: Replace applicable portions of paragraph (2) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014:]***  (2) As soon as practicable, but no later than 1330, ERCOT shall post on the ERCOT website 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;  (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; and  (iii) The total absolute value quantity of awards to bid portions of Energy Bid/Offer Curves (in MWh) cleared in the DAM 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;  (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; and  (iii) The total quantity of awards to offer portions of Energy Bid/Offer Curves (in MWh) cleared in the DAM 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;  (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 for an Operating Day when a market solution is determined to be invalid or invalid prices are identified in an otherwise valid market solution, accurate prices can be determined, and the impact of the price correction is significant. The following are some reasons that may cause an invalid market solution or invalid prices in a valid market solution.

(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) For purposes of a price correction performed prior to 1000 on the second Business Day after the Operating Day, the impact of a price correction is considered significant, as that term is used in paragraph (4) above, for the Operating Day when:

(a) The absolute value change to any single DAM Settlement Point Price at a Resource Node or Day-Ahead MCPC is greater than $0.05/MWh;

(b) The price correction would require ERCOT to change more than ten DAM Settlement Point Prices and Day-Ahead MCPCs; or

(c) The absolute value change to any DAM Settlement Point Price at a Load Zone or Hub is greater than $0.02/MWh.

(6) 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 qualify for a correction pursuant to paragraph (4) above and that ERCOT will seek 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) Before seeking ERCOT Board review of prices, ERCOT will determine if the impact of the price correction is significant, as that term is used in paragraph (4) above, by calculating the potential changes to the DAM Settlement Statement(s) of any Counter-Party on the given Operating Day. ERCOT shall seek ERCOT Board review of prices if the change in DAM Settlement Statement(s) would result in the absolute value impact to any single Counter-Party, based on the sum of all original DAM Settlement Statement amounts of Market Participants assigned to the Counter-Party, to be greater than:

(i) 2% and also greater than $20,000; or

(ii) 20% and also greater than $2,000.

(c) 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 should be corrected for an Operating Day.

(d) 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 should be corrected for an Operating Day.

(7) 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 Market Information System (MIS) Secure Area.

4.6 DAM Settlement

4.6.1 Day-Ahead Settlement Point Prices

(1) The Day-Ahead Settlement Point Price (DASPP) calculations are described in this Section for Resource Nodes, Load Zones, Hubs, and logical Resource Nodes.

4.6.1.1 Day-Ahead Settlement Point Prices for Resource Nodes

(1) The DASPP for a Resource Node Settlement Point for an hour is the Locational Marginal Price (LMP) at that Resource Node for that hour as calculated in the Day-Ahead Market (DAM) process.

4.6.1.2 Day-Ahead Settlement Point Prices for Load Zones

(1) The DASPP for a Load Zone Settlement Point for an hour is calculated as follows:

For all Load Zones except Direct Current Tie (DC Tie) Load Zones:

**DASPP = DASL - (DALZSF *c* \* DASP *c*)**

Where:

DALZSF *c =*(DADF *pb, c* \* DASF *pb, c*)

DADF *pb, c* = DAL *pb, c* / ( DAL *pb, c*)

For a DC Tie Load Zone:

**DASPP= DALMP *b***

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| DASPP | $/MWh | *Day-Ahead Settlement Point Price*⎯The DAM Settlement Point Price at the Load Zone, for the hour. |
| DALMP *b* | $/MWh | *Day-Ahead Locational Marginal Price per bus*⎯The DAM LMP at Electrical Bus *b* for the hour. |
| DASL | $/MWh | *Day-Ahead System Lambda*⎯The DAM Shadow Price for the system power balance constraint for the hour. |
| DASP *c* | $/MWh | *Day-Ahead Shadow Price for a binding transmission constraint*⎯The DAM Shadow Price for the constraint *c* for the hour. |
| DALZSF *c* | none | *Day-Ahead Shift factor of the Load Zone ⎯*The DAM aggregated Shift Factor of a Load Zone for the constraint *c* for the hour. |
| DASF *pb, ,c* | none | *Day-Ahead Shift factor of the power flow bus⎯*The DAM Shift Factor of a power flow bus *pb* that is a component of the Load Zone for the constraint *c* for the hour. |
| DADF *pb, c* | none | *Day-Ahead Distribution factor per power flow bus for a constraint*⎯The Load distribution factor for power flow bus *pb* in the Load Zone for the constraint *c* for the hour. |
| DAL *pb, c* | MW | *Day-Ahead Load at power flow bus for a constraint*⎯The DAM distributed load for power flow bus *pb* in the Load Zone for the constraint *c* for the hour. |
| *b* | none | An Electrical Bus that is assigned to the DC Tie Load Zone. |
| *pb* | none | An energized power flow bus that is assigned to the Load Zone for the constraint *c*. |
| *c* | None | A DAM binding transmission constraint for the hour caused by either base case or a contingency. |

4.6.1.3 Day-Ahead Settlement Point Prices for Hubs

(1) The DASPP for a Settlement Point at a Hub is determined according to the methodology included in the definition of that Hub in Section 3.5, Hubs.

4.6.1.4 Day-Ahead Settlement Point Prices at the Logical Resource Node for a Combined Cycle Generation Resource

(1) ERCOT shall calculate the DASPP for each hour at the logical Resource Node for the Combined Cycle Generation Resource as follows:

(a) The DASPP at a logical Resource Node shall be the sum of a weight factor as determined in paragraph (b) below times the Day-Ahead LMP at each of the Resource Nodes of the generation units registered in the Combined Cycle Train registration for the Combined Cycle Generation Resource designated in the Three-Part Supply Offer:

Where:

DASPP = ∑CCGR\_PhyR DALMP CCGR\_PhyR \* DACCGRWF CCGR\_PhyR

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| DASPP | $/MWh | *Day-Ahead Settlement Point Price at a logical Resource Node for a Combined Cycle Train*—The DAM Settlement Point Price at the logical Resource Node for a Combined Cycle Generation Resource for the hour. |
| DALMP CCGR\_PhyR | $/MWh | *Day-Ahead Locational Marginal Price at a Resource Node for a generation unit registered in the Combined Cycle Generation Resource*—The Day-Ahead LMP at the Resource Node of a generation unit designated in the Combined Cycle Train registration for the Combined Cycle Generation Resource. |
| DACCGRWF CCGR\_PhyR | none | *Day-Ahead Combined Cycle Generation Resource Weighting Factor*—The DAM Combined Cycle Generation Resource weighting factor for a generation unit designated in a Combined Cycle Train registration for the Combined Cycle Generation Resource. |
| CCGR\_PhyR | none | A generation unit designated in a Combine Cycle Train for the Combined Cycle Generation Resource. |

(b) The weight factor for each generation unit designated in the Combined Cycle Train registration for the Combined Cycle Generation Resource shall be the generation unit’s High Reasonability Limit (HRL), as specified in the Resource Registration data provided to ERCOT pursuant to Planning Guide Section 6.8.2, Resource Registration Process, divided by the total of all HRL values for the generation units designated in the Combined Cycle Generation Resource Registration data.

Where:

**DACCGRWF *CCGR\_PhyR* = HRL *CCGR\_PhyR* / ∑*CCGR\_PhyR* HRL *CCGR\_PhyR***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| DACCGRWF CCGR\_PhyR | none | *Day-Ahead Combined Cycle Generation Resource Weighting Factor*—The DAM Combined Cycle Generation Resource weighting factor for a generation unit designated in a Combined Cycle Train registration for the Combined Cycle Generation Resource. |
| HRL CCGR\_PhyR | MW | *High Reasonability Limit*—The HRL as specified in the ERCOT-approved Resource Registration data for a generation unit designated in a Combined Cycle Train registration for the Combined Cycle Generation Resource. |
| CCGR\_PhyR | none | A generation unit designated in a Combined Cycle Train for the Combined Cycle Generation Resource. |

4.6.2 Day-Ahead Energy and Make-Whole Settlement

4.6.2.1 Day-Ahead Energy Payment

(1) The Day-Ahead Energy Payment is made for all cleared offers to sell energy in the DAM, whether through Three-Part Supply Offers or DAM Energy-Only Offer Curves. The payment to each Qualified Scheduling Entity (QSE) for each Settlement Point for a given hour of the Operating Day is calculated as follows:

DAESAMT *q,**p* = (-1) \* DASPP *p* \* DAES *q,**p*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| DAESAMT *q, p* | $ | *Day-Ahead Energy Sale Amount per QSE per Settlement Point*⎯The payment to QSE *q* for the cleared energy offers at Settlement Point *p* for the hour. |
| DASPP *p* | $/MWh | *Day-Ahead Settlement Point Price per Settlement Point*⎯The DAM SPP at Settlement Point *p* for the hour. |
| DAES *q, p* | MW | *Day-Ahead Energy Sale per QSE per Settlement Point*⎯The total amount of energy represented by QSE *q*’s cleared Three-Part Supply Offers in the DAM and cleared DAM Energy-Only Offer Curves at Settlement Point *p*, for the hour. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1014: Replace paragraph (1) above with the following upon system implementation:]***  (1) The Day-Ahead Energy Payment is made for all cleared offers to sell energy in the DAM, whether through Three-Part Supply Offers, DAM Energy-Only Offer Curves, or cleared sales from the offer portion of Energy Bid/Offer Curves. The payment to each Qualified Scheduling Entity (QSE) for each Settlement Point for a given hour of the Operating Day is calculated as follows:  DAESAMT *q,**p* = (-1) \* DASPP *p* \* DAES *q,**p*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Definition** | | DAESAMT *q, p* | $ | *Day-Ahead Energy Sale Amount per QSE per Settlement Point*⎯The payment to QSE *q* for the cleared energy offers at Settlement Point *p* for the hour. | | DASPP *p* | $/MWh | *Day-Ahead Settlement Point Price per Settlement Point*⎯The DAM SPP at Settlement Point *p* for the hour. | | DAES *q, p* | MW | *Day-Ahead Energy Sale per QSE per Settlement Point*⎯The total amount of energy represented by QSE *q*’s cleared Three-Part Supply Offers in the DAM, cleared DAM Energy-Only Offer Curves, and cleared sales from the offer portion of Energy Bid/Offer Curves at Settlement Point *p*, for the hour. | | *q* | none | A QSE. | | *p* | none | A Settlement Point. | |

(2) The total of the Day-Ahead Energy Payments to each QSE for the hour is calculated as follows:

DAESAMTQSETOT *q* = DAESAMT *q, p*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| DAESAMTQSETOT *q* | $ | *Day-Ahead Energy Sale Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for its cleared energy offers at all Settlement Points for the hour. |
| DAESAMT *q, p* | $ | *Day-Ahead Energy Sale Amount per QSE per Settlement Point*⎯The payment to QSE *q* for the cleared energy offers at Settlement Point *p* for the hour. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |

4.6.2.2 Day-Ahead Energy Charge

(1) The Day-Ahead Energy Charge is made for all cleared DAM Energy Bids. This charge to each QSE for each Settlement Point for a given hour of the Operating Day is calculated as follows:

DAEPAMT *q, p* = DASPP *p* \* DAEP *q, p*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| DAEPAMT *q, p* | $ | *Day-Ahead Energy Charge per QSE per Settlement Point*⎯The charge to QSE *q* for all its cleared DAM Energy Bids at Settlement Point *p* for the hour. |
| DASPP *p* | $/MWh | *Day-Ahead Settlement Point Price per Settlement Point*⎯The DAM SPP at Settlement Point *p* for the hour. |
| DAEP *q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point*⎯The total amount of energy represented by QSE *q*’s cleared DAM Energy Bids at Settlement Point *p* for the hour. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1014: Replace paragraph (1) above with the following upon system implementation:]***  (1) The Day-Ahead Energy Charge is made for all cleared DAM Energy Bids or cleared purchases from the bid portion of Energy Bid/Offer Curves. This charge to each QSE for each Settlement Point for a given hour of the Operating Day is calculated as follows:  DAEPAMT *q, p* = DASPP *p* \* DAEP *q, p*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | DAEPAMT *q, p* | $ | *Day-Ahead Energy Charge per QSE per Settlement Point*⎯The charge to QSE *q* for all its cleared energy bids at Settlement Point *p* for the hour. | | DASPP *p* | $/MWh | *Day-Ahead Settlement Point Price per Settlement Point*⎯The DAM SPP at Settlement Point *p* for the hour. | | DAEP *q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point*⎯The total amount of energy represented by QSE *q*’s cleared DAM Energy Bids and cleared purchases from the bid portion of Energy Bid/Offer Curves at Settlement Point *p* for the hour. | | *q* | none | A QSE. | | *p* | none | A Settlement Point. | |

(2) The total of the Day-Ahead Energy Charges to each QSE for the hour is calculated as follows:

DAEPAMTQSETOT *q* = DAEPAMT *q, p*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| DAEPAMTQSETOT *q* | $ | *Day-Ahead Energy Purchase Amount QSE Total per QSE*⎯The total of the charges to QSE *q* for its cleared DAM Energy Bids at all Settlement Points for the hour. |
| DAEPAMT *q, p* | $ | *Day-Ahead Energy Purchase Amount per QSE per Settlement Point*⎯The charge to QSE *q* for its cleared DAM Energy Bids at Settlement Point *p* for the hour. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1014: Replace paragraph (2) above with the following upon system implementation:]***  (2) The total of the Day-Ahead Energy Charges to each QSE for the hour is calculated as follows:  DAEPAMTQSETOT *q* = DAEPAMT *q, p*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Definition** | | DAEPAMTQSETOT *q* | $ | *Day-Ahead Energy Purchase Amount QSE Total per QSE*⎯The total of the charges to QSE *q* for its cleared energy bids at all Settlement Points for the hour. | | DAEPAMT *q, p* | $ | *Day-Ahead Energy Purchase Amount per QSE per Settlement Point*⎯The charge to QSE *q* for its cleared DAM Energy Bids and cleared purchases from the bid portion of Energy Bid/Offer Curves at Settlement Point *p* for the hour. | | *q* | none | A QSE. | | *p* | none | A Settlement Point. | |

4.6.2.3 Day-Ahead Make-Whole Settlements

(1) A QSE that has a Three-Part Supply Offer cleared in the DAM is eligible for a Day-Ahead Make-Whole Payment startup cost compensation, if, for the Resource associated with the offer:

(a) The generator’s breakers were open, as indicated by a telemetered Resource status of Off-Line, for at least five minutes during the Adjustment Period for the beginning of the DAM commitment;

(b) The generator’s breakers were closed, as indicated by a telemetered Resource status of On-Line, for at least one minute during the DAM commitment period; and

(c) The breaker open-close sequence, as indicated by the On-Line/Off-Line sequence from the telemetered Resource status, for which the QSE is eligible for startup cost compensation in the DAM or Reliability Unit Commitment (RUC) for the previous Operating Day does not qualify in meeting the criteria in items (a) and (b) above.

(d) The breaker open-close sequence for which the QSE is eligible for startup cost compensation in an earlier DAM commitment period within the same Operating Day does not qualify in meeting the criteria in items (a) and (b) above.

(2) Notwithstanding the eligibility criteria described in paragraph (1) above, a Resource will not be eligible for Day-Ahead Make-Whole Payment Startup Cost compensation if the Resource was considered by the DAM as not having a cost to start due to the DAM commitment period being contiguous with a self-committed hour, as described in Section 4.4.9.1, Three-Part Supply Offers.

(3) A QSE that has a Three-Part Supply Offer cleared in the DAM is eligible for Day-Ahead Make-Whole Payment energy cost compensation in a DAM-committed Operating Hour, if, for the Resource associated with the offer the generator’s breakers were closed, as indicated by a telemetered Resource Status of On-Line, for at least one minute during the DAM-committed Operating Hour.

(4) The Day-Ahead Make-Whole Payment guarantees the QSE that the total payment received from the DAM for a DAM-committed Resource is not less than the total cost calculated based on the Startup Cap, the Minimum Energy Cap, and the Energy Offer Curve capped by the Energy Offer Curve Cap defined under Section 4.4.9.3.3, Energy Offer Curve Cost Caps.

(5) If a Generation Resource is eligible for startup or energy cost compensation in the Day-Ahead Make-Whole payment, then Ancillary Service revenue from the hours committed in the DAM will be included in its make-whole calculation for that Resource.

(6) For purposes of this Section 4.6.2.3, the telemetered Resource Status of OFFQS shall be considered as Off-Line.

|  |
| --- |
| ***[NPRR1014: Insert paragraph (7) below upon system implementation:]***  (7) An Energy Storage Resource (ESR) is not eligible for Day-Ahead Make-Whole Payment. |

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 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.

|  |
| --- |
| ***[NPRR1008: Replace paragraph (2) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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 in DAM*—The DAM MCPC for Non-Spin for the hour *h*.   |  | | --- | | ***[NPRR1008: Replace the description above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  *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. |

4.6.2.3.2 Day-Ahead Make-Whole Charge

(1) ERCOT shall charge a Day-Ahead Make-Whole Charge to each QSE that has one or more cleared DAM Energy Bids and/or Point-to-Point (PTP) Obligation Bids. The Day-Ahead Make-Whole Charge for an hour is that QSE’s prorata share of the total amount of Day-Ahead Make-Whole Payments for that hour. The proration must be based on the ratio of the energy amount of the QSE’s cleared DAM Energy Bids and PTP Obligation Bids to the total energy amount of all QSEs’ cleared DAM Energy Bids and PTP Obligation Bids. The Day-Ahead Make-Whole Charge to each QSE for a given hour is calculated as follows:

LADAMWAMT *q* = (-1) \* DAMWAMTTOT \* DAERS *q*

Where:

Day-Ahead Make-Whole Payment Total

DAMWAMTTOT = DAMWAMTQSETOT *q*

Day-Ahead Energy Purchase Ratio Share per QSE

DAERS *q* = DAE *q* / DAETOT

DAETOT = DAE *q*

DAE *q* = DAEP *q, p* + RTOBL *q, (j, k)*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| LADAMWAMT *q* | $ | *Day-Ahead Make-Whole Charge*⎯The allocated charge to QSE *q* to make whole all the eligible DAM-committed Resources for the hour. |
| DAMWAMTTOT | $ | *Day-Ahead Make-Whole Payment Total*⎯The total of the Day-Ahead Make-Whole Payments to all QSEs for all DAM-committed Resources for the hour. |
| 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. |
| DAERS *q* | none | *Day-Ahead Energy Purchase Ratio Share per QSE*⎯ The ratio of QSE *q*’s total amount of energy represented by its cleared DAM Energy Bids and PTP Obligation Bids, to the total amount of energy represented by all QSEs’ cleared DAM Energy Bids and PTP Obligation Bids, for the hour. |
| DAETOT | MW | *Day-Ahead Energy Total*—The total amount of energy represented by all cleared DAM Energy Bids and all cleared PTP Obligation Bids for the hour. |
| DAE *q* | MW | *Day-Ahead Energy per QSE*—QSE *q*’s total amount of energy, represented by its cleared DAM Energy Bids and PTP Obligation Bids, for the hour. |
| DAEP *q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point*—The total amount of energy represented by QSE *q*’s cleared DAM Energy Bids at the Settlement Point *p* for the hour. |
| RTOBL *q, (j, k)* | MW | *Real-Time Obligation per QSE per pair of source and sink*—The total amount of energy represented by QSE *q*’s cleared PTP Obligation Bids with the source *j* and the sink *k*, for the hour. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *j* | none | A source Settlement Point. |
| *k* | none | A sink Settlement Point. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1014: Replace paragraph (1) above with the following upon system implementation:]***  (1) ERCOT shall charge a Day-Ahead Make-Whole Charge to each QSE that has one or more cleared DAM Energy Bids, cleared purchases from the bid portion of Energy Bid/Offer Curves, and/or Point-to-Point (PTP) Obligation Bids. The Day-Ahead Make-Whole Charge for an hour is that QSE’s prorata share of the total amount of Day-Ahead Make-Whole Payments for that hour. The proration must be based on the ratio of the energy amount of the QSE’s cleared DAM Energy Bids, cleared purchases from the bid portion of Energy Bid/Offer Curves, and PTP Obligation Bids to the total energy amount of all QSEs’ cleared DAM Energy Bids, cleared purchases from the bid portion of Energy Bid/Offer Curves, and PTP Obligation Bids. The Day-Ahead Make-Whole Charge to each QSE for a given hour is calculated as follows:  LADAMWAMT *q* = (-1) \* DAMWAMTTOT \* DAERS *q*  Where:  Day-Ahead Make-Whole Payment Total  DAMWAMTTOT = DAMWAMTQSETOT *q*  Day-Ahead Energy Purchase Ratio Share per QSE  DAERS *q* = DAE *q* / DAETOT  DAETOT = DAE *q*  DAE *q* = DAEP *q, p* + RTOBL *q, (j, k)*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | LADAMWAMT *q* | $ | *Day-Ahead Make-Whole Charge*⎯The allocated charge to QSE *q* to make whole all the eligible DAM-committed Resources for the hour. | | DAMWAMTTOT | $ | *Day-Ahead Make-Whole Payment Total*⎯The total of the Day-Ahead Make-Whole Payments to all QSEs for all DAM-committed Resources for the hour. | | 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. | | DAERS *q* | none | *Day-Ahead Energy Purchase Ratio Share per QSE*⎯ The ratio of QSE *q*’s total amount of energy represented by its cleared DAM Energy Bids, cleared purchases from the bid portion of Energy Bid/Offer Curves, and PTP Obligation Bids, to the total amount of energy represented by all QSEs’ cleared DAM Energy Bids, cleared purchases from the bid portion of Energy Bid/Offer Curves, and PTP Obligation Bids, for the hour. | | DAETOT | MW | *Day-Ahead Energy Total*—The total amount of energy represented by all cleared DAM Energy Bids, all cleared purchases from the bid portion of Energy Bid/Offer Curves, and all cleared PTP Obligation Bids for the hour. | | DAE *q* | MW | *Day-Ahead Energy per QSE*—QSE *q*’s total amount of energy, represented by its cleared DAM Energy Bids, cleared purchases from the bid portion of Energy Bid/Offer Curves, and PTP Obligation Bids, for the hour. | | DAEP *q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point*—The total amount of energy represented by QSE *q*’s cleared DAM Energy Bids and cleared purchases from the bid portion of Energy Bid/Offer Curves at the Settlement Point *p* for the hour. | | RTOBL *q, (j, k)* | MW | *Real-Time Obligation per QSE per pair of source and sink*—The total amount of energy represented by QSE *q*’s cleared PTP Obligation Bids with the source *j* and the sink *k*, for the hour. | | *q* | none | A QSE. | | *p* | none | A Settlement Point. | | *j* | none | A source Settlement Point. | | *k* | none | A sink Settlement Point. | |

4.6.3 Settlement for PTP Obligations Bought in DAM

(1) ERCOT shall pay or charge a QSE for a cleared PTP Obligation bid the difference in the DAM Settlement Point Prices between the sink Settlement Point and the source Settlement Point. The charge or payment to each QSE for a given Operating Hour of its cleared PTP Obligation bids with each pair of source and sink Settlement Points is calculated as follows:

DARTOBLAMT *q, (j, k)* = DAOBLPR *(j, k)* \* RTOBL *q, (j, k)*

Where:

DAOBLPR *(j, k)* = DASPP *k* – DASPP *j*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| DARTOBLAMT *q, (j, k)* | $ | *Day-Ahead Real-Time Obligation Amount per QSE per pair of source and sink*⎯The charge or payment to QSE *q* for a PTP Obligation bid cleared in the DAM with the source *j* and the sink *k*, for the hour. |
| DAOBLPR *(j, k)* | $/MWh | *Day-Ahead Obligation Price per pair of source and sink*⎯The DAM clearing price of a PTP Obligation bid with the source *j* and the sink *k*, for the hour. |
| DASPP *j* | $/MWh | *Day-Ahead Settlement Point Price at source*⎯The DAM Settlement Point Price at the source Settlement Point *j* for the hour. |
| DASPP *k* | $/MWh | *Day-Ahead Settlement Point Price at sink*⎯The DAM Settlement Point Price at the sink Settlement Point *k* for the hour. |
| RTOBL *q, (j, k)* | MW | *Real-Time Obligation per QSE per pair of source and sink*⎯The total MW of QSE *q*’s PTP Obligation bids cleared in the DAM and settled in Real-Time for the source *j* and the sink *k,* for the hour. |
| *q* | none | A QSE. |
| *j* | none | A source Settlement Point. |
| *k* | none | A sink Settlement Point. |

(2) The net total charge or payment to the QSE for the hour of all its cleared PTP Obligation bids is calculated as follows:

DARTOBLAMTQSETOT *q* = DARTOBLAMT *q*, *(j, k)*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| DARTOBLAMTQSETOTq | $ | *Day-Ahead Real-Time Obligation Amount QSE Total per QSE*⎯The net total charge or payment to QSE *q* for all its PTP Obligation bids cleared in the DAM for the hour. |
| DARTOBLAMT q, (j, k) | $ | *Day-Ahead Real-Time Obligation Amount per QSE per pair of source and sink*⎯The charge or payment to QSE *q* for a PTP Obligation bids cleared in the DAM with the source *j* and the sink *k*, for the hour. |
| *q* | none | A QSE. |
| *j* | none | A source Settlement Point. |
| *k* | none | A sink Settlement Point. |

(3) ERCOT shall charge a QSE for a cleared PTP Obligation bid with Links to an Option the positive difference in the DASPP between the sink Settlement Point and the source Settlement Point. The charge to each QSE for a given Operating Hour of its cleared PTP Obligation bid with Links to an Option with each pair of source and sink Settlement Points is calculated as follows:

DARTOBLLOAMT *q, (j, k)* = Max (0, DAOBLPR *(j, k)*) \* RTOBLLO *q, (j, k)*

Where:

RTOBLLO *q, (j, k)* =  OBLLOCRR *q, (j, k), crrid, crrofferid*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| DARTOBLLOAMT *q, (j, k)* | $ | *Day-Ahead Real-Time Obligation with Links to an Option Amount per QSE per pair of source and sink*⎯The charge to QSE *q* for a PTP Obligation bid with Links to an Option cleared in the DAM with the source *j* and the sink *k*, for the hour. |
| DAOBLPR *(j, k)* | $/MWh | *Day-Ahead Obligation Price per pair of source and sink*⎯The DAM clearing price of a PTP Obligation bid with the source *j* and the sink *k*, for the hour. |
| RTOBLLO *q, (j, k)* | MW | *Real-Time PTP Obligation with Links to an Option per QSE per pair of source and sink*⎯The total MW of QSE *q*’s PTP Obligation bids with Links to an Option cleared in the DAM and settled in Real-Time for the source *j* and the sink *k,* for the hour. |
| OBLLOCRR *q, (j, k), crrid, crrofferid* | MW | *PTP Obligation with Links to an Option per QSE per pair of source and sink, CRRID and CRR Offer ID of the linked Option*⎯The total MW of QSE *q*’s PTP Obligation bids with Links to an Option cleared in the DAM for the source *j* and the sink *k,* for the hour and CRRID and CRROFFERID of the linked PTP Option. |
| *crrid* | none | A Congestion Revenue Right (CRR) Option identification code. |
| *crrofferid* | none | A CRR Offer identification code. |
| *q* | none | A QSE. |
| *j* | none | A source Settlement Point. |
| *k* | none | A sink Settlement Point. |

(4) The net total charge to the QSE for the hour of all its cleared PTP Obligation bids with Links to an Option is calculated as follows:

DARTOBLLOAMTQSETOT *q* = DARTOBLLOAMT *q*, *(j, k)*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| DARTOBLLOAMTQSETOT *q* | $ | *Day-Ahead Real-Time Obligation with Links to an Option Amount QSE Total per QSE*⎯The net total charge to QSE *q* for all its PTP Obligation bids with Links to an Option cleared in the DAM for the hour. |
| DARTOBLLOAMT*q, (j, k)* | $ | *Day-Ahead Real-Time Obligation with Links to Option Amount per QSE per pair of source and sink*⎯The charge to QSE *q* for a PTP Obligation bid with Links to an Option cleared in the DAM with the source *j* and the sink *k*, for the hour. |
| *q* | none | A QSE. |
| *j* | none | A source Settlement Point. |
| *k* | none | A sink Settlement Point. |

4.6.4 Settlement of Ancillary Services Procured in the DAM

(1) ERCOT shall pay each QSE providing Ancillary Services procured in the DAM the amount of Ancillary Service Capacity in MW procured from the QSE multiplied by the MCPC for the Ancillary Service provided, expressed in $/MW. Each QSE shall pay for its share of each Ancillary Service procured by ERCOT in the DAM.

4.6.4.1 Payments for Ancillary Services Procured in the DAM

4.6.4.1.1 Regulation Up Service Payment

(1) ERCOT shall pay each QSE whose 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*

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. |
| 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 per hour | *Market Clearing Price for Capacity for Reg-Up in DAM*—The DAM MCPC for Reg-Up for the hour. |
| *r* | none | A Resource. |
| *q* | none | A QSE. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1008: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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 per 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 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*

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. |
| 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 per hour | *Market Clearing Price for Capacity for Reg-Down in DAM*—The DAM MCPC for Reg-Down for the hour. |
| *r* | none | A Resource. |
| *q* | none | A QSE. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1008: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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 Amount 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 per 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 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*

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. |
| 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. |
| *r* | none | A Resource. |
| *q* | none | A QSE. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1008: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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 Amount 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 per 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 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*

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. |
| 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 per hour | *Market Clearing Price for Capacity for Non-Spin in DAM*—The DAM MCPC for Non-Spin for the hour. |
| *r* | none | A Resource. |
| *q* | none | A QSE. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1008: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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 Amount 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 per QSE* —The Non-Spin only capacity quantity awarded in DAM to QSE *q* for the hour. | | *r* | none | A Resource. | | *q* | none | A QSE. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR863 and NPRR1008: Insert applicable portions of Section 4.6.4.1.5 below upon system implementation or upon system implementation of the Real-Time Co-Optimization (RTC) project, respectively:]***  ***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 Amount 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 per 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 Charges for Ancillary Services Procurement in the DAM

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) \* PCRUAMTTOT / DARUQTOT

PCRUAMTTOT = PCRUAMT *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 per hour | *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. |
| PCRUAMTTOT | $ | *Procured Capacity for Reg-Up Amount Total in DAM*—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. |
| 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. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1008: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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) \* PCRDAMTTOT / DARDQTOT

PCRDAMTTOT = PCRDAMT *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 per hour | *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. |
| PCRDAMTTOT | $ | *Procured Capacity for Reg-Down Amount Total in DAM*—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. |
| 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. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1008: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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 Amount 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) \* PCRRAMTTOT / DARRQTOT

PCRRAMTTOT = PCRRAMT *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 per hour | *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. |
| PCRRAMTTOT | $ | *Procured Capacity for Responsive Reserve Amount Total in DAM*—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. |
| 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. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1008: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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 Amount 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) \* PCNSAMTTOT / DANSQTOT

PCNSAMTTOT = PCNSAMT *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. |
| PCNSAMTTOT | $ | *Procured Capacity for Non-Spin Amount Total in DAM*—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. |
| 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. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1008: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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 | *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 Amount 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. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR863 and NPRR1008: Insert applicable portions of Section 4.6.4.2.5 below upon system implementation, or upon system implementation of the Real-Time Co-Optimization (RTC) project, respectively:]***  ***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 / DAECRQTOT  DAPCECRAMTTOT = (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 Amount 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. | |

4.6.5 Calculation of “Average Incremental Energy Cost” (AIEC)

(1) The methodology of AIEC calculation is presented below. AIEC is used to account for the additional cost for a Generation Resource to produce energy above its LSL. This cost calculation methodology is used for the calculation of the DAAIEC variable.

I. Energy Offer Curve:

|  |  |  |
| --- | --- | --- |
| Index (i) | MW | $/MWh |
| 1 | Q1 | P1 |
| 2 | Q2 | P2 |
|  |  |  |
| N (N≤10) | QN | PN |

II. MW quantity corresponding with Energy Offer Curve Cost Cap[[1]](#footnote-1),  ($/MWh), where  ():

 (MW), where 

III. Energy Offer Curve capped with the Energy Offer Curve Cost Cap:

A. When :

|  |  |  |
| --- | --- | --- |
| Index (j) | MW | $/MWh |
| 1 | Q1 | P1 |
| M | M | M |
| i | Qi | Pi |
| i+1 |  |  |
| i+2 | QN |  |

B. When :

|  |  |  |
| --- | --- | --- |
| Index (j) | MW | $/MWh |
| 1 | Q1 | P1 |
| M | M | M |
| N | QN | PN |

IV. Cleared offer on the capped Energy Offer Curve:

A. When :

Q (MW), where  ()

B. When :

Q (MW), where  ()

V. Incremental energy price corresponding with cleared offer, on the capped Energy Offer Curve or between two points along the Energy Offer Curve:

P ($/MWh), where 

VI. AIEC corresponding with (Q-Q1>0), on the capped Energy Offer Curve:



1. If the Energy Offer Curve Cost Cap is less than the lowest price of the energy offer curve, the AIEC is the Energy Offer Curve Cap. If the Energy Offer Curve Cost Cap is greater than the highest price of the energy offer curve, then does not need to be calculated. [↑](#footnote-ref-1)