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| NPRR Number | [1310](https://www.ercot.com/mktrules/issues/NPRR1310) | NPRR Title | Dispatchable Reliability Reserve Service Plus Energy Storage Resource Participation and Release Factor |
| Date Posted | | November 20, 2025 | |
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| Requested Resolution | | Normal | |
| Nodal Protocol Sections Requiring Revision | | 2.1, Definitions  2.2, Acronyms and Abbreviations  3.2.3, Short-Term System Adequacy Reports  3.9.1, Current Operating Plan (COP) Criteria  3.17.5, Dispatchable Reliability Reserve Service (new)  3.18, Resource Limits in Providing Ancillary Service  4.4.7.1, Self-Arranged Ancillary Service Quantities  4.4.7.2, Ancillary Service Offers  4.4.7.3, Ancillary Service Trades  4.4.12, Determination of Ancillary Service Demand Curves for the Day-Ahead Market and Real-Time Market  4.5.1, DAM Clearing Process  4.6.2.3, Day-Ahead Make-Whole Settlements  4.6.2.3.1, Day-Ahead Make-Whole Payment  4.6.4.1.6, Dispatchable Reliability Reserve Service Payment (new)  4.6.4.2.6, Dispatchable Reliability Reserve Service Charge (new)  5.5.2, Reliability Unit Commitment (RUC) Process  5.6.2, RUC Startup Cost Eligibility  5.7.1, RUC Make-Whole Payment  5.7.1.1, RUC Guarantee  5.7.1.2, RUC Minimum-Energy Revenue  5.7.1.3, Revenue Less Cost Above LSL During RUC-Committed Hours  5.7.1.4, Revenue Less Cost During QSE Clawback Intervals  5.7.2, RUC Clawback Charge  5.7.4.1.1, Capacity Shortfall Ratio Share  6.1, Introduction  6.5.7.3, Security Constrained Economic Dispatch  6.5.7.3.1, Determination of Real-Time On-Line Reliability Deployment Price Adder  6.5.7.5, Ancillary Services Capacity Monitor  6.5.7.6.2.5, Deployment of Dispatchable Reliability Reserve Service (DRRS) (new)  6.6.1.6, Real-Time Market Clearing Prices for Ancillary Services  6.6.9.1 , Payment for Emergency Power Increase Directed by ERCOT  6.6.12.1 , Switchable Generation Make-Whole Payment  6.7.4, Real-Time Settlement for Updated Day-Ahead Market Ancillary Service Obligations  6.7.5.7, Dispatchable Reliability Reserve Service Payments and Charges (new)  6.7.5.7, Real-Time Derated Ancillary Service Capability Payment  6.7.5.8, Real-Time Derated Ancillary Service Capability Charge  6.7.6, Real-Time Ancillary Service Revenue Neutrality Allocation  8.1.1.2.1.8, Dispatchable Reliability Reserve Service Qualification (new)  8.1.1.3.5, Dispatchable Reliability Reserve Service Capacity Monitoring Criteria (new)  8.1.1.4.5, Dispatchable Reliability Reserve Service Energy Deployment Criteria (new)  9.2.3, DAM Settlement Charge Types  9.14.10, Settlement for Market Participants Impacted by Omitted Procedures or Manual Actions to Resolve the DAM  9.19.1, Default Uplift Invoices  16.11.4.3.1, Day-Ahead Liability Estimate  16.11.4.3.2, Real-Time Liability Estimate | |
| Related Documents Requiring Revision/Related Revision Requests | | Nodal Operating Guide Revision Request (NOGRR) 284, Related to NPRR1310, Dispatchable Reliability Reserve Service Plus Energy Storage Resource Participation and Release Factor  ERCOT and QSE Operations Business Practices During the Operating Hour | |
| Revision Description | | This Nodal Protocol Revision Request (NPRR) develops Dispatchable Reliability Reserve Service (DRRS) as a new Ancillary Service that includes the following functionality:   1. DRRS is added to the Protocols on top of Real-Time Co-optimization (RTC) and Energy Storage Resource (ESR) single-model Protocols; 2. DRRS is offered, awarded, and paid in both the Day-Ahead Market (DAM) and the Real-Time Market (RTM); 3. DRRS can be self-arranged and traded and Ancillary Service-only DRRS offers (i.e., virtual DRRS offers) can be submitted into the DAM; 4. DRRS can be provided by eligible Off-Line Generation Resources, On-Line Generation Resources, and ESRs using only the injection capability (i.e., High Sustained Limit (HSL) to 0 MW). Unless and until ERCOT receives approval from the Public Utility Commission of Texas (PUCT) indicating otherwise, no ESRs will be qualified to offer and awarded DRRS. Absent such approval, qualification for DRRS will be limited to Off-Line and On-Line Generation Resources only. ERCOT will work with PUCT Staff to determine the process for PUCT approval of ESR participation in DRRS. ERCOT anticipates bringing a revised Impact Analysis subsequently and will address that process at that time. 5. A new Resource Status code will be developed for Off-Line Generation Resources providing DRRS that have not been deployed by ERCOT; 6. When looking to commit capacity during the Reliability Unit Commitment (RUC) process, RUC will prioritize committing Off-Line Generation Resources providing DRRS. This is accomplished because Off-Line DRRS Resources will appear to have lower start-up and minimum energy costs relative to other Off-Line Generation Resources in the RUC optimization; 7. DRRS deployments of Off-Line Generation Resources will be included in the Reliability Deployment Price Adder (RDPA) process, in alignment with other existing Protocol language for similar deployments; 8. DRRS capacity will be considered in the calculation of the Qualified Scheduling Entities’ (QSEs’) RUC Capacity Short charges; 9. DRRS deployments will not qualify for RUC Make-Whole Payments or RUC Clawback Charges. For RUC blocks that are contiguous with a DRRS deployment, only minimum energy costs for the RUC hours will be included in the RUC Guarantee; 10. An Ancillary Service Imbalance Settlement will be created for DRRS in RTM; 11. DRRS revenues will be considered in the following Settlements: revenues used to offset the DAM guarantee in DAM Make-Whole Payments, revenues used to offset the RUC guarantee in RUC Make-Whole Payments, emergency Settlements, Switchable Generation Make-Whole Payments, Real-Time Ancillary Service deration payments, and DAM Settlement for Market Participants impacted by omitted procedures or manual actions to resolve the DAM; 12. DRRS-eligible Resources that did not receive a DAM award may offer into the RTM provided that they submitted and maintained an On-Line Resource Status (or statuses of DRRS or OFF if eligible to provide Non-Spinning Reserve (Non-Spin) for a given Operating Hour in their Current Operating Plan (COP) for Day-Ahead Reliability Unit Commitment (DRUC) and each subsequent run of Hourly Reliability Unit Commitment (HRUC); and 13. DRRS procurement quantities will be determined as part of the annual ERCOT Methodology for Determining Ancillary Service Requirements. To design DRRS with additional flexibility to support dispatchable Resources over and above any MW required to support an operational reserve if desired by the PUCT, DRRS-awarded capacity can ‘overlap’ with other energy and Ancillary Service awards via the concept of a Release Factor. The DRRS Release Factor is a number ranging from 0 to 1 which determines the proportion of DRRS-awarded capacity that can overlap with other energy and Ancillary Service awards. The DRRS Release Factor is an hourly parameter input into the clearing engine in the Day-Ahead and Real-Time Market that can be adjusted based on factors such as season, time of day, etc.     1. A DRRS Release Factor of 0 means that **no** DRRS-awarded capacity can overlap with other energy and Ancillary Service awards;     2. A DRRS Release Factor of 1 means that **all** DRRS-awarded capacity can overlap with other energy and Ancillary Service awards.   The inclusion of a Release Factor is in accordance with guidance from the PUCT to design DRRS with optionality to be utilized for Resource adequacy purposes. Unless and until a determination is made by the PUCT to procure DRRS MW in quantities beyond those required to serve operational uncertainty and concordantly provides guidance to update this parameter, the DRRS Release Factor will be set to 0. | |
| Reason for Revision | | [Strategic Plan](https://www.ercot.com/files/docs/2023/08/25/ERCOT-Strategic-Plan-2024-2028.pdf) Objective 1 – Be an industry leader for grid reliability and resilience  [Strategic Plan](https://www.ercot.com/files/docs/2023/08/25/ERCOT-Strategic-Plan-2024-2028.pdf) Objective 2 - Enhance the ERCOT region’s economic competitiveness with respect to trends in wholesale power rates and retail electricity prices to consumers  [Strategic Plan](https://www.ercot.com/files/docs/2023/08/25/ERCOT-Strategic-Plan-2024-2028.pdf) Objective 3 - Advance ERCOT, Inc. as an independent leading industry expert and an employer of choice by fostering innovation, investing in our people, and emphasizing the importance of our mission  General system and/or process improvement(s)  Regulatory requirements  ERCOT Board/PUCT Directive  *(please select ONLY ONE – if more than one apply, please select the ONE that is most relevant)* | |
| Justification of Reason for Revision and Market Impacts | | This NPRR has been developed pursuant to Public Utility Regulatory Act § 39.159(d), which requires ERCOT “to develop and implement an ancillary services program to procure dispatchable reliability reserve services on a day-ahead and real-time basis to account for market uncertainty.” | |

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| Market Segment | Not applicable |

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| Market Rules Notes |

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

* NPRR1214, Reliability Deployment Price Adder Fix to Provide Locational Price Signals, Reduce Uplift and Risk
  + Section 6.5.7.3.1
  + Section 6.7.6
* NPRR1290, Gap Resolutions and Clarifications for the Implementation of RTC+B
  + Section 3.18
  + Section 4.4.7.1
  + Section 6.5.7.3
  + Section 6.5.7.3.1
  + Section 6.5.7.5
  + Section 6.6.9.1
* NPRR1309, Dispatchable Reliability Reserve Service Ancillary Service
  + Section 2.1
  + Section 2.2
  + Section 3.2.3
  + Section 3.9.1
  + Section 3.17.5
  + Section 3.18
  + Section 4.4.7.1
  + Section 4.4.7.2
  + Section 4.4.7.3
  + Section 4.4.12
  + Section 4.5.1
  + Section 4.6.2.3
  + Section 4.6.2.3.1
  + Section 4.6.4.1.6
  + Section 4.6.4.2.6
  + Section 5.5.2
  + Section 5.6.2
  + Section 5.7.1
  + Section 5.7.1.1
  + Section 5.7.1.2
  + Section 5.7.1.3
  + Section 5.7.1.4
  + Section 5.7.2
  + Section 5.7.4.1.1
  + Section 6.1
  + Section 6.5.7.3
  + Section 6.5.7.3.1
  + Section 6.5.7.5
  + Section 6.5.7.6.2.5
  + Section 6.6.1.6
  + Section 6.6.9.1
  + Section 6.6.12.1
  + Section 6.7.4
  + Section 6.7.5.7
  + Section 6.7.5.7
  + Section 6.7.5.8
  + Section 6.7.6
  + Section 8.1.1.2.1.8
  + Section 8.1.1.3.5
  + Section 8.1.1.4.5
  + Section 9.2.3
  + Section 9.14.10
  + Section 9.19.1
  + Section 16.11.4.3.1
  + Section 16.11.4.3.2

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| Proposed Protocol Language Revision |

## 2.1 DEFINITIONS

**Dispatchable Reliability Reserve Service (DRRS)**

An Ancillary Service that provides operating reserves that are intended to manage uncertainty on the ERCOT System while mitigating the need for Reliability Unit Commitment (RUC) instructions. DRRS may also be procured to provide support to dispatchable Resources beyond operation reserve requirements.

**Dispatchable Reliability Reserve Service Release Factor (DRRSRF)**

The DRRS Release Factor is a number ranging from 0 to 1 that allows for DRRS-awarded capacity to overlap with energy and other Ancillary Service awards. The DRRSRF is an hourly parameter input into the Day-Ahead and Real-Time Market clearing engines that can be adjusted based on variables such as season, day, or hour which determines the degree to which DRRS-awarded capacity can overlap with other energy and Ancillary Service awards. Any DRRS-awarded capacity that overlaps with other awards is intended to provide support to dispatchable Resources beyond operational reserve requirements, whereas non-overlapping DRRS-awarded capacity is being secured solely to serve operational uncertainty.

(a) A DRRSRF of 0 means that no DRRS-awarded capacity can overlap with energy and other Ancillary Service awards

(b) A DRRSRF of 1 means tha**t** all DRRS-awarded capacity can overlap with energy and other Ancillary Service awards.

(c) A DRRSRF between 0 and 1 means that DRRS-awarded capacity can partially overlap with energy and other Ancillary Service awards.

Qualified Scheduling Entity (QSE)-Committed Interval

A Settlement Interval for which the QSE for a Resource has committed the Resource without a Reliability Unit Commitment (RUC) instruction or a deployment for Dispatchable Reliability Reserve Service (DRRS) to commit it. For Settlement purposes, a Resource with a Current Operating Plan (COP) Resource Status of OFFQS will not be considered as QSE-committed for the Settlement Interval unless that interval has been committed due to a Day-Ahead Market (DAM) award for energy.

**Reliability Unit Commitment for Additional Capacity (RUCAC)-Hour**

An Operating Hour for which a Combined Cycle Generation Resource is Qualified Scheduling Entity (QSE)-committed and receives a Reliability Unit Commitment (RUC) instruction from ERCOT to transition to a configuration with additional capacity above the configuration that was QSE-committed or DRRS-deployed.

**Reliability Unit Commitment for Additional Capacity (RUCAC)-Interval**

A Settlement Interval within the hour for which there is a Reliability Unit Commitment (RUC) instruction from ERCOT for a Combined Cycle Generation Resource to transition to a configuration with additional capacity above the configuration that was Qualified Scheduling Entity (QSE)-committed or DRRS-deployed.

## 2.2 ACRONYMS AND ABBREVIATIONS

**DRRS** Dispatchable Reliability Reserve Service

**DRRSRF** Dispatchable Reliability Reserve Service Release Factor

3.2.3 Short-Term System Adequacy Reports

(1) ERCOT shall generate and post short-term adequacy reports on the ERCOT website. ERCOT shall update these reports hourly following updates to the Seven-Day Load Forecast, except where noted otherwise. The short-term adequacy reports will provide:

(a) For Generation Resources, the available On-Line Resource capacity for each hour, aggregated by Forecast Zone, using the COP for the first seven days and considering Resources with a COP Resource Status listed in paragraph (5)(b)(i) of Section 3.9.1, Current Operating Plan (COP) Criteria;

(b) The total system-wide capacity of Resource Outages as reflected in the Outage Scheduler that are accepted or approved. The Resource Outage capacity amount shall be based from each Resource’s current Seasonal High Sustained Limit (HSL) and posted each hour for the top of each Operating Hour for the next 168 hours. This posted information will exclude specific Resource information and Outages related to Mothballed or Decommissioned Generation Resources, and will be aggregated on a Forecast Zone basis in three categories:

(i) IRRs with an Outage Scheduler nature of work other than “New Equipment Energization”;

(ii) Other Resources with an Outage Scheduler nature of work other than “New Equipment Energization”; and

(iii) Resources with an Outage Scheduler nature of work “New Equipment Energization”;

(c) For Load Resources, the available capacity for each hour aggregated by Forecast Zone, using the COP for the first seven days and considering Resources with a COP Resource Status of ONRGL, ONCLR, or ONRL;

(d) Forecast Demand for each hour described in Section 3.2.2, Demand Forecasts;

(e) For Generation Resources, the available Off-Line Resource capacity that can be started for each hour, aggregated by Forecast Zone, using the COP for the first seven days and considering Resources with a COP Resource Status of OFF or OFFNS and temporal constraints; and

(f) Following each Hourly Reliability Unit Commitment (HRUC), the available On-Line capacity from Generation Resources, aggregated by Forecast Zone, based on Real-Time telemetry, for which the COP Resource Status is OFF, OUT, or EMR for all hours within the HRUC Study Period. The available On-Line capacity will consider those Resources with a Real-Time Resource Status listed in paragraph (5)(b)(i) of Section 3.9.1 excluding SHUTDOWN.

(g) The available capacity for each hour for the next seven days. For day one, and for day two following the execution of the Day-Ahead Reliability Unit Commitment (DRUC) on day one, the available capacity will be the sum of the values calculated in paragraphs (a) and (e) above, except that for IRRs the forecasted output will be used instead of COP values, and Direct Current Tie (DC Tie) exports will be subtracted. For the remaining hours of the seven days, the available capacity will be calculated as the sum of the Seasonal HSLs for non-IRR Generation Resources including seasonal Private Use Network capacity and the forecasted output for IRRs minus the total capacity of accepted or approved Resource Outages.

(h) The available capacity for reserves for each hour, which will be the available capacity calculated in paragraph (g) above minus the forecasted Demand for that hour; and

(i) For each DC Tie, the sum of any ERCOT-approved DC Tie Schedules for each 15-minute interval for the first seven days. The sum shall be displayed as an absolute value and classified as a net import or net export.

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| ***[NPRR1007 and NPRR1029: Replace applicable portions of Section 3.2.3 above with the following upon system implementation for NPRR1029; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007:]***  ***3.2.3 Short-Term System Adequacy Reports***  (1) ERCOT shall generate and post short-term adequacy reports on the ERCOT website. ERCOT shall update these reports hourly following updates to the Seven-Day Load Forecast, except where noted otherwise. The short-term adequacy reports will provide:  (a) For Generation Resources, the available On-Line Resource capacity for each hour, aggregated by Forecast Zone, using the COP for the first seven days and considering Resources with a COP Resource Status listed in paragraph (5)(b)(i) of Section 3.9.1, Current Operating Plan (COP) Criteria;  (b) The total system-wide capacity of Resource Outages as reflected in the Outage Scheduler that are accepted or approved. The Resource Outage capacity amount shall be based from each Resource’s current Seasonal High Sustained Limit (HSL) and posted each hour for the top of each Operating Hour for the next 168 hours. This posted information will exclude specific Resource information and Outages related to Mothballed or Decommissioned Generation Resources, and will be aggregated on a Forecast Zone basis in three categories:  (i) IRRs and the intermittent renewable generation component of each DC-Coupled Resource with an Outage Scheduler nature of work other than “New Equipment Energization”;  (ii) Other Resources with an Outage Scheduler nature of work other than “New Equipment Energization”; and  (iii) Resources with an Outage Scheduler nature of work “New Equipment Energization”;  (c) For Load Resources, the available capacity for each hour aggregated by Forecast Zone, using the COP for the first seven days and considering Resources with a COP Resource Status of ONL;  (d) The total capability of Resources available to provide the following Ancillary Service combinations, using COPs submitted by QSEs for the first seven days and capped by the COP limits for individual Resources. A Resource’s capability shall only be included in the sums below if the Resource Status allows the Resource to provide at least one of the Ancillary Services within the sum:  (i) Capacity to provide Reg-Up, irrespective of whether it is capable of providing any other Ancillary Service;  (ii) Capacity to provide RRS, irrespective of whether it is capable of providing any other Ancillary Service;  (iii) Capacity to provide ECRS, irrespective of whether it is capable of providing any other Ancillary Service;  (iv) Capacity to provide Non-Spin, irrespective of whether it is capable of providing any other Ancillary Service;  (v) Capacity to provide Reg-Up, RRS, or both, irrespective of whether it is capable of providing ECRS, Non-Spin, or DRRS;  (vi) Capacity to provide Reg-Up, RRS, ECRS, or any combination thereof, irrespective of whether it is capable of providing Non-Spin or DRRS;  (vii) Capacity to provide Reg-Up, RRS, ECRS, Non-Spin, or any combination thereof, irrespective of whether it is capable of providing DRRS;  (viii) Capacity to provide Reg-Up, RRS, ECRS, Non-Spin, DRRS, or any combination thereof; and  (ix) Capacity to provide Reg-Down;  (f) Forecast Demand for each hour described in Section 3.2.2, Demand Forecasts;  (g) For Generation Resources, the available Off-Line Resource capacity that can be started for each hour, aggregated by Forecast Zone, using the COP for the first seven days and considering Resources with a COP Resource Status of OFF and temporal constraints;  (h) Following each Hourly Reliability Unit Commitment (HRUC), the available On-Line capacity from Generation Resources, aggregated by Forecast Zone, based on Real-Time telemetry, for which the COP Resource Status is OFF, OUT, or EMR for all hours within the HRUC Study Period. The available On-Line capacity will consider those Resources with a Real-Time Resource Status listed in paragraph (5)(b)(i) of Section 3.9.1 excluding SHUTDOWN;  (i) For each Direct Current Tie (DC Tie), the sum of any ERCOT-approved DC Tie Schedules for each 15-minute interval for the first seven days. The sum shall be displayed as an absolute value and classified as a net import or net export;  (j) The available capacity for each hour for the next seven days. For day one, and for day two following the execution of the Day-Ahead Reliability Unit Commitment (DRUC) on day one, the available capacity will be the sum of the values calculated in paragraphs (a) and (f) above, except that for IRRs the forecasted output will be used instead of COP values, and DC Tie exports will be subtracted. For the remaining hours of the seven days, the available capacity will be calculated as the sum of the Seasonal HSLs for non-IRR Generation Resources including seasonal Private Use Network capacity and the forecasted output for IRRs minus the total capacity of accepted or approved Resource Outages; and  (k) The available capacity for reserves for each hour, which will be the available capacity calculated in paragraph (j) above minus the forecasted Demand for that hour. |

***3.9.1 Current Operating Plan (COP) Criteria***

(1) Each QSE that represents a Resource must submit a COP to ERCOT that reflects expected operating conditions for each Resource for each hour in the next seven Operating Days.

(2) Each QSE that represents a Resource shall update its COP reflecting changes in availability of any Resource as soon as reasonably practicable, but in no event later than 60 minutes after the event that caused the change. Each QSE shall timely update its COP unless in the reasonable judgment of the QSE, such compliance would create an undue threat to safety, undue risk of bodily harm, or undue damage to equipment. The QSE is excused from updating the COP only for so long as the undue threat to safety, undue risk of bodily harm, or undue damage to equipment exists. The time for updating the COP begins once the undue threat to safety, undue risk of bodily harm, or undue damage to equipment no longer exists.

(3) The Resource capacity in a QSE’s COP must be sufficient to supply the Ancillary Service Supply Responsibility of that QSE. Additionally, for a COP provided for an ESR, the QSE shall ensure that the Hour Beginning Planned State of Charge (HBSOC) for any two consecutive hours shall be feasible based on the ESR’s maximum rate of charge or discharge.

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| ***[NPRR1007, NPRR1014, NPRR1029, and NPRR1204: Replace applicable portions of paragraph (3) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007 and NPRR1204; or upon system implementation for NPRR1014 or NPRR1029:]***  (3) Each QSE that represents a Resource shall update its COP to reflect the ability of the Resource to provide each Ancillary Service by product and sub-type. Additionally, for a COP provided for an ESR, the QSE shall ensure that the Hour Beginning Planned State of Charge (HBSOC) for any two consecutive hours shall be feasible based on the ESR’s maximum rate of charge or discharge. |

(4) Load Resource COP values may be adjusted to reflect Distribution Losses in accordance with Section 8.1.1.2, General Capacity Testing Requirements.

(5) A COP must include the following for each Resource represented by the QSE:

(a) The name of the Resource;

(b) The expected Resource Status:

(i) Select one of the following for Generation Resources synchronized to the ERCOT System that best describes the Resource’s status. Unless otherwise provided below, these Resource Statuses are to be used for COP and/or Real-Time telemetry purposes, as appropriate.

(A) ONRUC – On-Line and the hour is a RUC-Committed Hour;

(B) ONREG – On-Line Resource with Energy Offer Curve providing Regulation Service;

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| ***[NPRR1007, NPRR1014, and NPRR1029: Delete item (B) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029; and renumber accordingly.]*** |

(C) ON – On-Line Resource with Energy Offer Curve;

(D) ONDSR – On-Line Dynamically Scheduled Resource (DSR);

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| ***[NPRR1000: Delete item (D) above upon system implementation and renumber accordingly.]*** |

(E) ONOS – On-Line Resource with Output Schedule;

(F) ONOSREG – On-Line Resource with Output Schedule providing Regulation Service;

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| ***[NPRR1007, NPRR1014, and NPRR1029: Delete item (F) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029; and renumber accordingly.]*** |

(G) ONDSRREG – On-Line DSR providing Regulation Service;

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| ***[NPRR1000, NPRR1007, NPRR1014, and NPRR1029: Delete item (G) above upon system implementation for NPRR1000, NPRR1014, or NPRR1029; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; and renumber accordingly.]*** |

(H) FRRSUP – Available for Dispatch of Fast Responding Regulation Service (FRRS). This Resource Status is only to be used for Real-Time telemetry purposes;

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| ***[NPRR1007, NPRR1014, and NPRR1029: Delete item (H) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 and NPRR1029; and renumber accordingly.]*** |

(I) ONTEST – On-Line blocked from Security-Constrained Economic Dispatch (SCED) for operations testing (while ONTEST, a Generation Resource may be shown on Outage in the Outage Scheduler);

(J) ONEMR – On-Line EMR (available for commitment or dispatch only for ERCOT-declared Emergency Conditions; the QSE may appropriately set LSL and High Sustained Limit (HSL) to reflect operating limits);

(K) ONRR – On-Line as a synchronous condenser providing Responsive Reserve (RRS) but unavailable for Dispatch by SCED and available for commitment by RUC;

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| ***[NPRR1007, NPRR1014, and NPRR1029: Delete item (K) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029; and renumber accordingly.]*** |

(L) ONECRS – On-Line as a synchronous condenser providing ERCOT Contingency Response Service (ECRS) but unavailable for Dispatch by SCED and available for commitment by RUC;

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| ***[NPRR1007, NPRR1014, and NPRR1029: Delete item (L) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029; and renumber accordingly.]*** |

(M) ONOPTOUT – On-Line and the hour is a RUC Buy-Back Hour;

(N) SHUTDOWN – The Resource is On-Line and in a shutdown sequence, and has no Ancillary Service Obligations other than Off-Line Non-Spinning Reserve (Non-Spin) which the Resource will provide following the shutdown. This Resource Status is only to be used for Real-Time telemetry purposes;

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| ***[NPRR1007, NPRR1014, and NPRR1029: Replace paragraph (N) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029:]***  (N) SHUTDOWN – The Resource is On-Line and in a shutdown sequence, and is not eligible for an Ancillary Service award. This Resource Status is only to be used for Real-Time telemetry purposes; |

(O) STARTUP – The Resource is On-Line and in a start-up sequence and has no Ancillary Service Obligations. This Resource Status is only to be used for Real-Time telemetry purposes;

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| ***[NPRR1007, NPRR1014, and NPRR1029: Replace paragraph (O) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029:]***  (O) STARTUP – The Resource is On-Line and in a start-up sequence and is not eligible for an Ancillary Service award, unless coming On-Line in response to a manual deployment of ERCOT Contingency Reserve Service (ECRS) or Non-Spinning Reserve (Non-Spin). This Resource Status is only to be used for Real-Time telemetry purposes; |

(P) OFFQS – Off-Line but available for SCED deployment. Only qualified Quick Start Generation Resources (QSGRs) may utilize this status;

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| ***[NPRR1007, NPRR1014, and NPRR1029: Replace paragraph (P) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029:]***  (P) OFFQS – Off-Line but available for SCED deployment and to provide ECRS, Non-Spin, and DRRS, if qualified and capable. Only qualified Quick Start Generation Resources (QSGRs) may utilize this status; |

(Q) ONFFRRRS – Available for Dispatch of RRS when providing Fast Frequency Response (FFR) from Generation Resources. This Resource Status is only to be used for Real-Time telemetry purposes. A Resource with this Resource Status may also be providing Ancillary Services other than FFR; and

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| ***[NPRR1007, NPRR1014, and NPRR1029: Delete item (Q) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029; and renumber accordingly.]*** |

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| ***[NPRR1007, NPRR1014, and NPRR1029: Insert item (K) below upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029:]***  (K) ONSC – Resource is On-Line operating as a synchronous condenser and available to provide Responsive Reserve (RRS) and ECRS, if qualified and capable, and for commitment by RUC, but is unavailable for Dispatch by SCED. For SCED, Resource Base Points will be set equal to the telemetered net real power of the Resource available at the time of the SCED execution; and |

(R) ONHOLD – Resource is On-Line but temporarily unavailable for Dispatch by SCED or for participating in Ancillary Services. This Resource Status is only to be used for Real-Time telemetry purposes. For SCED, Resource Base Points will be set equal to the telemetered net real power of the Resource available at the time of the SCED execution.

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| ***[NPRR1007, NPRR1014, NPRR1029, and NPRR1188: Replace item (R) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014, NPRR1029, or NPRR1188:]***  (R) ONHOLD – Resource is On-Line but temporarily unavailable for Dispatch by SCED or Ancillary Service awards due to a valid and verifiable operational reason. This Resource Status is only to be used for Real-Time telemetry purposes. For SCED, Resource Base Points will be set equal to the telemetered net real power of the Resource available at the time of the SCED execution. |

(ii) Select one of the following for Off-Line Generation Resources not synchronized to the ERCOT System that best describes the Resource’s status. These Resource Statuses are to be used for COP and/or Real-Time telemetry purposes, as appropriate.

(A) OUT – Off-Line and unavailable, or not connected to the ERCOT System and operating in a Private Microgrid Island (PMI);

(B) OFFNS – Off-Line but reserved for Non-Spin;

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| ***[NPRR1007, NPRR1014, and NPRR1029: Delete item (B) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029; and renumber accordingly.]*** |

(C) OFF – Off-Line but available for commitment in the Day-Ahead Market (DAM) and RUC;

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| ***[NPRR1007, NPRR1014, and NPRR1029: Replace item (C) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029:]***  (B) OFF – Off-Line but available for commitment in the Day-Ahead Market (DAM), RUC, and providing Non-Spin or DRRS, if qualified and capable;  (C) DRRS – Off-Line and available for DRRS deployment; |

(D) EMR – Available for commitment as a Resource contracted by ERCOT under Section 3.14.1, Reliability Must Run, or under paragraph (4) of Section 6.5.1.1, ERCOT Control Area Authority, or available for commitment only for ERCOT-declared Emergency Condition events; the QSE may appropriately set LSL and HSL to reflect operating limits;

(E) EMRSWGR – Switchable Generation Resource (SWGR) operating in a non-ERCOT Control Area, or in the case of a Combined Cycle Train with one or more SWGRs, a configuration in which one or more of the physical units in that configuration are operating in a non-ERCOT Control Area.

(iii) Select one of the following for Load Resources. Unless otherwise provided below, these Resource Statuses are to be used for COP and/or Real-Time telemetry purposes.

(A) ONRGL – Available for Dispatch of Regulation Service by Load Frequency Control (LFC) and, for any remaining Dispatchable capacity, by SCED with a Real-Time Market (RTM) Energy Bid;

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| ***[NPRR1188: Replace item (A) above with the following upon system implementation:]***  (A) ONRGL – Available for Dispatch of Regulation Service by Load Frequency Control (LFC) and, for any remaining Dispatchable capacity, by SCED with an Energy Bid Curve; |

(B) FRRSUP – Available for Dispatch of FRRS by LFC and not Dispatchable by SCED. This Resource Status is only to be used for Real-Time telemetry purposes;

(C) FRRSDN – Available for Dispatch of FRRS by LFC and not Dispatchable by SCED. This Resource Status is only to be used for Real-Time telemetry purposes;

(D) ONCLR – Available for Dispatch as a Controllable Load Resource (CLR) by SCED with an RTM Energy Bid;

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| ***[NPRR1188: Replace item (D) above with the following upon system implementation:]***  (D) ONCLR – Available for Dispatch as a Controllable Load Resource (CLR) by SCED with an Energy Bid Curve; |

(E) ONRL – Available for Dispatch of RRS or Non-Spin, excluding CLRs. A Load Resource, excluding CLR, may not provide ECRS with this Resource Status;

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| ***[NPRR1007, NPRR1014, and NPRR1029: Delete items (A)-(E) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029; and renumber accordingly.]*** |

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| ***[NPRR1188: Insert items (F) and (G) below upon system implementation and renumber accordingly:]***  (F) ONTEST – On-Line blocked from SCED for operations testing;  (G) ONHOLD – CLR is On-Line but temporarily unavailable for Dispatch by SCED or providing Ancillary Service due to a valid and verifiable operational reason. This Resource Status is only to be used for Real-Time telemetry purposes. For SCED, Resource Base Points will be set equal to the telemetered net real power of the Resource available at the time of the SCED execution. |

(F) ONECL – Available for Dispatch of ECRS or available for Dispatch of ECRS and RRS simultaneously, excluding CLRs;

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| ***[NPRR1007, NPRR1014, and NPRR1029: Delete item (F) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029; and renumber accordingly.]*** |

(G) OUTL – Not available;

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| ***[NPRR1188: Replace item (G) above with the following upon system implementation:]***  (I) OUTL – Not available. For a CLR that is not an Aggregate Load Resource (ALR), this status can only be used when the Resource is Off-Line and unavailable with its energy consumption at zero; |

(H) ONFFRRRSL – Available for Dispatch of RRS when providing FFR, excluding CLRs. This Resource Status is only to be used for Real-Time telemetry purposes;

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| ***[NPRR1007, NPRR1014, and NPRR1029: Delete item (H) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029.]*** |

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| ***[NPRR1007, NPRR1014, NPRR1029: Insert item (B) below upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029:]***  (B) ONL – On-Line and available for Dispatch by SCED or providing Ancillary Services. |

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| ***[NPRR1014 or NPRR1029: Insert applicable portions of paragraph (iv) below upon system implementation:]***  (iv) Select one of the following for Energy Storage Resources (ESRs). Unless otherwise provided below, these Resource Statuses are to be used for COP and Real-Time telemetry purposes:  (A) ON – On-Line Resource with Energy Bid/Offer Curve;  (B) ONOS – On-Line Resource with Output Schedule;  (C) ONTEST – On-Line blocked from SCED for operations testing (while ONTEST, an ESR may be shown on Outage in the Outage Scheduler);  (D) ONEMR – On-Line EMR (available for commitment or dispatch only for ERCOT-declared Emergency Conditions; the QSE may appropriately set LSL and High Sustained Limit (HSL) to reflect operating limits);  (E) ONHOLD – Resource is On-Line but temporarily unavailable for Dispatch by SCED or Ancillary Service awards. ESRs shall not be discharging into or charging from the grid. This Resource Status is only to be used for Real-Time telemetry purposes; and  (F) OUT – Off-Line and unavailable, or not connected to the ERCOT System and operating in a Private Microgrid Island (PMI); |

(c) The HSL;

(i) For Load Resources other than CLRs, the HSL should equal the expected power consumption;

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| ***[NPRR1014 and NPRR1029: Insert applicable portions of paragraph (ii) below upon system implementation:]***  (ii) For ESRs, the HSL may be negative; |

(d) The LSL;

(i) For Load Resources other than CLRs, the LSL should equal the expected Low Power Consumption (LPC);

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| ***[NPRR1014 and NPRR1029: Insert applicable portions of paragraph (ii) below upon system implementation:]***  (ii) For ESRs, the LSL may be positive; |

(e) The High Emergency Limit (HEL);

(f) The Low Emergency Limit (LEL); and

(g) Ancillary Service Resource Responsibility capacity in MW for:

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| ***[NPRR1007, NPRR1014, and NPRR1029: Replace applicable portions of item (g) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029:]***  (g) Ancillary Service capability in MW for each product and sub-type. |

(i) Regulation Up Service (Reg-Up);

(ii) Regulation Down Service (Reg-Down);

(iii) RRS;

(iv) ECRS; and

(v) Non-Spin.

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| ***[NPRR1007, NPRR1014, and NPRR1029: Delete items (i)-(v) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029.]*** |

(h) For ESRs:

(i) Minimum State of Charge (MinSOC);

(ii) Maximum State of Charge (MaxSOC); and

(iii) HBSOC.

(6) For Combined Cycle Generation Resources, the above items are required for each operating configuration. In each hour only one Combined Cycle Generation Resource in a Combined Cycle Train may be assigned one of the On-Line Resource Status codes described above.

(a) During a RUC study period, if a QSE’s COP reports multiple Combined Cycle Generation Resources in a Combined Cycle Train to be On-Line for any hour, then until the QSE corrects its COP, the On-Line Combined Cycle Generation Resource with the largest HSL is considered to be On-Line and all other Combined Cycle Generation Resources in the Combined Cycle Train are considered to be Off-Line. Furthermore, until the QSE corrects its COP, the Off-Line Combined Cycle Generation Resources as designated through the application of this process are ineligible for RUC commitment or de-commitment Dispatch Instructions.

(b) For any hour in which QSE-submitted COP entries are used to determine the initial state of a Combined Cycle Generation Resource for a DAM or Day-Ahead Reliability Unit Commitment (DRUC) study and the COP shows multiple Combined Cycle Generation Resources in a Combined Cycle Train to be in an On-Line Resource Status, then until the QSE corrects its COP, the On-Line Combined Cycle Generation Resource that has been On-Line for the longest time from the last recorded start by ERCOT systems, regardless of the reason for the start, combined with the COP Resource Status for the remaining hours of the current Operating Day, is considered to be On-Line at the start of the DRUC study period and all other COP-designated Combined Cycle Generation Resources in the Combined Cycle Train are considered to be Off-Line.

(c) ERCOT systems shall allow only one Combined Cycle Generation Resource in a Combined Cycle Train to offer Off-Line Non-Spin in the DAM or Supplemental Ancillary Services Market (SASM).

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| ***[NPRR1007, NPRR1014, and NPRR1029: Replace paragraph (c) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029:]***  (c) ERCOT systems shall allow only one Combined Cycle Generation Resource in a Combined Cycle Train to offer Off-Line Non-Spin in the DAM or SCED. |

(i) If there are multiple Non-Spin offers from different Combined Cycle Generation Resources in a Combined Cycle Train, then prior to execution of the DAM, ERCOT shall select the Non-Spin offer from the Combined Cycle Generation Resource with the highest HSL for consideration in the DAM and ignore the other offers.

(ii) Combined Cycle Generation Resources offering Off-Line Non-Spin must be able to transition from the shutdown state to the offered Combined Cycle Generation Resource On-Line state and be capable of ramping to the full amount of the Non-Spin offered.

(d) The DAM and RUC shall honor the registered hot, intermediate or cold Startup Costs for each Combined Cycle Generation Resource registered in a Combined Cycle Train when determining the transition costs for a Combined Cycle Generation Resource. In the DAM and RUC, the Startup Cost for a Combined Cycle Generation Resource shall be determined by the positive transition cost from the On-Line Combined Cycle Generation Resource within the Combine Cycle Train or from a shutdown condition, whichever ERCOT determines to be appropriate.

(7) ERCOT may accept COPs only from QSEs.

(8) For the first 168 hours of the COP, ERCOT will update the HSL values for Wind-powered Generation Resources (WGRs) with the most recently updated Short-Term Wind Power Forecast (STWPF), and the HSL values for PhotoVoltaic Generation Resources (PVGRs) with the most recently updated Short-Term PhotoVoltaic Power Forecast (STPPF). ERCOT will notify the QSE via an Extensible Markup Language (XML) message each time COP HSL values are updated with the forecast values. A QSE representing a WGR may override the STWPF HSL value but must submit an HSL value that is less than or equal to the amount for that Resource from the most recent STWPF provided by ERCOT; a QSE representing a PVGR may override the STPPF HSL value but must submit an HSL value that is less than or equal to the amount for that Resource from the most recent STPPF provided by ERCOT.

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| ***[NPRR1029: Replace paragraph (8) above with the following upon system implementation:]***  (8) For the first 168 hours of the COP, ERCOT will update the HSL values for Wind-powered Generation Resources (WGRs) with the most recently updated Short-Term Wind Power Forecast (STWPF), and the HSL values for PhotoVoltaic Generation Resources (PVGRs) with the most recently updated Short-Term PhotoVoltaic Power Forecast (STPPF). A QSE representing a DC-Coupled Resource shall provide the capacity value of the Energy Storage System (ESS) that is included in the HSL of the DC-Coupled Resource, and ERCOT will update the DC-Coupled Resource’s HSL with the sum of the forecasts of the intermittent renewable generation component and the QSE-submitted value for the ESS component. ERCOT will notify the QSE via an Extensible Markup Language (XML) message each time COP HSL values are updated with the forecast values. A QSE representing a WGR may override the STWPF HSL value but must submit an HSL value that is less than or equal to the amount for that Resource from the most recent STWPF provided by ERCOT; a QSE representing a PVGR may override the STPPF HSL value but must submit an HSL value that is less than or equal to the amount for that Resource from the most recent STPPF provided by ERCOT. A QSE representing a DC-Coupled Resource may override the COP HSL value with a value that is lower than the ERCOT-populated value, and may override with a value that is higher than the ERCOT-populated value if the ESS component of the DC-Coupled Resource can support the higher value. |

(9) A QSE representing a Generation Resource that is not actively providing Ancillary Services or is providing Off-Line Non-Spin that the Resource will provide following the shutdown, may only use a Resource Status of SHUTDOWN to indicate to ERCOT through telemetry that the Resource is operating in a shutdown sequence or a Resource Status of ONTEST to indicate in the COP and through telemetry that the Generation Resource is performing a test of its operations either manually dispatched by the QSE or by ERCOT as part of the test. A QSE representing a Generation Resource that is not actively providing Ancillary Services may only use a Resource Status of STARTUP to indicate to ERCOT through telemetry that the Resource is operating in a start-up sequence requiring manual control and is not available for Dispatch.

(10) If a QSE has not submitted a valid COP for any Generation Resource for any hour in the DAM or RUC Study Period, then the Generation Resource is considered to have a Resource Status as OUT thus not available for DAM awards or RUC commitments for those hours.

(11) If a COP is not available for any Resource for any hour from the current hour to the start of the DAM period or RUC study, then the Resource Status for those hours are considered equal to the last known Resource Status from a previous hour’s COP or from telemetry as appropriate for that Resource.

(12) A QSE representing a Resource may only use the Resource Status code of EMR for a Resource whose operation would have impacts that cannot be monetized and reflected through the Resource’s Energy Offer Curve or recovered through the RUC make-whole process or if the Resource has been contracted by ERCOT under Section 3.14.1 or under paragraph (4) of Section 6.5.1.1. If ERCOT chooses to commit an Off-Line unit with EMR Resource Status that has been contracted by ERCOT under Section 3.14.1 or under paragraph (4) of Section 6.5.1.1, the QSE shall change its Resource Status to ONRUC. Otherwise, the QSE shall change its Resource Status to ONEMR.

(13) A QSE representing a Resource may use the Resource Status code of ONEMR for a Resource that is:

(a) On-Line, but for equipment problems it must be held at its current output level until repair and/or replacement of equipment can be accomplished; or

(b) A hydro unit.

(14) A QSE operating a Resource with a Resource Status code of ONEMR may set the HSL and LSL of the unit to be equal to ensure that SCED does not send Base Points that would move the unit.

(15) A QSE representing a Resource may use the Resource Status code of EMRSWGR only for an SWGR.

(16) A QSE representing a Self-Limiting Facility must ensure that the sum of the COP HSL/LSL and the sum of the telemetered HSL/LSL submitted for each Resource within the Self-Limiting Facility do not exceed either the limit on MW Injection or the limit on the MW Withdrawal established for the Self-Limiting Facility.

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| ***[NPRR1029: Insert paragraph (17) below upon system implementation and renumber accordingly:]***  (17) A QSE representing a DC-Coupled Resource shall not submit an HSL that exceeds the inverter rating or the sum of the nameplate ratings of the generation component(s) of the Resource. |

(17) A QSE representing an ESR shall ensure that COP values for a given hour follow the following rules:

(a) MinSOC is greater than or equal to the nameplate minimum MWh operating SOC limit;

(b) MaxSOC is less than or equal to the nameplate maximum MWh operating SOC limit; and

(c) HBSOC is a value between the corresponding COP values of MinSOC and MaxSOC.

***3.17.5*** ***Dispatchable Reliability Reserve Service***

(1) Dispatchable Reliability Reserve Service (DRRS) is a market mechanism designed to manage uncertainty on the ERCOT System while mitigating the need for Reliability Unit Commitment (RUC) instructions. It may also be used to support Resource adequacy through the DRRS Release Factor (DRRSRF) which allows DRRS-awarded capacity to overlap with energy and other Ancillary Service awards. DRRS is provided using capacity from:

(a) Off-Line Generation Resources that can demonstrate a two-hour ramping capability to a specified output level and operate at a specified output level for at least four consecutive hours;

(b) On-Line Generation Resources that can demonstrate a two-hour ramping capability to a specified output level and operate at a specified output level for at least four consecutive hours; and

(c) The injection capability (i.e., 0 MW to High Sustained Limit (HSL)) of an Energy Storage Resource (ESR) that can demonstrate a two-hour ramping capability to a specified output level and operate at a specified output level for at least four consecutive hours.

(3) DRRS-awarded capacity can overlap with energy and other Ancillary Service awards when the DRRSRF parameter is set to a value greater than 0.

(a) The default parameter value for the DRRSRF is 0 unless and until the Public Utility Commission of Texas (PUCT) approves an adjustment to the DRRSRF.

(b) Following such PUCT approval, ERCOT shall provide a Market Notice prior to implementation of the updated parameter values for the DRRSRF.

**3.18 Resource Limits in Providing Ancillary Service**

(1) For both Generation Resources and Load Resources the High Sustained Limit (HSL) must be greater than or equal to the Low Sustained Limit (LSL) and the sum of the Resource-specific designation of capacity to provide Responsive Reserve (RRS), ERCOT Contingency Reserve Service (ECRS), Regulation Up Service (Reg-Up), Regulation Down Service (Reg-Down), and Non-Spinning Reserve (Non-Spin).

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| ***[NPRR1007 and NPRR1246: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (1) For Generation Resources, Energy Storage Resources (ESRs), and Load Resources the High Sustained Limit (HSL) must be greater than or equal to the Low Sustained Limit (LSL) and the sum of the Resource-specific awards for Responsive Reserve (RRS), ERCOT Contingency Reserve Service (ECRS), Regulation Up Service (Reg-Up), Regulation Down Service (Reg-Down), and Non-Spinning Reserve (Non-Spin). |

(2) For Non-Spin, the amount of Non-Spin provided must be less than or equal to the HSL for Off-Line Generation Resources.

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| ***[NPRR1007: Replace paragraph (2) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (2) For Non-Spin, the amount of Non-Spin awarded must be less than or equal to the HSL for Off-Line Generation Resources. |

(3) For any DRRS-eligible On-Line Generation Resource or Energy Storage Resource (ESR), the Resource’s HSL must be greater than or equal to the sum of the Resource-specific awards to that Resource for RRS, ECRS, Reg-Up, Reg-Down, Non-Spin, and (1 - DRRSRF)\*DRRS.

(4) For any Off-Line Generation Resource, the sum of awards to that Resource for ECRS, Non-Spin, and (1 - DRRSRF) \* DRRS must be less than or equal to the Resource’s HSL.

(5) For any DRRS-eligible ESR, the ESR must have sufficient State of Charge (SOC) to sustain its DRRS award for four consecutive hours. In addition, the SOC reserved for (1 - DRRSRF) \* DRRS portion of the DRRS award cannot be used for energy or any other type of Ancillary Service.

(6) For RRS:

(a) The full amount of RRS using Primary Frequency Response awarded to or self-arranged from an On-Line Resource is dependent upon the verified droop characteristics of the Resource. ERCOT shall calculate and update, using the methodology described in Nodal Operating Guide Section 8, Attachment N, Procedure for Calculating RRS MW Limits for Individual Resources to Provide RRS Using Primary Frequency Response, a maximum MW amount of RRS using Primary Frequency Response for each Resource subject to verified droop performance. The default value for any newly qualified Resource not yet evaluated per Nodal Operating Guide Section 8, Attachment N shall be 20% of its HSL. A Private Use Network with a registered Resource may use the gross HSL for qualification and establishing a limit on the amount of RRS capacity that the Resource within the Private Use Network can provide;

(b) Generation Resources operating in the synchronous condenser fast-response mode may provide RRS up to the Generation Resource’s proven 20-second response capability (which may be 100% of the HSL). The initiation setting of the automatic under-frequency relay setting shall not be lower than 59.80 Hz. Once deployed, a Resource telemetering a Resource Status of ONRR shall telemeter an RRS Ancillary Service Schedule of zero, and when recalled by ERCOT after frequency recovers above 59.98 Hz, such Resource shall telemeter an RRS Ancillary Service Schedule that shall be a non-zero value equal to its RRS Ancillary Service Responsibility;

(c) The initiation setting of the automatic under-frequency relay setting for Load Resources providing RRS shall not be lower than 59.70 Hz; and

(d) The amount of RRS provided from a Resource capable of providing Fast Frequency Response (FFR) must be less than or equal to its 15-minute rated capacity. The initiation setting of the automatic self-deployment of the Resource providing RRS as FFR must be no lower than 59.85 Hz. A Resource providing RRS as FFR that is deployed shall not recall its capacity until system frequency is greater than 59.98 Hz. Once deployed, a Resource telemetering a Resource Status of ONFFRRRS or ONFFRRRSL shall telemeter an RRS Ancillary Service Schedule of zero, and when recalled, such Resource shall telemeter an RRS Ancillary Service Schedule that shall be a non-zero value equal to its RRS Ancillary Service Responsibility. Once recalled, a Resource providing RRS as FFR must restore its full RRS Ancillary Service Resource Responsibility within 15 minutes after cessation of deployment or as otherwise directed by ERCOT.

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| ***[NPRR1007 and NPRR1246: Replace paragraph (7) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (7) For RRS:  (a) The full amount of RRS using Primary Frequency Response that can be provided by an On-Line Resource is dependent upon the verified droop characteristics of the Resource. ERCOT shall calculate and update, using the methodology described in Nodal Operating Guide Section 8, Attachment N, Procedure for Calculating RRS MW Limits for Individual Resources to Provide RRS Using Primary Frequency Response, a maximum MW amount of RRS using Primary Frequency Response for each Resource subject to verified droop performance. The default value for any newly qualified Resource not yet evaluated per Nodal Operating Guide Section 8, Attachment N shall be 20% of its HSL. A Private Use Network with a registered Resource may use the gross HSL for qualification and establishing a limit on the amount of RRS capacity that the Resource within the Private Use Network can provide;  (b) Generation Resources operating in the synchronous condenser fast-response mode may be awarded RRS up to the Generation Resource’s proven 20-second response capability (which may be 100% of the HSL). The initiation setting of the automatic under-frequency relay setting shall not be lower than 59.80 Hz;  (c) The initiation setting of the automatic under-frequency relay setting for Load Resources providing RRS shall not be lower than 59.70 Hz; and  (d) The amount of RRS awarded to a Resource capable of providing Fast Frequency Response (FFR) must be less than or equal to its 15-minute rated capacity. The initiation setting of the automatic self-deployment of the Resource providing RRS as FFR must be no lower than 59.85 Hz. |

(8) For ECRS:

(a) The full amount of ECRS provided from an On-Line Generation Resource must be less than or equal to ten times the Emergency Ramp Rate;

(b) The full amount of ECRS provided by a Quick Start Generation Resource (QSGR) must be less than or equal to its proven ten-minute capability as demonstrated pursuant to paragraph (16) of Section 8.1.1.2, General Capacity Testing Requirements;

(c) Generation Resources operating in the synchronous condenser fast-response mode may provide ECRS up to the Generation Resource’s proven 20-second response capability (which may be 100% of the HSL). The initiation setting of the automatic under-frequency relay setting shall not be lower than 59.80 Hz; and

(d) For any Load Resources controlled by under-frequency relay and providing ECRS, the initiation setting of the automatic under-frequency relay setting shall not be lower than 59.70 Hz. To provide ECRS, Load Resources are not required to be controlled by under-frequency relays.

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| ***[NPRR1007 and NPRR1246: Replace applicable portions of paragraph (8) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (8) For ECRS:  (a) The full amount of ECRS that can be awarded to an On-Line Generation Resource or ESR must be less than or equal to ten times the Emergency Ramp Rate;  (b) The full amount of ECRS that can be awarded to a Quick Start Generation Resource (QSGR) must be less than or equal to its proven ten-minute capability as demonstrated pursuant to paragraph (16) of Section 8.1.1.2, General Capacity Testing Requirements;  (c) Generation Resources operating in the synchronous condenser fast-response mode may be awarded ECRS up to the Generation Resource’s proven 20-second response capability (which may be 100% of the HSL). The initiation setting of the automatic under-frequency relay setting shall not be lower than 59.80 Hz; and  (d) For any Load Resources controlled by under-frequency relay and awarded ECRS, the initiation setting of the automatic under-frequency relay setting shall not be lower than 59.70 Hz. To provide ECRS, Load Resources are not required to be controlled by under-frequency relays. |

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 ERCOT Contingency Reserve Service (ECRS), 100 MW of Responsive Reserve (RRS), 25 MW of Regulation Up Service (Reg-Up), 25 MW of Regulation Down Service (Reg-Down), and 50 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 Services Market (SASM), as applicable, for $0/MWh.

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| ***[NPRR1091: Replace paragraph (1) above with the following upon system implementation:]***  (1) For each Ancillary Service, a QSE may self-arrange all or a portion of the 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 150 MW of Responsive Reserve (RRS), 25 MW of Regulation Up Service (Reg-Up), 25 MW of Regulation Down Service (Reg-Down), and 300 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 Services Market (SASM), as applicable, for $0/MWh. |

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

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| ***[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.

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| ***[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.

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| ***[NPRR1008: Replace paragraph (4) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (4) Before 1430 in the Day-Ahead, all Self-Arranged Ancillary Service Quantities must be represented by physical capacity, either by Generation Resources, ESRs, or Load Resources, or backed by Ancillary Service Trades. |

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

(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 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.

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| ***[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, 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.

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| ***[NPRR1213: Replace paragraph (10) above with the following upon system implementation, and upon system implementation of NPRR1171:]***  (10) For self-arranged ECRS and Non-Spin, the QSE shall indicate the quantity of the service that is provided from Resources that are manually dispatched, Distribution Generation Resources (DGRs) and Distribution Energy Storage Resources (DESRs) on circuits subject to Load shed, and Resources that are SCED-dispatchable not on circuits subject to Load shed.  (11) For self-arranged Non-Spin, the QSE shall indicate the quantity of the service that is provided from Resources that are manually dispatched, DGRs and DESRs on circuits subject to Load shed, and Resources that are SCED-dispatchable and not on circuits subject to Load shed. |

**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.

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| ***[NPRR1008, NPRR1014, and NPRR1188: 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 or NPRR1188:]***  (1) By 1000 in the Day-Ahead, a QSE may submit Resource-Specific Ancillary Service Offers from Generation Resources, Controllable Load Resources (CLRs), and ESRs to ERCOT for the DAM and may offer the same Generation Resource, CLR, or ESR capacity for any or all of the Ancillary Service products simultaneously with any Energy Offer Curves from that Generation Resource, Energy Bid Curves from that CLR, 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 CLR may be inclusive or exclusive of each other but considered inclusive of any Energy Bid Curve, 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, 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.

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| ***[NPRR1008 and NPRR1014: Replace applicable portions of paragraph (2) above with the following upon system implementation for 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. |

(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. A QSE may also submit Ancillary Service Offers in a SASM. 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.

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| ***[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:]***  (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. |

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| ***[NPRR1008, NPRR1014, and NPRR1245: Insert applicable portions of paragraph (4) below upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008 and NPRR1245; or upon system implementation for NPRR1014; and renumber accordingly:]***  (4) 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 or Non-Spin will be treated as if it was an offer for ECRS or Non-Spin from an On-Line Generation Resource. |

(4) 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.

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| ***[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) Ancillary Service Offers remain active for the offered period unless the offer is:  (a) Effective after DAM and is higher than the Real-Time System-Wide Offer Cap (RTSWCAP);  (b) Automatically inactivated by the software at the offer expiration time specified by the QSE when the offer is submitted; or  (c) Withdrawn by the QSE, but a withdrawal is not effective if the deadline for submitting offers has already passed. |

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

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| ***[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:]***  (5) 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. |

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

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| ***[NPRR1014: Replace paragraph (6) above with the following upon system implementation:]***  (6) A Load Resource that is not a Controllable Load Resource may specify whether its Resource-Specific Ancillary Service Offer for ECRS may only be procured by ERCOT as a block. |

(7) 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 Off-Line Ancillary Service Offer 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 Off-Line Ancillary Service Offer 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.

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| ***[NPRR1008 and NPRR1014: Replace applicable portions of paragraph (7) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014:]***  (7) 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 an Off-Line Resource-Specific Ancillary Service Offer 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 Off-Line Resource-Specific Ancillary Service Offer 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.  (8) 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. |

**4.4.7.3 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.

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| ***[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.

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| ***[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.

(4) A QSE with an Ancillary Service Supply Responsibility for ECRS, originally designated to be provided by a Generation Resource, may transfer its responsibility via Ancillary Service Trade(s) to another QSE only if that QSE designates the ECRS will be provided by a Generation Resource.

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| ***[NPRR1008 and NPRR1246: Replace paragraph (4) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (4) A QSE with an Ancillary Service Position for ECRS, originally designated to be provided by a SCED-dispatchable 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 SCED-dispatchable Resource. |

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| ***[NPRR1213: Delete paragraph (4) above upon system implementation, and upon system implementation of NPRR1171, and renumber accordingly.]*** |

(5) A QSE with an Ancillary Service Supply Responsibility for ECRS, originally designated to be provided by a Load Resource providing ECRS triggered with or without under-frequency relays set at 59.70 Hz, may transfer its responsibility via Ancillary Service Trade(s) to another QSE only if that QSE designates the ECRS will be provided by either:

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| ***[NPRR1008: Replace paragraph (5) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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

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| ***[NPRR1246: Insert item (b) below upon system implementation of the Real-Time Co-Optimization (RTC) project and renumber accordingly:]***  (b) An ESR; or |

(b) A Load Resource providing ECRS triggered with or without under-frequency relays set at 59.70 Hz.

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| ***[NPRR1213: Delete paragraph (5) above upon system implementation, and upon system implementation of NPRR1171, and renumber accordingly.]*** |

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

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|  | **Allowable ECRS Ancillary Service Trades** | |
| **Original Responsibility** | **SCED-dispatchable ECRS** | **Manually dispatched ECRS** |
| SCED-dispatchable ECRS | Yes | No |
| Manually dispatched ECRS | Yes | Yes |

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| ***[NPRR1213: Replace paragraph (6) above with the following upon system implementation, and upon system implementation of NPRR1171:]***  (4) 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 not from DGRs and DESRs on a Load shed circuit** | **SCED-dispatchable ECRS from DGRs and DESRs on a Load shed circuit** | **Manually dispatched ECRS** | | SCED-dispatchable ECRS not from DGRs and DESRson a Load shed circuit | Yes | No | No | | SCED-dispatchable ECRS from DGRs and DESRson a Load shed circuit | Yes | Yes | No | | Manually dispatched ECRS | Yes | No | Yes | |

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

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|  | **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 |

(8) The table below shows the Non-Spin trades that are allowed for each type of original responsibility:

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|  | **Allowable Non-Spin Ancillary Service Trades** | |
| **Original Responsibility** | **Generation Resource or Controllable Load Resource** | **Load Resource other than a Controllable Load Resource** |
| Generation Resource or Controllable Load Resource | Yes | No |
| Load Resource other than a Controllable Load Resource | Yes | Yes |

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| ***[NPRR1213: Replace paragraph (8) above with the following upon system implementation, and upon system implementation of NPRR1171:]***  (6) The table below shows the Non-Spin trades that are allowed for each type of original responsibility:   |  |  |  |  | | --- | --- | --- | --- | |  |  |  |  | |  | **Allowable Non-Spin Ancillary Service Trades** | | | | **Original Responsibility** | **Generation Resource not DGRs and DESRs on a Load shed circuit or Controllable Load Resource** | **DGRs and DESRs on a Load shed circuit** | **Load Resource other than a Controllable Load Resource** | | Generation Resource not on circuits subject to Load shed or Controllable Load Resource | Yes | No | No | | DGRs and DESRs on a Load shed circuit | Yes | Yes | No | | Load Resource other than a Controllable Load Resource | Yes | No | Yes | |

(9) A QSE with an Ancillary Service Supply Responsibility for Regulation Service may transfer that portion of its Ancillary Service Supply Responsibility via Ancillary Service Trade(s) to another QSE only if that QSE provides the transferred portion with Regulation Service that is not Fast Responding Regulation Service (FRRS). The table below shows the Regulation Service trades that are allowed for each type of original responsibility. The same limitations apply separately to both Reg-Up and Reg-Down:

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|  | **Allowable Regulation Ancillary Service Trades** | |
| **Original Responsibility** | **Regulation Service that is not FRRS** | **FRRS** |
| Regulation Service that is not FRRS | Yes | No |
| FRRS | Yes | No |

(10) A QSE can buy or sell a DRRS position via Ancillary Service Trade(s) from or to another QSE.

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| ***[NPRR1008, NPRR1216, NPRR1245, NPRR1268, and NPRR1269: Insert applicable portions of Section 4.4.12 below upon system implementation of NPRR1216; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008, NPRR1245, NPRR1268, and NPRR1269:]***  ***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), Non-Spinning Reserve (Non-Spin), and Dispatchable Reliability Reserve Service (DRRS) 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 Value of Lost Load (VOLL) is determined as described in Section 4.4.11, Day-Ahead and Real-Time System-Wide Offer Caps, and Section 4.4.11.1, Scarcity Pricing Mechanism.  (3) The DAM shall use the same ASDCs as the RTM, as an initial condition. Specific to the DAM, the ASDCs will be adjusted, as needed, to account for negative Self-Arranged Ancillary Service Quantities.  (4) For Reg-Down, the ASDC shall be a constant value equal to VOLL for the full range of the Ancillary Service Plan for Reg-Down.  (5) 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.  (6) ERCOT shall develop the AORDC from historical data from the period of June 1, 2014 through August 31, 2025 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 historical reserve pricing outcomes, which are used in the regression analysis described in paragraph (b) below:  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 August 31, 2025 | | 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 August 31, 2025 | | *μ* | None | The mean value of the shifted LOLP distribution as published for Summer 2026 | | *σ* | None | The standard deviation of the shifted LOLP distribution as published for Summer 2026 |   (b) Using the results of paragraph (a) above, use regression methods to fit the following curve to the average reserve pricing outcomes for the various MW reserve levels:  **AORDC =** **(𝟏 −(reserve level − 3000,** *\****,** *\****)) ∗ 𝑽𝑶𝑳𝑳**  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | *μ\** | None | The mean value used for the calculation of the AORDC as determined using the regression fit method described above. | | *σ\** | None | The standard deviation used for the calculation of the AORDC as determined using the regression fit method described above. |   (c) Calculate points on the regression curve in 1 MW increments for any observed reserve level >= 3,000 MW and price >$0.01/MWh. These points form the AORDC.  (7) ERCOT shall disaggregate the AORDC developed pursuant to paragraph (6) above into individual ASDCs for each Ancillary Service product as follows:  (a) Using the required percentage of Reg-Up, the maximum percentages of RRS and ECRS, and the minimum quantities of required Non-Spin and ECRS, the quantities of each Ancillary Service product procured until the Minimum Contingency Level (MCL) is satisfied are calculated as follows:  If, RUPCT \* RUREQ + RRSPCTMAX \* RRSREQ + ECRSPCTMAX \* ECRSREQ + NSMWMIN < MCL:  RUMW = RUPCT \* RUREQ  ECRSMW = ECRSPCTMAX \* ECRSREQ  RRSMW = RRSPCTMAX \* RRSREQ  NSMW = MCL – RUMW – RRSMW – ECRSMW  Else, if RUPCT \* RUREQ + RRSPCTMAX \* RRSREQ + ECRSMWMIN + NSMWMIN > MCL:  RUMW = RUPCT \* RUREQ  ECRSMW = ECRSMWMIN  RRSMW = RRSPCTMAX \* RRSREQ – (RRSPCTMAX \* RRSREQ + RUPCT \* RUREQ – (MCL – ECRSMWMIN – NSMWMIN)  NSMW = NSMWMIN  Otherwise, if RUPCT \* RUREQ + RRSPCTMAX \* RRSREQ + ECRSPCTMAX \* ECRSREQ + NSMWMIN > MCL:  RUMW = RUPCT \* RUREQ  RRSMW = RRSPCTMAX \* RRSREQ – 0.5(RUPCT\*RUREQ + RRSPCTMAX \* RRSREQ + ECRSPCTMAX \* ECRSREQ – (MCL – NSMWMIN))  ECRSMW = ECRSPCTMAX \* ECRSREQ – 0.5(RUPCT\*RUREQ + RRSPCTMAX \* RRSREQ + ECRSPCTMAX \* ECRSREQ – (MCL – NSMWMIN))  NSMW = NSMWMIN  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | MCL | MW | *Minimum Contingency Level* – the minimum amount of reserves that ERCOT considers necessary to avoid a system-wide failure. This value is set at 3,000 MW. | | RUREQ | MW | Total capacity of Reg-Up in the Ancillary Service Plan | | RRSREQ | MW | Total capacity of RRS in the Ancillary Service Plan | | ECRSREQ | MW | Total capacity of ECRS in the Ancillary Service Plan | | RUPCT | % | Fixed percentage of Reg-Up included in the MCL | | RRSPCTMAX | % | Maximum RRS percentage included in the MCL | | ECRSPCTMAX | % | Maximum ECRS percentage included in the MCL | | ECRSMWMIN | MW | Minimum ECRS capacity included in the MCL | | NSMWMIN | MW | Minimum Non-Spin capacity included in the MCL | | RUMW | MW | Capacity of Reg-Up included in the MCL | | RRSMW | MW | Capacity of RRS included in the MCL | | ECRSMW | MW | Capacity of ECRS included in the MCL | | NSMW | MW | Capacity of Non-Spin included in the MCL |   Fixed parameters are defined as follows:   | **Parameter** | **Unit** | **Current Value** | | --- | --- | --- | | RUPCT | % | 90 | | RRSPCTMAX | % | 90 | | ECRSPCTMAX | % | 30 | | ECRSMWMIN | MW | 40 | | NSMWMIN | MW | 10 |   Further, the quantities of each Ancillary Service product procured until the MCL is satisfied are priced as follows:   | **Parameter** | **Unit** | **Current Value** | | --- | --- | --- | | Reg-Up Max Demand Price | $/MWh | VOLL + 4,052 | | RRS Max Demand Price | $/MWh | VOLL + 2,051 | | ECRS Max Demand Price | $/MWh | VOLL + 50 | | Non-Spin Max Demand Price | $/MWh | VOLL |   (b) Beyond the MCL, the nonlinear segments of the AORDC are disaggregated as follows:  (i) First, extract evenly spaced 1 MW AORDC segments extending from the MCL to the minimum Reg-Up price. These segments form the nonlinear portion of the Reg-Up ASDC;  (ii) Second, extract evenly spaced 1 MW AORDC segments extending from MCL to the minimum RRS price. These segments form the nonlinear portion of the RRS ASDC;  (iii) Third, assign the remaining 1 MW segments of the AORDC to ECRS and Non-Spin alternately, until the requirements for both products have been met; and  (iv) Assign any remaining 1 MW segments of the AORDC priced above $0.01/MWh to Non-Spin.  The minimum prices for Reg-Up and RRS are defined as follows:   | **Parameter** | **Unit** | **Current Value** | | --- | --- | --- | | Reg-Up Min Price | $/MWh | 250 | | RRS Min Price | $/MWh | 100 |   (8) Each ASDC, with the exception of DRRS, will be represented by a linear approximation to the corresponding part of the AORDC.  (9) All ASDCs, with the exception of DRRS, will have a floor price, based on ERCOT’s assessment of the need for a floor price on the ASDC for RUC, such that no values on the curve for any Ancillary Service fall below $15 per MW per hour for the portion of the ASDC that corresponds to the Ancillary Service Plan.   |  |  | | --- | --- | | (10) The points on the ASDC for DRRS are described in the table with a linear line connecting each point along the curve: MW | Price (per MW per hour) | | 0 | $150 | | Ancillary Service Plan for DRRS multiplied by (1 minus the DRRS Release Factor) | $10 | | Ancillary Service Plan for DRRS | $10 | | Ancillary Service Plan for DRRS | $0 | |

***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 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.

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| ***[NPRR1008, NPRR1014, and NPRR1188: 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 NPRR1188:]***  (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, Energy Bid Curves, 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 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 that is not a Controllable Load Resource (CLR) – 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.

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| ***[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.

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| ***[NPRR1268: Replace paragraph (9) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (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. However, if an Ancillary Service price determined by the DAM algorithm exceeds the effective VOLL at the time of the DAM execution for any hour, that Day-Ahead MCPC will be capped at the effective VOLL. |

(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 Section 22, Attachment P, Methodology for Setting Maximum Shadow Prices for Network and Power Balance Constraints, will not be awarded.

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| ***[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.

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| ***[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.

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| ***[NPRR1014 and NPRR1188: 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.

**4.6.2.3 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;

(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), or was due to a deployment for DRRS, for the previous Operating Day does not qualify in meeting the criteria in items (a) and (b) above; and

(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.

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| ***[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.

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| ***[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) \* 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*) + ((-1) \* MCPCDRR *DAM, h* \* PCDRRR *r, q, DAM, h*)

The above variables are defined as follows:

| Variable | Unit | Definition |
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| DAMWAMT *q, p, r, h* | $ | *Day-Ahead Make-Whole Payment per QSE per Settlement Point per Resource per hour*¾The 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*¾The 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*¾The 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*¾The 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*¾The 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*¾The 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*. |
| 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*. | |
| PCDRRR *r, q, DAM, h* | MW | *Procured Capacity for Dispatchable Reliability Reserve Service from Resource per Resource per QSE per hour in DAM*—The Dispatchable Reliability ReserveService (DRRS) 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. |
| MCPCDRR *DAM, h* | $/MW per hour | *Market Clearing Price for Capacity for Dispatchable Reliability Reserve Service per hour in DAM*—The DAM MCPC for DRRS 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*¾The 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*¾The 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.   |  | | --- | | ***[NPRR1216: Replace the definition above with the following upon system implementation:]***  *Day-Ahead Average Incremental Energy Cost per QSE per Settlement Point per Resource per hour*¾The average incremental energy cost, calculated according to the Energy Offer Curve capped by the generic energy price and the SWCAP used in the DAM Clearing, 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. |  |  | | --- | | ***[NPRR1216: Replace the definition above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  *Day-Ahead Average Incremental Energy Cost per QSE per Settlement Point per Resource per hour*¾The average incremental energy cost, calculated according to the Energy Offer Curve capped by the generic energy price and the DASWCAP, 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*¾The 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*¾The payment to QSE *q* to make-whole the Startup Cost and energy cost of Resource *r* committed in the DAM at Resource Node *p* for the hour. When a Combined Cycle Generation Resource is committed in the DAM, payment is made to the Combined Cycle Train for the DAM-committed Combined Cycle Generation Resource. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *r* | none | A DAM-committed Generation Resource. |

4.6.4.1.6 Dispatchable Reliability Reserve Service Payment

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

PCDRRAMT *q* = (-1) \* MCPCDRR *DAM* \* PCDRR *q*

Where:

PCDRR *q* = ActiveX controlPCDRRR *r, q, DAM*

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

DAPCDRROAMT *q* = (-1) \* MCPCDRR *DAM* \* DADRROAWD *q*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Definition** |
| PCDRRAMT *q* | $ | *Procured Capacity for Dispatchable Reliability Reserve Service Amount per QSE in DAM*—The DAM DRRS payment for QSE *q* for the hour. |
| DAPCDRROAMT *q* | $ | *Day-Ahead Procured Capacity for Dispatchable Reliability Reserve Service-Only Amount per QSE—* The payment to QSE *q* for all DRRS-only awards in DAM for the hour. |
| PCDRR *q* | MW | *Procured Capacity for Dispatchable Reliability Reserve Service per QSE in DAM*—The total DRRS capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by this QSE for the hour. |
| PCDRRR *r, q, DAM* | MW | *Procured Capacity for Dispatchable Reliability Reserve Service from Resource per Resource per QSE in DAM*—The DRRS 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. |
| MCPCDRR *DAM* | $/MW per hour | *Market Clearing Price for Capacity for Dispatchable Reliability Reserve Service in DAM*—The DAM MCPC for DRRS for the hour. |
| DADRROAWD *q* | MW | *Day-Ahead Dispatchable Reliability Reserve Service-Only Award per QSE —*The DRRS-only capacity quantity awarded in DAM to QSE *q* for the hour. |
| *r* | none | A Resource. |
| *q* | none | A QSE. |

4.6.4.2.6 Dispatchable Reliability Reserve Service Charge

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

DADRRAMT *q* = DADRRPR \* DADRRQ *q*

Where:

DADRRPR = (-1) \* DAPCDRRAMTTOT / DADRRQTOT

DAPCDRRAMTTOT = (PCDRRAMT *q* + DAPCDRROAMT *q*)

DADRRQTOT = DADRRQ *q*

DADRRQ *q* = DADRRO *q* – DASADRRQ *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| DADRRAMT *q* | $ | *Day-Ahead Dispatchable Reliability Reserve Service Amount per QSE*—QSE *q*’s share of the DAM cost for DRRS, for the hour. |
| DADRRPR | $/MW per hour | *Day-Ahead Dispatchable Reliability Reserve Service Price*—The Day-Ahead DRRS price for the hour. |
| DADRRQ *q* | MW | *Day-Ahead Dispatchable Reliability Reserve Service Quantity per QSE*—The QSE *q*’s Day-Ahead Ancillary Service Obligation minus its self-arranged DRRS quantity for the hour. |
| DAPCDRRAMTTOT | $ | *Day-Ahead Procured Capacity for Dispatchable Reliability Reserve Service Amount Total in DAM*—The total of the DAM DRRS payments for all QSEs for the hour. |
| PCDRRAMT *q* | $ | *Procured Capacity for Dispatchable Reliability Reserve Service Amount per QSE for DAM*—The DAM DRRS payment for QSE *q* for the hour. |
| DAPCDROAMT *q* | $ | *Day-Ahead Procured Capacity for Dispatchable Reliability Reserve Service-Only Amount per QSE—*The payment to QSE *q* for all DRRS-only awards in DAM for the hour. |
| DADRRQTOT | MW | *Day-Ahead Dispatchable Reliability Reserve Service Quantity Total*—The sum of every QSE’s Day-Ahead Ancillary Service Obligation minus its self-arranged DRRS quantity for the hour. |
| DADRRO *q* | MW | *Day-Ahead Dispatchable Reliability Reserve Service Obligation per QSE*—The DRRS capacity obligation for QSE *q* for the DAM for the hour. |
| DASADRRQ *q* | MW | *Day-Ahead Self-Arranged Dispatchable Reliability Reserve Service Quantity per QSE*—The self-arranged DRRS quantity submitted by QSE *Q* before 1000 in the Day-Ahead. |
| *q* | none | A QSE. |

***5.5.2 Reliability Unit Commitment (RUC) Process***

(1) The RUC process recommends commitment of Generation Resources, to match ERCOT’s forecasted Load including Direct Current Tie (DC Tie) Schedules, subject to all transmission constraints and Resource performance characteristics. The RUC process takes into account Resources already committed in the Current Operating Plans (COPs), Resources already committed in previous RUCs, Off-Line Available Resources having a start-up time of one hour or less, and Resource capacity already committed to provide Ancillary Service. The formulation of the RUC objective function must employ penalty factors on violations of security constraints. The objective of the RUC process is to minimize costs based on the Resource costs described in paragraphs (5) through (9) below. For all hours of the RUC Study Period within the RUC process, Quick Start Generation Resources (QSGRs) with a COP Resource Status of OFFQS shall be considered as On-Line with Low Sustained Limit (LSL) at zero MW. QSGRs with a Resource Status of OFFQS shall only be committed by ERCOT through a RUC instruction in instances when a reliability issue would not otherwise be managed through Dispatch Instructions from Security-Constrained Economic Dispatch (SCED). For On-Line Energy Storage Resources (ESRs), the Hour Beginning Planned State of Charge (HBSOC) values provided in the COP for a given hour are discounted to ensure sufficient SOC is preserved to meet Ancillary Service Resource Responsibilities, as reflected in the COP. Any remaining SOC on the ESR will be considered available for energy dispatch by RUC while respecting the Minimum State of Charge (MinSOC) and Maximum State of Charge (MaxSOC) values provided in the COP.

(2) The RUC process can recommend Resource decommitment. ERCOT may only decommit a Resource to resolve transmission constraints that are otherwise unresolvable. Qualifying Facilities (QFs) may be decommitted only after all other types of Resources have been assessed for decommitment. In addition, the HRUC process provides decision support to ERCOT regarding a Resource decommitment requested by a Qualified Scheduling Entity (QSE).

(3) ERCOT shall review the RUC-recommended Resource commitments and the list of Off-Line Available Resources having a start-up time of one hour or less to assess feasibility and shall make any changes that it considers necessary, in its sole discretion. During the RUC process, ERCOT may also review and commit, through a RUC instruction, Combined Cycle Generation Resources that are currently planned to be On-Line but are capable of transitioning to a configuration with additional capacity. ERCOT may deselect Resources recommended in DRUC and in all HRUC processes if in ERCOT’s sole discretion there is enough time to commit those Resources in the future HRUC processes, taking into account the Resources’ start-up times, to meet ERCOT System reliability. After each RUC run, ERCOT shall post the amount of capacity deselected per hour in the RUC Study Period to the MIS Secure Area. A Generation Resource shown as On-Line and available for SCED dispatch for an hour in its COP prior to a DRUC or HRUC process execution, according to Section 5.3, ERCOT Security Sequence Responsibilities, will be considered self-committed for that hour. For purpose of Settlement, snapshot data will be used as specified in paragraph (2) of Section 5.3. ERCOT shall issue RUC instructions to each QSE specifying its Resources that have been committed as a result of the RUC process. ERCOT shall, within one day after making any changes to the RUC-recommended commitments, post to the MIS Secure Area any changes that ERCOT made to the RUC-recommended commitments with an explanation of the changes.

|  |
| --- |
| ***[NPRR1239: Replace paragraph (3) above with the following upon system implementation:]***  (3) ERCOT shall review the RUC-recommended Resource commitments and the list of Off-Line Available Resources having a start-up time of one hour or less to assess feasibility and shall make any changes that it considers necessary, in its sole discretion. During the RUC process, ERCOT may also review and commit, through a RUC instruction, Combined Cycle Generation Resources that are currently planned to be On-Line but are capable of transitioning to a configuration with additional capacity. ERCOT may deselect Resources recommended in DRUC and in all HRUC processes if in ERCOT’s sole discretion there is enough time to commit those Resources in the future HRUC processes, taking into account the Resources’ start-up times, to meet ERCOT System reliability. After each RUC run, ERCOT shall post the amount of capacity deselected per hour in the RUC Study Period to the ERCOT website. A Generation Resource shown as On-Line and available for SCED dispatch for an hour in its COP prior to a DRUC or HRUC process execution, according to Section 5.3, ERCOT Security Sequence Responsibilities, will be considered self-committed for that hour. For purpose of Settlement, snapshot data will be used as specified in paragraph (2) of Section 5.3. ERCOT shall issue RUC instructions to each QSE specifying its Resources that have been committed as a result of the RUC process. ERCOT shall, within one day after making any changes to the RUC-recommended commitments, post to the ERCOT website any changes that ERCOT made to the RUC-recommended commitments with an explanation of the changes. |

(4) A QSE shall notify the ERCOT Operator of any physical limitation that impacts its Resource’s ability to start that is not reflected in the Resource’s COP or the Resource’s startup time, minimum On-Line time, or minimum Off-Line time. The following shall apply:

(a) If a Resource receives a RUC Dispatch Instruction that it cannot meet due to a physical limitation described in paragraph (4) above, the QSE representing the Resource shall notify the ERCOT Operator of the inability to fully comply with the instruction and shall comply with the instruction to the best of the Resource’s ability. If the QSE has provided the ERCOT Operator notice of that limitation at least seven days prior to the Operating Day in which the instruction occurs, the QSE shall be excused from complying with the portion of the RUC Dispatch Instruction that it could not meet due to the identified limitation.

(b) If a QSE provides notice pursuant to paragraph (a) above of a physical limitation that will delay the RUC-committed Resource’s ability to reach its LSL in accordance with a RUC Dispatch Instruction, ERCOT shall extend the RUC Dispatch Instruction so that the Resource’s minimum run time is respected. However, if the Resource will not be available in time to address the issue for which it received the RUC instruction, ERCOT may instead cancel the RUC Dispatch Instruction.

(5) A QSE shall be excused from complying with any portion of a RUC Dispatch Instruction that it could not meet due to a physical limitation that was reflected, at the time of the RUC Dispatch Instruction, in the Resource’s COP, startup time, minimum On-Line time, or minimum Off-Line time.

(6) To determine the projected energy output level of each Resource and to project potential congestion patterns for each hour of the RUC, ERCOT shall calculate proxy Energy Offer Curves based on the Mitigated Offer Caps (MOCs) for the type of Resource as specified in Section 4.4.9.4, Mitigated Offer Cap and Mitigated Offer Floor, for use in the RUC. Proxy Energy Offer Curves are calculated by multiplying the MOC by a constant selected by ERCOT from time to time that is no more than 0.10% and applying the cost for all Generation Resource output between High Sustained Limit (HSL) and LSL. The intent of this process is to minimize the effect of the proxy Energy Offer Curves on optimization.

(7) ERCOT shall use the RUC process to evaluate the need to commit Resources for which a QSE has submitted Three-Part Supply Offers and other available Off-Line Resources in addition to Resources that are planned to be On-Line during the RUC Study Period. All of the above commitment information must be as specified in the QSE’s COP. For available Off-Line Resources with a cold start time of one hour or less that have not been removed from special consideration under paragraph (9) below pursuant to paragraph (4) of Section 8.1.2, Current Operating Plan (COP) Performance Requirements, the Startup Offers and Minimum-Energy Offer from a Resource’s Three-Part Supply Offer shall not be used in the RUC process.

(8) ERCOT shall create Three-Part Supply Offers for all Resources that did not submit a Three-Part Supply Offer, but are specified as available but Off-Line, excluding Resources with a Resource Status of EMR, in a QSE’s COP. For such Resources, excluding available Off-Line Resources with a cold start time of one hour or less that have not been removed from special consideration under paragraph (9) below pursuant to paragraph (4) of Section 8.1.2, ERCOT shall use in the RUC process 100% of any approved verifiable Startup Cost and verifiable minimum-energy cost or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as described specified in Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, registered with ERCOT. Also, for Settlement purposes, ERCOT shall use any approved verifiable Startup Costs and verifiable minimum-energy cost for such Resources, or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and Generic Minimum-Energy Offer Cost.

(9) For all available Off-Line Resources having a cold start time of one hour or less and not removed from special consideration pursuant to paragraph (4) of Section 8.1.2, ERCOT shall scale any approved verifiable Startup Cost and verifiable minimum-energy cost or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as specified in Section 4.4.9.2.3 for use in the RUC process.

The above parameter is defined as follows:

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Current Value\*** |
| 1HRLESSCOSTSCALING | Percentage | Maximum value of 100% |
| \* The current value for the parameter(s) referenced in this table above will be recommended by the Technical Advisory Committee (TAC) and the ERCOT Board and approved by the Public Utility Commission of Texas (PUCT). ERCOT shall update parameter value(s) on the first day of the month following PUCT approval unless otherwise directed. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. | | |

(10) The RUC process must treat all Resource capacity providing Ancillary Service as unavailable for the RUC Study Period, unless that treatment leads to infeasibility (i.e., that capacity is needed to resolve some local transmission problem that cannot be resolved by any other means). If an ERCOT Operator decides that the Ancillary Service capacity allocated to that Resource is infeasible based on ERCOT System conditions, then, ERCOT shall inform each affected QSE of the amount of its Resource capacity that does not qualify to provide Ancillary Service, and the projected hours for which this is the case. In that event, the affected QSE may, under Section 6.4.9.1.2, Replacement of Infeasible Ancillary Service Due to Transmission Constraints, either:

(a) Substitute capacity from Resources represented by that QSE;

(b) Substitute capacity from other QSEs using Ancillary Service Trades; or

(c) Ask ERCOT to replace the capacity.

(11) Factors included in the RUC process are:

(a) ERCOT System-wide hourly Load forecast allocated appropriately over Load buses;

(b) Transmission constraints – Transfer limits on energy flows through the electricity network;

(i) Thermal constraints – protect transmission facilities against thermal overload;

(ii) Generic constraints – protect the transmission system against transient instability, dynamic, instability or voltage collapse;

(c) Planned transmission topology;

(d) Energy sufficiency constraints;

(e) Inputs from the COP, as appropriate;

(f) Inputs from Resource Parameters, including a list of Off-Line Available Resources having a start-up time of one hour or less, as appropriate;

(g) Each Generation Resource’s Minimum-Energy Offer and Startup Offer, from its Three-Part Supply Offer;

(h) Any Generation Resource that is Off-Line and available but does not have a Three-Part Supply Offer;

(i) Forced Outage information; and

(j) Inputs from the eight-day look ahead planning tool, which may potentially keep a unit On-Line (or start a unit for the next day) so that a unit minimum duration between starts does not limit the availability of the unit (for security reasons).

(12) The HRUC process and the DRUC process are as follows:

(a) The HRUC process uses current Resource Status for the initial condition for the first hour of the RUC Study Period. All HRUC processes use the projected status of transmission breakers and switches starting with current status and updated for each remaining hour in the study as indicated in the COP for Resources and in the Outage Scheduler for transmission elements.

(b) The DRUC process uses the Day-Ahead forecast of total ERCOT Load including DC Tie Schedules for each hour of the Operating Day. The HRUC process uses the current hourly forecast of total ERCOT Load including DC Tie Schedules for each hour in the RUC Study Period.

(c) The DRUC process uses the Day-Ahead weather forecast for each hour of the Operating Day. The HRUC process uses the weather forecast information for each hour of the balance of the RUC Study Period.

(13) A QSE that has one or more of its Resources RUC-committed to provide Ancillary Services must increase its Ancillary Service Supply Responsibility by the total amount of RUC-committed Ancillary Service quantities. The QSE may only use a RUC-committed Resource to meet its Ancillary Service Supply Responsibility during that Resource’s RUC-Committed Interval if the Resource has been committed by the RUC process to provide Ancillary Service, or the Resource is a Combined Cycle Generation Resource that was RUC-committed to transition from one On-Line configuration to a different configuration with additional capacity. For cases in which the commitment was to provide Ancillary Service, the QSE shall indicate the exact amount and type of Ancillary Service for which it was committed as the Resource’s Ancillary Service Resource Responsibility and Ancillary Services Schedule for the RUC-Committed Intervals for both telemetry and COP information provided to ERCOT. Upon deployment of the Ancillary Services, the QSE shall adjust its Ancillary Services Schedule to reflect the amounts requested in the deployment.

(14) A QSE with a Resource that is not a Reliability Must-Run (RMR) Unit or has not received an Outage Schedule Adjustment (OSA) that has been committed in a DRUC or HRUC process may opt out of the RUC Settlement (or “buy back” the commitment) by setting the COP status of the RUC-committed Resource to ONOPTOUT for the first hour of a contiguous block of RUC-Committed Hours in the Opt Out Snapshot. All the configurations of the same Combined Cycle Train shall be treated as the same Resource for the purpose of creating the block of RUC-Committed Hours. A RUC-committed Combined Cycle Generation Resource may opt out of the RUC Settlement by setting the COP status of any Combined Cycle Generation Resource within the same Combined Cycle Train as the RUC-committed Resource to ONOPTOUT for the first hour of a contiguous block of RUC-Committed Hours in the Opt Out Snapshot. A Combined Cycle Generation Resource that is RUC-committed from one On-Line configuration in order to transition to a different configuration with additional capacity may opt out of the RUC Settlement following the same rule for RUC-committed Combined Cycle Generation Resources described above. A QSE that opts out of RUC Settlement forfeits RUC Settlement for the affected Resource for a given block of RUC Buy-Back Hours. A QSE that opts out of RUC Settlement treatment must make the Resource available to SCED for all RUC Buy-Back Hours. All hours in a contiguous block of RUC-Committed Hours that includes the RUC Buy-Back Hour shall be considered RUC Buy-Back Hours. If a contiguous block of RUC-Committed Hours spans more than one Operating Day and a QSE wishes to opt out of RUC Settlement for the RUC-Committed Hours in the second or subsequent Operating Day, the QSE must set its COP status to ONOPTOUT for the first hour of the first Operating Day in the Opt Out Snapshot of the first Operating Day.

(15) ERCOT shall, as soon as practicable, post to the MIS Secure Area a report identifying those hours that were considered RUC Buy-Back Hours, along with the name of each RUC-committed Resource whose QSE opted out of RUC Settlement.

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| ***[NPRR1239: Replace paragraph (15) above with the following upon system implementation:]***  (15) ERCOT shall, as soon as practicable, post to the ERCOT website a report identifying those hours that were considered RUC Buy-Back Hours, along with the name of each RUC-committed Resource whose QSE opted out of RUC Settlement. |

(16) A Resource that has a Three-Part Supply Offer cleared in the Day-Ahead Market (DAM) and subsequently receives a RUC commitment for the Operating Hour for which it was awarded will be treated as if the telemetered Resource Status was ONOPTOUT for purposes of Section 6.5.7.3, Security Constrained Economic Dispatch, and Section 6.5.7.3.1, Determination of Real-Time On-Line Reliability Deployment Price Adder.

(17) A Resource that has self-committed for an Operating Hour after the RUC Snapshot was taken but before the RUC commitment has been communicated through an XML message for that RUC process and that Operating Hour is included in a block of RUC-committed hours for that RUC process will be treated as if the Resource Status was ONOPTOUT for purposes of Section 6.5.7.3, Section 6.5.7.3.1, Operating Reserve Demand Curve (ORDC) calculations, and RUC Settlement for the entire block of RUC-committed hours. A QSE that has a Resource that meets these conditions must make the Resource available to SCED for the entire block of RUC-committed hours. ERCOT will send the QSE a notification stating the Operating Day and block of hours for which this occurred.

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| ***[NPRR1009, NPRR1032, NPRR1204, NPRR1239, NPRR1245, and NPRR1269: Replace applicable portions of Section 5.5.2 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009, NPRR1204, NPRR1245, NPRR1269, and NPRR1282; or upon system implementation for NPRR1032 or NPRR1239:]***  ***5.5.2 Reliability Unit Commitment (RUC) Process***  (1) The RUC process recommends commitment of Generation Resources, to match ERCOT’s forecasted Load including Direct Current Tie (DC Tie) Schedules and RUC Ancillary Service Demand Curves (ASDCs), subject to all transmission constraints and Resource performance characteristics. The RUC process takes into account Resources already committed in the Current Operating Plans (COPs), Resources already committed in previous RUCs, Resources showing a Resource Status of DRRS in the COP, and Off-Line Available Resources having a start-up time of one hour or less. For On-Line Energy Storage Resources (ESRs), using RUC duration requirements for energy and Ancillary Services, RUC-projected dispatch for energy and Ancillary Service in one interval shall respect the ESR’s minimum and maximum State of Charge (SOC) values from the COP, while incorporating any adjustments under paragraph (20)(d) below. In addition, using the Ancillary Service Deployment Factors and their respective deployment duration requirements, the SOC required to support these dispatch levels for energy and Ancillary Services will match as closely as possible the difference between the adjusted COP values of the next interval’s Hour Beginning Planned SOC (HBSOC) and the current interval’s HBSOC. The formulation of the RUC objective function must employ penalty factors on violations of security constraints and violations of ESR COP HBSOC. The objective of the RUC process is to minimize costs based on the Resource costs described in paragraphs (12) through (16) below. ESR energy dispatch costs and Ancillary Service Offer costs are not included in the RUC objective function.  (2) ERCOT shall create an ASDC for each Ancillary Service for use in RUC, except DRRS. The ASDCs for each Ancillary Service for use in RUC shall be substantively the same as the ASDCs defined in Section 4.4.12, Determination of Ancillary Service Demand Curves for the Day-Ahead Market and the Real-Time Market. Specific to RUC, the ASDC for Non-Spin shall not extend beyond the Ancillary Service Plan for Non-Spin for the relevant Operating Hour. ERCOT shall post the ASDCs for RUC to the ERCOT website following each execution of the RUC process.  (3) ERCOT shall post the following Ancillary Service Deployment Factor data on the ERCOT website:  (a) Following each execution of RUC, ERCOT shall post the Ancillary Service Deployment Factors used by that RUC process for each hour in the RUC Study Period;  (b) No later than 0600 in the Day-Ahead for each Operating Day, ERCOT shall post the Ancillary Service Deployments Factors that are projected to be used in the RUC process for that Operating Day; and  (c) Following each month, ERCOT shall post the average, minimum, and maximum Ancillary Service Deployment Factors used in the RUC process by type of Ancillary Service and hour of the day for the month.  (4) For all hours of the RUC Study Period within the RUC process, Quick Start Generation Resources (QSGRs) with a COP Resource Status of OFFQS shall be considered as On-Line with Low Sustained Limit (LSL) at zero MW. QSGRs with a Resource Status of OFFQS shall only be committed by ERCOT through a RUC instruction in instances when a reliability issue would not otherwise be managed through Dispatch Instructions from Security-Constrained Economic Dispatch (SCED).  (5) In addition to On-Line qualified Generation Resources and ESRs, the RUC engine shall consider a COP Resource status of OFFQS for QSGRs that are qualified for ERCOT Contingency Reserve Service (ECRS), as being eligible to provide ECRS constrained by the Ancillary Service capability in the COP.  (6) In addition to On-Line qualified Generation Resources and ESRs, the RUC engine shall consider a COP Resource Status of OFFQS for QSGRs that are qualified for Non-Spinning Reserve (Non-Spin), as being eligible to provide Non-Spin constrained by the Ancillary Service capability in the COP. The RUC engine shall also consider a COP Resource Status of OFF (Off-Line but available for commitment in the DAM and RUC) for a Resource that is qualified for Non-Spin, as being eligible to provide Non-Spin constrained by the Ancillary Service capability in the COP.  (7) In addition to On-Line qualified Generation Resources and ESRs, the RUC engine shall consider a COP Resource Status of ONL for Load Resources that are qualified for Ancillary Services, as being eligible to provide Ancillary Services constrained by the Ancillary Service capability in the COP. The RUC engine will not consider any Load Resources for dispatch of energy.  (8) The RUC constraints in the RUC engine shall use 60 minutes as the duration for energy and Ancillary Services, excluding Responsive Reserve (RRS) provided using Fast Frequency Response, for which duration shall be 15 minutes. These same duration requirements will be used to enforce a constraint on each ESR’s dispatch for energy and Ancillary Services using Ancillary Service deployment factors for a given hour such that the calculated SOC at the end of that hour is equal to the next hour’s COP value of HBSOC.  (9) The RUC process can recommend Resource decommitment. ERCOT may only decommit a Resource to resolve transmission constraints that are otherwise unresolvable. Qualifying Facilities (QFs) may be decommitted only after all other types of Resources have been assessed for decommitment. In addition, the HRUC process provides decision support to ERCOT regarding a Resource decommitment requested by a Qualified Scheduling Entity (QSE).  (10) ERCOT shall review the RUC-recommended Resource commitments and the list of Off-Line Available Resources having a start-up time of one hour or less to assess feasibility and shall make any changes that it considers necessary, in its sole discretion. During the RUC process, ERCOT may also review and commit, through a RUC instruction, Combined Cycle Generation Resources that are currently planned to be On-Line but are capable of transitioning to a configuration with additional capacity. ERCOT may deselect Resources recommended in DRUC and in all HRUC processes if in ERCOT’s sole discretion there is enough time to commit those Resources in the future HRUC processes, taking into account the Resources’ start-up times, to meet ERCOT System reliability. After each RUC run, ERCOT shall post the amount of capacity deselected per hour in the RUC Study Period to the ERCOT website. A Generation Resource shown as On-Line and available for SCED dispatch for an hour in its COP prior to a DRUC or HRUC process execution, according to Section 5.3, ERCOT Security Sequence Responsibilities, will be considered self-committed for that hour. For purpose of Settlement, snapshot data will be used as specified in paragraph (2) of Section 5.3.  (11) ERCOT shall issue RUC instructions to each QSE specifying its Resources that have been committed as a result of the RUC process. ERCOT shall, within one day after making any changes to the RUC-recommended commitments, post to the ERCOT website any changes that ERCOT made to the RUC-recommended commitments with an explanation of the changes.  (12) ERCOT shall use the RUC process to evaluate the need to commit Resources for which a QSE has submitted Three-Part Supply Offers and other available Off-Line Resources in addition to Resources that are planned to be On-Line during the RUC Study Period. All of the above commitment information must be as specified in the QSE’s COP. For available Off-Line Resources with a cold start time of one hour or less that have not been removed from special consideration under paragraph (17) below pursuant to paragraph (4) of Section 8.1.2, Current Operating Plan (COP) Performance Requirements, the Startup Offers and Minimum-Energy Offer from a Resource’s Three-Part Supply Offer shall not be used in the RUC process.  (13) ERCOT shall create Three-Part Supply Offers for all Resources that did not submit a Three-Part Supply Offer, but are specified as available but Off-Line, excluding Resources with a Resource Status of EMR, in a QSE’s COP. For such Resources, excluding available Off-Line Resources with a cold start time of one hour or less that have not been removed from special consideration under paragraph (16) below pursuant to paragraph (4) of Section 8.1.2, ERCOT shall use in the RUC process 100% of any approved verifiable Startup Cost and verifiable minimum-energy cost or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as described specified in Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, registered with ERCOT. Also, for Settlement purposes, ERCOT shall use any approved verifiable Startup Costs and verifiable minimum-energy cost for such Resources, or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and Generic Minimum-Energy Offer Cost.  (14) A QSE shall notify the ERCOT Operator of any physical limitation that impacts its Resource’s ability to start that is not reflected in the Resource’s COP or the Resource’s startup time, minimum On-Line time, or minimum Off-Line time. The following shall apply:  (a) If a Resource receives a RUC Dispatch Instruction that it cannot meet due to a physical limitation described in paragraph (5) above, the QSE representing the Resource shall notify the ERCOT Operator of the inability to fully comply with the instruction and shall comply with the instruction to the best of the Resource’s ability. If the QSE has provided the ERCOT Operator notice of that limitation at least seven days prior to the Operating Day in which the instruction occurs, the QSE shall be excused from complying with the portion of the RUC Dispatch Instruction that it could not meet due to the identified limitation.  (b) If a QSE provides notice pursuant to paragraph (a) above of a physical limitation that will delay the RUC-committed Resource’s ability to reach its LSL in accordance with a RUC Dispatch Instruction, ERCOT shall extend the RUC Dispatch Instruction so that the Resource’s minimum run time is respected. However, if the Resource will not be available in time to address the issue for which it received the RUC instruction, ERCOT may instead cancel the RUC Dispatch Instruction.  (15) A QSE shall be excused from complying with any portion of a RUC Dispatch Instruction that it could not meet due to a physical limitation that was reflected, at the time of the RUC Dispatch Instruction, in the Resource’s COP, startup time, minimum On-Line time, or minimum Off-Line time.  (16) To determine the projected energy output level of each Resource and to project potential congestion patterns for each hour of the RUC, ERCOT shall calculate proxy Energy Offer Curves based on the Mitigated Offer Caps (MOCs) for the type of Resource as specified in Section 4.4.9.4, Mitigated Offer Cap and Mitigated Offer Floor, for use in the RUC. Proxy Energy Offer Curves are calculated by multiplying the MOC by a constant selected by ERCOT from time to time that is no more than 0.10% and applying the cost for all Generation Resource output between High Sustained Limit (HSL) and LSL. The intent of this process is to minimize the effect of the proxy Energy Offer Curves on optimization. For ESRs, energy dispatch costs are not considered in determining projected energy output levels.  (17) Except for DRRS, ERCOT shall calculate proxy Ancillary Service Offer Curves for use in RUC based on validated Ancillary Service Offers as specified in Section 4.4.7.2, Ancillary Service Offers. For all Resources that do not have a valid Ancillary Service Offer but are qualified to provide an Ancillary Service, ERCOT shall create an Ancillary Service Offer Curve for use in RUC as described in Section 6.5.7.3, Security Constrained Economic Dispatch. Proxy Ancillary Service Offer Curves for use in RUC are calculated by multiplying the Ancillary Service Offer by a constant selected by ERCOT from time to time that is no more than 0.1%, and are extended between the HSL and LSL. Notwithstanding the presence or absence of a proxy Ancillary Service Offer, Ancillary Service provision in RUC shall be limited by the Resource’s Ancillary Service capabilities as reflected in the COP. For ESRs, Ancillary Service Offer costs are not considered in determining projected Ancillary Service awards.  (18) For all available Off-Line Resources having a cold start time of one hour or less and not removed from special consideration pursuant to paragraph (4) of Section 8.1.2, ERCOT shall scale any approved verifiable Startup Cost and verifiable minimum-energy cost or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as specified in Section 4.4.9.2.3 for use in the RUC process.  The above parameter is defined as follows:   |  |  |  | | --- | --- | --- | | **Parameter** | **Unit** | **Current Value\*** | | 1HRLESSCOSTSCALING | Percentage | Maximum value of 100% | | \* The current value for the parameter(s) referenced in this table above will be recommended by the Technical Advisory Committee (TAC) and the ERCOT Board and approved by the Public Utility Commission of Texas (PUCT). ERCOT shall update parameter value(s) on the first day of the month following PUCT approval unless otherwise directed. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. | | |   (19) The RUC process, including any Verbal Dispatch Instructions (VDIs), will be used to deploy DRRS from Off-Line Resources showing a DRRS Resource Status in the COP. A commitment instruction issued to a Resource that is providing DRRS will be treated as a DRRS deployment for any hours in which the Resource has a DRRS award.  (20) To prioritize the utilization of Off-Line DRRS ahead of the commitment of other Resources and to maximize the use of Resources that are planned to be On-Line before deploying DRRS, ERCOT shall scale any approved verifiable Startup Cost and verifiable minimum-energy cost or, if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as specified in Section 4.4.9.2.3 for use in the RUC process for that Operating Hour for all Off-Line Generation Resources with a Resource Status of DRRS in an Operating Hour, based on the Resource’s COP. This scaling factor will be set as follows:   |  |  |  | | --- | --- | --- | | **Parameter** | **Unit** | **Current Value\*** | | GENDRRSCOSTSCALING | Percentage | Maximum value of 20% | | \* The current value for the parameter(s) referenced in this table above will be recommended by the Technical Advisory Committee (TAC) and the ERCOT Board and approved by the Public Utility Commission of Texas (PUCT). ERCOT shall update parameter value(s) on the first day of the month following PUCT approval unless otherwise directed. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. | | |   (21) Factors included in the RUC process are:  (a) ERCOT System-wide hourly Load forecast allocated appropriately over Load buses;  (b) ERCOT’s Ancillary Service Plans in the form of ASDCs;  (c) Transmission constraints – Transfer limits on energy flows through the electricity network;  (i) Thermal constraints – protect transmission facilities against thermal overload;  (ii) Generic constraints – protect the transmission system against transient instability, dynamic instability or voltage collapse;  (d) Planned transmission topology;  (e) Energy sufficiency constraints, including RUC duration requirements for energy and Ancillary Services;  (f) Inputs from the COP, as appropriate;  (g) Inputs from Resource Parameters, including a list of Off-Line Available Resources having a start-up time of one hour or less, as appropriate;  (h) Each Generation Resource’s Minimum-Energy Offer and Startup Offer, from its Three-Part Supply Offer;  (i) Any Generation Resource that is Off-Line and available but does not have a Three-Part Supply Offer;  (j) Any Resource with a Resource Status of DRRS in the QSE-submitted COP;  (k) Forced Outage information;  (l) Inputs from the eight-day look ahead planning tool, which may potentially keep a unit On-Line (or start a unit for the next day) so that a unit minimum duration between starts does not limit the availability of the unit (for security reasons); and  (m) Ancillary Service Deployment Factors.  (22) The HRUC process and the DRUC process are as follows:  (a) The HRUC process uses current Resource Status for the initial condition for the first hour of the RUC Study Period. All HRUC processes use the projected status of transmission breakers and switches starting with current status and updated for each remaining hour in the study as indicated in the COP for Resources and in the Outage Scheduler for transmission elements.  (b) The DRUC process uses the current hourly forecast of total ERCOT Load including DC Tie Schedules up to the physical rating of the DC Tie for each hour of the Operating Day. The HRUC process uses the current hourly forecast of total ERCOT Load including DC Tie Schedules up to the physical rating of the DC Tie for each hour in the RUC Study Period.  (c) The DRUC process uses the Day-Ahead weather forecast for each hour of the Operating Day. The HRUC process uses the weather forecast information for each hour of the balance of the RUC Study Period.  (d) For the HRUC, DRUC, and Weekly Reliability Unit Commitment (WRUC) processes, a feasibility check on the COP submitted HBSOC will be performed. This check may adjust the HBSOC used in the RUC process. The feasibility check looks sequentially across all intervals in the RUC Study Period to validate whether a particular interval’s COP HBSOC is achievable from the previous interval. If it is not feasible, then RUC will adjust the HBSOC to the closest achievable value.  (23) A QSE with a Resource that is not a Reliability Must-Run (RMR) Unit or has not received an Outage Schedule Adjustment (OSA) that has been committed in a DRUC or HRUC process may opt out of the RUC Settlement (or “buy back” the commitment) by setting the COP status of the RUC-committed Resource to ONOPTOUT for the first hour of a contiguous block of RUC-Committed Hours in the Opt Out Snapshot. All the configurations of the same Combined Cycle Train shall be treated as the same Resource for the purpose of creating the block of RUC-Committed Hours. A RUC-committed Combined Cycle Generation Resource may opt out of the RUC Settlement by setting the COP status of any Combined Cycle Generation Resource within the same Combined Cycle Train as the RUC-committed Resource to ONOPTOUT for the first hour of a contiguous block of RUC-Committed Hours in the Opt Out Snapshot. A Combined Cycle Generation Resource that is RUC-committed from one On-Line configuration in order to transition to a different configuration with additional capacity may opt out of the RUC Settlement following the same rule for RUC-committed Combined Cycle Generation Resources described above. A QSE that opts out of RUC Settlement forfeits RUC Settlement for the affected Resource for a given block of RUC Buy-Back Hours. A QSE that opts out of RUC Settlement treatment must make the Resource available to SCED for all RUC Buy-Back Hours. All hours in a contiguous block of RUC-Committed Hours that includes the RUC Buy-Back Hour shall be considered RUC Buy-Back Hours. If a contiguous block of RUC-Committed Hours spans more than one Operating Day and a QSE wishes to opt out of RUC Settlement for the RUC-Committed Hours in the second or subsequent Operating Day, the QSE must set its COP status to ONOPTOUT for the first hour of that the first Operating Day in the Opt Out Snapshot of the first Operating Day.  (24) ERCOT shall, as soon as practicable, post to the ERCOT website a report identifying those hours that were considered RUC Buy-Back Hours, along with the name of each RUC-committed Resource whose QSE opted out of RUC Settlement.  (25) A Resource that has a Three-Part Supply Offer cleared in the Day-Ahead Market (DAM) and subsequently receives a RUC commitment for the Operating Hour for which it was awarded will be treated as if the Resource Status was ONOPTOUT for purposes of Section 6.5.7.3 and Section 6.5.7.3.1, Determination of Real-Time Reliability Deployment Price Adders.  (26) A Resource that has self-committed for an Operating Hour after the RUC Snapshot was taken but before the RUC commitment has been communicated through an XML message for that RUC process and that Operating Hour is included in a block of RUC-committed hours for that RUC process will be treated as if the Resource Status was ONOPTOUT for purposes of Section 6.5.7.3, Section 6.5.7.3.1, and RUC Settlement for the entire block of RUC-committed hours. A QSE that has a Resource that meets these conditions must make the Resource available to SCED for the entire block of RUC-committed hours. ERCOT will send the QSE a notification stating the Operating Day and block of hours for which this occurred. |

5.6.2 RUC Startup Cost Eligibility

(1) For purposes of this Section 5.6.2, all contiguous RUC-Committed Hours are considered as one RUC instruction. For each Resource, only one Startup Cost is eligible per block of contiguous RUC-Committed Hours.

(2) For a Resource’s Startup Costs in the Operating Day, per RUC instruction, to be included in the calculation of the RUC guarantee for that Operating Day, all the criteria below must be met:

(a) According to the Current Operating Plan (COP) and Trades Snapshot for the RUC process that committed the Resource, the Resource must not be QSE-committed in the Settlement Interval immediately before the designated start hour or after the last hour of the RUC instruction;

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| ***[NPRR1009: Replace paragraph (a) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (a) According to the RUC Snapshot for the RUC process that committed the Resource, the Resource must not be QSE-committed or deployed for Dispatchable Reliability Reserve Service (DRRS) in the Settlement Interval immediately before the designated start hour or after the last hour of the RUC instruction; |

(b) A later RUC instruction or QSE commitment must not connect the designated start hour or last hour of the RUC instruction to a block of QSE-committed Intervals that was QSE-committed before the RUC instruction was given, according to the COP and Trades Snapshot for the RUC process that committed the Resource;

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| ***[NPRR1009: Replace paragraph (b) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (b) A later RUC instruction or QSE commitment must not connect the designated start hour or last hour of the RUC instruction to:  (i) A block of DRRS-deployed intervals; or  (ii) A block of QSE-committed intervals that was QSE-committed before the RUC instruction was given, according to the RUC Snapshot for the RUC process that committed the Resource. |

(c) The generation breakers must have been open, as indicated by a telemetered Resource Status of Off-Line, for at least five minutes during the lesser of six hours preceding the first RUC-Committed Hour, or the time between the most recent DAM Commitment, RUC Commitment, or DRRS deployment and the first RUC-Committed Hour; and

(d) The generation breakers must have been closed, as indicated by a telemetered Resource Status of On-Line, for at least one minute during the RUC commitment period or after the determined five-minute open breaker, as indicated by a telemetered Resource Status of Off-Line, as described in paragraph (c) above.

(3) Notwithstanding paragraphs (2)(c) and (2)(d) above, the QSE of a RUC-committed Resource may submit a Settlement dispute for a Resource’s Startup Costs in the Operating Day, per RUC instruction, to be included in the calculation of the RUC guarantee for that Operating Day if the startup time for the RUC-committed Resource is greater than six hours. The dispute is subject to verification and approval by ERCOT based on the criteria below:

(a) The generation breakers must have been open, as indicated by a telemetered Resource Status of Off-Line, for at least five minutes between the time the QSE is notified of the RUC instruction and the first RUC-Committed Hour;

(b) The generation breakers must have been closed, as indicated by a telemetered Resource Status of On-Line, for at least one minute during the RUC commitment period or after the five-minute open breaker determined in item (a) above;

(c) The breaker open-close sequence from items (a) and (b) above does not make the Resource eligible for Startup Cost compensation in the Day-Ahead Market (DAM) or for any other contiguous block of RUC-Committed Hours; and

(d) The startup time used to process the dispute will be the startup time considered by the ERCOT Operator at the time the RUC instruction was issued.

(4) For purposes of this Section 5.6.2, the telemetered Resource Status of OFFQS shall be considered as Off-Line.

(5) A Resource that has a Three-Part Supply Offer cleared in the DAM and subsequently receives a RUC commitment for the Operating Hour for which it was awarded will be settled in accordance with Section 4.6.2.3, Day-Ahead Make-Whole Settlements.

***5.7.1 RUC Make-Whole Payment***

(1) To make up the difference when the revenues that a Reliability Unit Commitment (RUC)-committed Resource receives are less than its costs as described in paragraph (2) below, ERCOT shall calculate a RUC Make-Whole Payment for that Operating Day for that Resource (whether committed by Day-Ahead RUC (DRUC) or Hourly RUC (HRUC)).

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| ***[NPRR1014: Replace paragraph (1) above with the following upon system implementation:]***  (1) To make up the difference when the revenues that a Reliability Unit Commitment (RUC)-committed Resource receives are less than its costs as described in paragraph (2) below, ERCOT shall calculate a RUC Make-Whole Payment for that Operating Day for that Resource (whether committed by Day-Ahead RUC (DRUC) or Hourly RUC (HRUC)). ERCOT shall not calculate or pay a RUC Make-Whole Payment for an Energy Storage Resource (ESR) or for DRRS deployments. |

(2) ERCOT shall pay to the Qualified Scheduling Entity (QSE) for the Resource a Make-Whole Payment if the RUC Guarantee calculated in Section 5.7.1.1, RUC Guarantee, is greater than the sum of:

(a) RUC Minimum-Energy Revenue calculated in Section 5.7.1.2, RUC Minimum-Energy Revenue;

(b) Revenue less cost above Low Sustained Limited (LSL) during RUC-Committed Hours calculated in Section 5.7.1.3, Revenue Less Cost Above LSL During RUC-Committed Hours; and

(c) Revenue less cost during QSE Clawback Intervals calculated in Section 5.7.1.4, Revenue Less Cost During QSE Clawback Intervals.

(3) The RUC Make-Whole Payment to the QSE for each RUC-committed Resource, including Reliability Must-Run (RMR) Units, for each RUC-Committed Hour in an Operating Day is calculated as follows:

**RUCMWAMT*q,r,h*** **=** **(-1) \* Max (0, RUCG*q,r,d* – RUCMEREV*q,r,d* – RUCEXRR*q,r,d* – RUCEXRQC*q,r,d*) / RUCHR*q,r,d***

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
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| RUCMWAMT*q,r,h* | $ | *RUC Make-Whole Payment*—The RUC Make-Whole Payment to the QSE for Resource *r*, for each RUC-Committed Hour of the Operating Day. When one or more Combined Cycle Generation Resources are committed by RUC, payment is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCG*q,r,d* | $ | *RUC Guarantee*—The sum of eligible Startup Costs and minimum-energy costs for Resource *r* during all RUC-Committed Hours, for the Operating Day. See Section 5.7.1.1. When one or more Combined Cycle Generation Resources are committed by RUC, guaranteed costs are calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCMEREV*q,r,d* | $ | *RUC Minimum-Energy Revenue*—The sum of the energy revenues for Resource *r*’s generation up to LSL during all RUC-Committed Hours, for the Operating Day. See Section 5.7.1.2. When one or more Combined Cycle Generation Resources are committed by RUC, minimum-energy revenue is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCEXRR*q,r,d* | $ | *Revenue Less Cost Above LSL During RUC-Committed Hours*—The sum of the total revenue for Resource *r* operating above its LSL less the cost during all RUC-Committed Hours, for the Operating Day. See Section 5.7.1.3. When one or more Combined Cycle Generation Resources are committed by RUC, revenue less cost above LSL is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCEXRQC*q,r,d* | $ | *Revenue Less Cost During QSE Clawback Intervals*—The sum of the total revenue for Resource *r* less the cost during all QSE Clawback Intervals, for the Operating Day. See Section 5.7.1.4. When one or more Combined Cycle Generation Resources are committed by RUC, revenue less cost during QSE Clawback Intervals is calculated for the Combined Cycle Train for all Combined Cycle Generation Resources earning revenue in QSE Clawback Intervals. |
| RUCHR*q,r,d* | None | *RUC Hour*—The total number of RUC-Committed Hours, for Resource *r* for the Operating Day. When one or more Combined Cycle Generation Resources are committed by RUC, the total number of RUC-Committed Hours is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| *q* | None | A QSE. |
| *r* | None | A RUC-committed Generation Resource. |
| *d* | None | An Operating Day containing the RUC-commitment. |
| *h* | None | An hour in the RUC-commitment period. |

**5.7.1.1 RUC Guarantee**

(1) The allowable Startup Costs and minimum-energy costs of a Resource committed by RUC is the RUC Guarantee. The RUC Guarantee minimum-energy costs are prorated according to the actual generation when the Resource’s average output during a 15-minute Settlement Interval is below the corresponding LSL.

(2) The SUPR, MEPR and LSL used to calculate the RUC Guarantee for a Combined Cycle Train are the SUPR, MEPR and LSL that correspond to the Combined Cycle Generation Resource, within the Combined Cycle Train, that is RUC-committed for the hour. If the RUC-Committed Interval is a RUC for Additional Capacity (RUCAC)-Interval, then the SUPR, MEPR, and LSL that corresponds to the QSE-committed or DRRS-deployed Combined Cycle Generation Resource is also used to calculate RUC Guarantee for a Combined Cycle Train.

(3) For an Aggregate Generation Resource (AGR), the Startup Cost shall be scaled according to the maximum number of its generators online during a contiguous block of RUC-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.

(4) The RUC Guarantee is calculated for non-Combined Cycle Trains as follows:

**RUCG *q, r, d* = (SUPR *q, r, s* \* RUCSUFLAG *q, r, s*) + (MEPR *q, r, i* \* Min ((LSL *q, r, i* \* (¼)), RTMG *q, r, i*))**

(5) The RUC Guarantee is calculated for Combined Cycle Trains as follows:

RUCG *q, r, d* = ******(SUPR *q, r,* s \* RUCSUFLAG *q, r,* s) +

******(MAX (0, SUPR - SUPR)) + (RUCGME *q, r, i*)

Where,

If a Combined Cycle Train transitions to a RUC-committed configuration from a QSE-committed, DRRS-deployed, or other RUC-committed configuration between two contiguous hours, or to a RUC-committed configuration from a QSE-committed or DRRS-deployed configuration within the same hour due to a RUCAC, the transition is calculated as follows:

MAX (0, SUPR *afterCCGR* – SUPR *beforeCCGR*)

If a Combined Cycle Train transitions to a QSE-committed or DRRS-deployed configuration from a RUC-committed configuration between two contiguous hours, the transition is calculated as follows:

MAX (0, SUPR *beforeCCGR* – SUPR *afterCCGR*)

If the interval *i* is a RUC-Committed Interval that is not a RUCAC, then:

RUCGME *q, r, i* = MEPR *q, r, i* \* Min ((LSL *q, r, i* \* (¼)), RTMG *q, r, i*)

If the interval *i* is a RUCAC of a previously QSE-committed or DRRS-deployed interval, then:

RUCGME *q, r, i* = Max [0, MEPR *q, afterCCGR, i* \* Min ((LSL *q, afterCCGR, i* \*

(¼)), RTMG q, r, i) – MEPR q, beforeCCGR, i \* (LSL q, beforeCCGR, i \* (¼))]

(6) If a validated Three-Part Supply Offer has been submitted for a Resource for the RUC, then the RUC Guarantee for that Resource is based on the minimum of the Startup Offer in that validated Three-Part Supply Offer and Startup Cap and the lesser of the Minimum-Energy Offer in that validated Three-Part Supply Offer and the Minimum-Energy Offer Cap. If a validated Three-Part Supply Offer has not been submitted for a Resource for the RUC and ERCOT has not yet approved verifiable unit-specific costs for the Resource, then the RUC Guarantee for a Resource is based on the Resource Category Startup Generic Cap and the Resource Category Minimum-Energy Generic Cap. If a validated Three-Part Supply Offer has not been submitted for a Resource for the RUC and ERCOT has approved verifiable unit-specific costs for the Resource, then the RUC Guarantee for a Resource is based on the most recent ERCOT-approved verifiable unit-specific costs for that Resource.

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

If the QSE submitted a validated Three-Part Supply Offer,

Then, SUPR *q, r,* s = Min (SUO *q, r, s*, SUCAP *q, r, s*)

MEPR *q, r, i* = Min (MEO *q, r, i*, MECAP *q, r, i*)

Otherwise, SUPR *q, r, s* = SUCAP *q, r, s*

MEPR *q, r, i* = MECAP *q, r, i*

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

Then, SUCAP *q, r, s* = verifiable Startup Costs *q, r, s*

MECAP *q, r, i* = verifiable minimum-energy costs *q, r, i*

Otherwise, SUCAP *q, r, s* = RCGSC *s*

MECAP *q, r, i* = RCGMEC *i*

**For AGRs,**

If the QSE submitted a validated Three-Part Supply Offer,

Then, SUPR *q, r,* s = Min (SUO *q, r, s*, SUCAP *q, r, s*)

MEPR *q, r, i* = Min (MEO *q, r, i*, MECAP *q, r, i*)

Otherwise, SUPR *q, r, s* = SUCAP *q, r, s*

MEPR *q, r, i* = MECAP *q, r, i*

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

Then, SUCAP *q, r, s* = Max c (AGRRATIO *q, p, r*) \* verifiable Startup Costs *q, r, s*

MECAP *q, r, i* = verifiable minimum-energy costs *q, r, i*

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

Otherwise, SUCAP *q, r, s* = Max c (AGRRATIO *q, p, r*) \* RCGSC *s*

MECAP *q, r, i* = RCGMEC *i*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RUCG *q, r, d* | $ | *RUC Guarantee*—The sum of eligible Startup Costs and minimum-energy costs for Resource *r* represented by QSE *q* during all RUC-Committed Hours, for the Operating Day *d*. When one or more Combined Cycle Generation Resources are committed by RUC, guaranteed costs are calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCGME *q, r, i* | $ | *RUC Minimum-Energy Guarantee by interval*—The guaranteed costs for Resource *r* represented by QSE *q* for minimum energy for the Settlement Interval *i*. When one or more Combined Cycle Generation Resources are committed by RUC, RUC Minimum-Energy Guarantee is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. During RUCAC-Intervals for a Combined Cycle Train, minimum energy cost is calculated as the difference between the minimum energy cost between the RUC-committed configuration and the QSE-committed or DRRS-deployed configuration. |
| SUPR *q, r, s* | $/Start | *Startup Price per start*—The Settlement price for Resource *r* represented by QSE *q* for the start *s*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| SUO *q, r, s* | $/Start | *Startup Offer per start*—Represents an offer for all costs incurred by Generation Resource *r* represented by QSE *q* in starting up and reaching the Resource’s LSL for the start *s*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| SUCAP *q, r, s* | $/Start | *Startup Cap*—The amount used for AGR *r* or Resource *r* represented by QSE *q* for the start *s* 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-AGRs. The verifiable unit-specific Startup Cost will be determined as described in Section 5.6.1, Verifiable Costs, minus the average energy produced during the time period between breaker close and LSL multiplied by the heat rate proxy “H” multiplied by the appropriate Fuel Index Price (FIP), Fuel Oil Price (FOP) or solid fuel price, for AGR and non-AGR Resources. 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 during an hour, as indicated by telemetry, compared to the total number of generators registered to the AGR *r* represented by QSE *q* at the Settlement Point *p* 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 registered to the AGR *r* represented by QSE *q* at the Settlement Point *p* 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 *r* represented by QSE *q* at the Settlement Point *p* and used in the approved verifiable cost for the AGR. The value is only applicable if the Resource is an AGR. |
| RCGSC *s* | $/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. |
| RUCSUFLAG *q, r, s* | none | *RUC Startup Flag*—The flag that indicates whether or not the start *s* for Resource *r* represented by QSE *q* is eligible for RUC Make-Whole Payment. Its value is one if eligible; otherwise, zero. See Section 5.6.2, RUC Startup Cost Eligibility, and Section 5.6.3, Forced Outage of RUC-Committed Resource, for more information on startup eligibility. For a Combined Cycle Train, the Resource *r* must be one of the registered Combined Cycle Generation Resources within the Combined Cycle Train. When one or more Combined Cycle Generation Resources are committed by RUC, the RUC Startup Flag is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| MEPR *q, r, i* | $/MWh | *Minimum-Energy Price*—The Settlement price for Resource *r* represented by QSE *q* for minimum energy for the Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MEO *q, r, i* | $/MWh | *Minimum-Energy Offer*—Represents an offer for the costs incurred by Resource *r* represented by QSE *q* in producing energy at the Resource’s LSL for the Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MECAP *q, r, i* | $/MWh | *Minimum-Energy Cap*—The amount used for Resource *r* represented by QSE *q* for the Settlement Interval *i* 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. |
| RCGMEC *i* | $/MWh | *Resource Category Generic Minimum-Energy Cost*—The Resource Category Generic Minimum Energy Cost cap for the category of the Resource, according to Section 4.4.9.2.3, for the Operating Day. |
| RTMG *q, r, i* | MWh | *Real-Time Metered Generation*—The metered generation of Resource *r* represented by QSE *q* for the Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| LSL *q, r, i* | MW | *Low Sustained Limit*—The LSL of Generation Resource *r* represented by QSE *q* for the hour that includes the Settlement Interval *i*, as submitted in the Current Operating Plan (COP). 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 Settlement Point. |
| *r* | none | A RUC-committed Generation Resource. |
| *d* | none | An Operating Day containing the RUC-commitment. |
| *i* | none | A 15-minute Settlement Interval within the hour that includes a RUC-commitment. |
| *s* | none | A start that is eligible to have its costs included in the RUC Guarantee. |
| *t* | none | A transition that is eligible to have its costs included in the RUC Guarantee. |
| *c* | none | A contiguous block of RUC–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. |

**5.7.1.2 RUC Minimum-Energy Revenue**

(1) The energy revenue for a Resource’s generation up to LSL during all RUC-Committed Hours of the Operating Day is RUC Minimum-Energy Revenue.

(2) The LSL used to calculate RUC Minimum-Energy Revenue for a Combined Cycle Train is the LSL that corresponds to the Combined Cycle Generation Resource, within the Combined Cycle Train, that is RUC-committed for the hour. If the interval is a RUCAC-Interval, then the LSL that corresponds to the QSE-committed or DRRS-deployed Combined Cycle Generation Resource is also used to calculate RUC Minimum-Energy Revenue for a Combined Cycle Train.

(3) For each RUC-committed Resource, RUC Minimum-Energy Revenue is calculated as follows:

**RUCMEREV*q,r,d* = (RUCMEREV96 *q, r, i*)**

Where,

If the interval *i* is a RUC-Committed Interval that is not a RUCAC-Interval, then:

RUCMEREV96 *q, r, i* = RTSPP *p, i* \* Min (RTMG *q, r, i*, (LSL *q, r, i* \* (¼)))

If the interval *i* is a RUCAC of a previously QSE-Committed or DRRS-deployed interval, then:

RUCMEREV96 *q, r, i* = RTSPP *p, i* \* Max [0, Min (RTMG *q, r, i*, (LSL *q, afterCCGR, i* \* (¼))) - LSL *q, beforeCCGR, i* \* (¼)]

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RUCMEREV *q, r, d* | $ | *RUC Minimum-Energy Revenue*—The sum of the energy revenues for generation of Resource *r* represented by QSE *q* up to LSL during all RUC-Committed Hours, for the Operating Day *d*. When one or more Combined Cycle Generation Resources are committed by RUC, RUC Minimum-Energy Revenue is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCMEREV96 *q, r, i* | $ | *RUC Minimum-Energy Revenue by interval*—The energy revenues for generation of Resource *r* represented by QSE *q* up to LSL during all RUC-Committed Hours, for the Settlement Interval *i*. When one or more Combined Cycle Generation Resources are committed by RUC, RUC Minimum-Energy Revenue is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. During RUCAC-Intervals for a Combined Cycle Train, the minimum energy revenue is calculated as the difference between the minimum energy revenue of the RUC-committed configuration and the QSE-committed or DRRS-deployed configuration. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price*—The Real-Time Settlement Point Price at the Resource Node Settlement Point *p* for the Settlement Interval *i*. |
| RTMG *q, r, i* | MWh | *Real-Time Metered Generation*—The metered generation of Resource *r* represented by QSE *q* for the Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| LSL *q, r, i* | MW | *Low Sustained Limit*—The LSL of Generation Resource *r* represented by QSE *q* for the hour that includes the Settlement Interval *i*, as submitted in the COP. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | A RUC-committed Generation Resource. |
| *d* | none | An Operating Day containing the RUC-commitment. |
| *p* | none | A Resource Node Settlement Point. |
| *i* | none | A 15-minute Settlement Interval within the hour that includes a RUC-commitment. |
| *afterCCGR* | none | The Combined Cycle Generation Resource that is RUC-committed. |
| *beforeCCGR* | none | The Combined Cycle Generation Resource that was QSE-committed or DRRS-deployed. |

**5.7.1.3 Revenue Less Cost Above LSL During RUC-Committed Hours**

(1) The total revenue for a Resource operating above its LSL less the cost based on the Energy Offer Curve Cost Cap (as described in Section 4.4.9.3.3, Energy Offer Curve Cost Caps) during all RUC-Committed Hours of the Operating Day is Revenue Less Cost Above LSL During RUC-Committed Hours.

(2) The LSL used to calculate Revenue Less Cost Above LSL During RUC-Committed Hours for a Combined Cycle Train is the LSL that corresponds to the Combined Cycle Generation Resource, within the Combined Cycle Train, that is RUC-committed for the hour.

(3) For each RUC-committed Resource, Revenue Less Cost Above LSL During RUC-Committed Hours is calculated as follows:

**RUCEXRR *q, r, d* = Max {0, [RUCEXRR96 *q, r, i*]}**

Where,

**RUCEXRR96 *q, r, i* = RTSPP *p, i* \* Max (0, RTMG *q, r, i* – (LSL *q, r, i* \* (¼)))**

**+ (-1) \* (VSSVARAMT *q, r, i* + VSSEAMT *q, r, i*)**

**+ (-1) \* EMREAMT *q, r, i***

**– RTEOCOST *q, r, i* \* Max (0, RTMG *q, r, i* – (LSL *q, r, i* \* (¼)))]}**

|  |
| --- |
| ***[NPRR1009, NPRR1014, and NPRR1140: Replace applicable portions of paragraph (3) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009; or upon system implementation for NPRR1014 or NPRR1140:]***  (3) For each RUC-committed Resource, Revenue Less Cost Above LSL During RUC-Committed Hours is calculated as follows:  If RUCFCA exists:  **RUCEXRR *q, r, d* = [RUCEXRR96 *q, r, i*]**  **Otherwise:**  **RUCEXRR *q, r, d* = Max {0, [RUCEXRR96 *q, r, i*]}**  Where,  **RUCEXRR96 *q, r, i* = RTSPP *p, i* \* Max (0, RTMG *q, r, i* – (LSL *q, r, i* \* (¼))) + RTASREV *q, r, i***  **+ (-1) \* (VSSVARAMT *q, r, i* + VSSEAMT *q, r, i*)**  **+ (-1) \* EMREAMT *q, r, i***  **– (RTEOCOST *q, r, i* + RUCFCA *q, r, i*) \* Max (0, RTMG *q, r, i* – (LSL *q, r, i* \* (¼)))**  Where,  RTASREV *q, r, i =* RTRUREV *q, r, i +* RTRDREV *q, r, i +* RTRRREV *q, r, i +* RTECRREV *q, r, i +* RTNSREV *q, r, i +* RTDRRREV *q, r, i*  **And,**  RUCFCA *q, r, i* = Max(0, Volume-weighted average actual fuel price *q, r, i* \* Average heat rate – RTEOCOST *q, r, i*) |

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RUCEXRR *q, r, d* | $ | *Revenue Less Cost Above LSL During RUC-Committed Hours*—The sum of the total revenue for Resource *r* represented by QSE *q* operating above its LSL less the cost during all RUC-Committed Hours, for the Operating Day *d*. When one or more Combined Cycle Generation Resources are committed by RUC, revenue less cost above LSL is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCEXRR96 *q, r, i* | $ | *Revenue Less Cost Above LSL During RUC-Committed Hours by interval*—The total revenue for Resource *r* represented by QSE *q* operating above its LSL less the cost during all RUC-Committed hours, for the Settlement Interval *i*. When one or more Combined Cycle Generation Resources are committed by RUC, revenue less cost above LSL is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price*—The Real-Time Settlement Point Price at the Resource’s Resource Node Settlement Point *p* for the Settlement Interval *i*. |
| RTEOCOST *q, r, i* | $/MWh | *Real-Time Energy Offer Curve Cost Cap*¾The Energy Offer Curve Cost Cap for Resource *r* represented by QSE *q*, for the Resource’s generation above the LSL for the Settlement Interval *i.*  SeeSection 4.4.9.3.3. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMG *q, r, i* | MWh | *Real-Time Metered Generation*—The metered generation of Resource *r* represented by QSE *q* for the Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| |  |  |  |  | | --- | --- | --- | --- | | ***[NPRR1140: Insert the variable “RUCFCA q, r, i” below upon system implementation:]***   | RUCFCA *q, r, i* | $/MWh | *Reliability Unit Commitment Fuel Cost Adder*—For a QSE that has been granted a fuel dispute per Section 9.14.7, Disputes for RUC Make-Whole Payment for Fuel Costs, the fuel cost adder is calculated as the volume-weighted average actual fuel price times the output-level average heat rate for Resource *r* represented by QSE *q*, for the Resource’s generation above LSL, for the Settlement Interval *i*, minus the RTEOCOST.When one or more Combined Cycle Generation Resources are committed by RUC, RUCFCA is calculated for the Combined Cycle Train for all RUC-Committed Combined Cycle Generation Resources.  The average heat rate for the Resource is the Average Heat Rate at the output level at Settlement Interval *i*, resulting from the input-output coefficients submitted with verifiable costs, if available, otherwise the heat rate value defined in Section 4.4.9.3.3.  The volume-weighted average actual fuel price must be proven by the QSE by submitting a dispute per Section 9.14.7. | | --- | --- | --- | | | | |
| LSL *q, r, i* | MW | *Low Sustained Limit*—The LSL of Generation Resource *r* represented by QSE *q* for the hour that includes the Settlement Interval *i*, as submitted in the COP. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | ***[NPRR1009 and NPRR1014: Insert applicable variables below upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009; or upon system implementation for NPRR1014:]***   |  |  |  | | --- | --- | --- | | RTASREV *q, r, i* | $ | *Real-Time Ancillary Service Revenue* — The total Real-Time Ancillary Service revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRUREV *q, r, i* | $ | *Real-Time Reg-Up Revenue* — The Real-Time Reg-Up revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDREV *q, r, i* | $ | *Real-Time Reg-Down Revenue* — The Real-Time Reg-Down revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.7.5. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRREV *q, r, i* | $ | *Real-Time Responsive Reserve Revenue* — The Real-Time RRS revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.7.5. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSREV *q, r, i* | $ | *Real-Time Non-Spin Revenue* — The Real-Time Non-Spin revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.7.5. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRREV *q, r, i* | $ | *Real-Time ERCOT Contingency Reserve Service Revenue* — The Real-Time ECRS revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.7.5. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTDRRREV *q, r, i* | $ | *Real-Time Dispatchable Reliability Reserve Service Revenue* — The Real-Time DRRS revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.7.5. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | | | |
| VSSVARAMT *q, r, i* | $ | *Voltage Support Service VAr Amount by interval*—The payment to the QSE *q* for the Voltage Support Service (VSS) provided by Generation Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.6.7.1, Voltage Support Service Payments. Payment for VSS is made to the Combined Cycle Train.   |  | | --- | | ***[NPRR1009 and NPRR1014: Replace applicable portions of the definition above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009; or upon system implementation for NPRR1014:]***  *Voltage Support Service VAr Amount*—The payment to the QSE *q* for the Voltage Support Service (VSS) provided by Generation Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.6.7.1, Voltage Support Service Payments. Payment for VSS is made to the Combined Cycle Train. | |
| VSSEAMT *q, r, i* | $ | *Voltage Support Service Energy Amount by interval*—The lost opportunity payment to the QSE *q* for ERCOT-directed VSS from the Generation Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.6.7.1. Payment for emergency energy is made to the Combined Cycle Train.   |  | | --- | | ***[NPRR1009 and NPRR1014: Replace applicable portions of the definition above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009; or upon system implementation for NPRR1014:]***  *Voltage Support Service Energy Amount*—The lost opportunity payment to the QSE *q* for ERCOT-directed VSS from the Generation Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.6.7.1. Payment for emergency energy is made to the Combined Cycle Train. | |
| EMREAMT *q, r, i* | $ | *Emergency Energy Amount by interval*—The payment to the QSE *q* as additional compensation for the additional energy produced by the Generation Resource *r* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. See Section 6.6.9.1, Payment for Emergency Power Increase Directed by ERCOT. Payment for emergency energy is made to the Combined Cycle Train.   |  | | --- | | ***[NPRR1009 and NPRR1014: Replace applicable portions of the definition above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009; or upon system implementation for NPRR1014:]***  *Emergency Energy Amount*—The payment to the QSE *q* as additional compensation for the additional energy or Ancillary Services produced or consumed by the Resource *r* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. See Section 6.6.9.1, Payment for Emergency Operations Settlement. Payment for emergency energy is made to the Combined Cycle Train. | |
| *q* | none | A QSE. |
| *r* | none | A RUC-committed Generation Resource. |
| *d* | none | An Operating Day containing the RUC-commitment. |
| *p* | none | A Resource Node Settlement Point. |
| *i* | none | A 15-minute Settlement Interval within the hour that includes a RUC instruction. |

**5.7.1.4 Revenue Less Cost During QSE Clawback Intervals**

(1) The total revenue for a Resource less the cost based on the Energy Offer Curve Cost Cap as described in Section 4.4.9.3.3, Energy Offer Curve Cost Caps, during all QSE Clawback Intervals of the Operating Day is Revenue Less Cost During QSE-Clawback Intervals.

(2) The MEPR and LSL used to calculate Revenue Less Cost During QSE Clawback Intervals for a Combined Cycle Train is the MEPR and LSL that corresponds to the Combined Cycle Generation Resource, within a Combined Cycle Train, that operates in Real-Time for the QSE Clawback Interval.

(3) For each QSE Clawback Interval, Revenue Less Cost During QSE Clawback Intervals is calculated as follows:

**RUCEXRQC *q, r, d* = Max {0, [(RTSPP *p, i* \* RTMG *q, r, i*)  
+ (-1) \* (VSSVARAMT *q, r, i* + VSSEAMT *q, r, i*)**

**+ (-1) \* EMREAMT *q, r, i***

**– [MEPR *q, r, i* \* Min (RTMG *q, r, i*, (LSL *q, r, i* \* (¼)))]**

**– [RTEOCOST *q, r, i* \* Max (0, RTMG *q, r, i* – (LSL *q, r, i* \* (¼)))]]}**

If the QSE submitted a validated Three-Part Supply Offer for the Resource,

Then, MEPR *q, r, i* = Min (MEO *q, r, i*, MECAP *q, r, i*)

Otherwise, MEPR *q, r, i* = MECAP *q, r, i*

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

Then, MECAP *q, r, i* = verifiable minimum-energy costs *q, r, i*

Otherwise, MECAP *q, r, i* = RCGMEC *i*

|  |
| --- |
| ***[NPRR1009 and NPRR1014: Replace applicable portions of the formula “RUCEXRQC q, r, d” above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009; or upon system implementation for NPRR1014:]***  **RUCEXRQC *q, r, d* = Max {0, [(RTSPP *p, i* \* RTMG *q, r, i*)**  **+ RTASREV*q, r, i***  **+ (-1) \* (VSSVARAMT *q, r, i* + VSSEAMT *q, r, i*)**  **+ (-1) \* EMREAMT *q, r, i***  **– [MEPR *q, r, i* \* Min (RTMG *q, r, i*, (LSL *q, r, i* \* (¼)))]**  **– [RTEOCOST *q, r, i* \* Max (0, RTMG *q, r, i* – (LSL *q, r, i* \* (¼)))]]}**  If the QSE submitted a validated Three-Part Supply Offer for the Resource,  Then, MEPR *q, r, i* = Min (MEO *q, r, i*, MECAP *q, r, i*)  Otherwise, MEPR *q, r, i* = MECAP *q, r, i*  If ERCOT has approved verifiable minimum-energy costs for the Resource,  Then, MECAP *q, r, i* = verifiable minimum-energy costs *q, r, i*  Otherwise, MECAP *q, r, i* = RCGMEC *i*  Where,  RTASREV *q, r, i =* RTRUREV *q, r, i +* RTRDREV *q, r, i +* RTRRREV *q, r, i +* RTECRREV *q, r, i +* RTNSREV *q, r, i +* RTDRRREV *q, r, i* |

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RUCEXRQC *q, r, d* | $ | *Revenue Less Cost During QSE-Clawback Intervals*—The sum of the total revenue for Resource *r* less the cost during all QSE-Clawback Intervals for the Operating Day. When one or more Combined Cycle Generation Resources are committed by RUC, Revenue Less Cost During QSE-Clawback Intervals is calculated for the Combined Cycle Train for all Combined Cycle Generation Resources earning revenue in QSE-Clawback Intervals. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price*—The Real-Time Settlement Point Price at the Resource’s Settlement Point for the Settlement Interval *i*. |
| MEPR *q, r, i* | $/MWh | *Minimum-Energy Price*—The Settlement price for Resource *r* for minimum energy for the Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MEO *q, r, i* | $/MWh | *Minimum-Energy Offer*—Represents an offer for the costs incurred by Resource *r* in producing energy at the Resource’s LSL for the Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MECAP *q, r, i* | $/MWh | *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, Verifiable Costs, 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. |
| RCGMEC *i* | $/MWh | *Resource Category Generic Minimum-Energy Cost*—The Resource Category Generic Minimum-Energy 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. |
| RTEOCOST *q, r, i* | $/MWh | *Real-Time Energy Offer Curve Cost Cap*¾The Energy Offer Curve Cost Cap for Resource *r* represented by QSE *q*, for the Resource’s generation above the LSL for the Settlement Interval *i.*  SeeSection 4.4.9.3.3. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMG *q, r, i* | MWh | *Real-Time Metered Generation*—The Resource *r*’s metered generation for the Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| LSL *q, r, i* | MW | *Low Sustained Limit*—The LSL of Generation Resource *r* represented by QSE *q* for the hour that includes the Settlement Interval *i*, as submitted in the COP. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | ***[NPRR1009 and NPRR1014: Insert applicable portions of the variables below upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009; or upon system implementation for NPRR1014:]***   |  |  |  | | --- | --- | --- | | RTASREV *q, r, i* | $ | *Real-Time Ancillary Service Revenue* — The total Real-Time Ancillary Service revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRUREV *q, r, i* | $ | *Real-Time Reg-Up Revenue* — The Real-Time Reg-Up revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDREV *q, r, i* | $ | *Real-Time Reg-Down Revenue* — The Real-Time Reg-Down revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.7.5. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRREV *q, r, i* | $ | *Real-Time Responsive Reserve Revenue* — The Real-Time RRS revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.7.5. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSREV *q, r, i* | $ | *Real-Time Non-Spin Revenue* — The Real-Time Non-Spin revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.7.5. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRREV *q, r, i* | $ | *Real-Time ERCOT Contingency Reserve Service Revenue* — The Real-Time ECRS revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.7.5. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTDRRREV *q, r, i* | $ | *Real-Time Dispatchable Reliability Reserve Service Revenue* — The Real-Time DRRS revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.7.5. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | | | |
| VSSVARAMT *q, r, i* | $ | *Voltage Support Service VAr Amount by interval*—The payment to the QSE for the VSS provided by Generation Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.6.7.1, Voltage Support Service Payments. Payment for VSS is made to the Combined Cycle Train.   |  | | --- | | ***[NPRR1009 and NPRR1014: Replace applicable portions of the definition above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009; or upon system implementation for NPRR1014:]***  *Voltage Support Service VAr Amount*—The payment to the QSE for the VSS provided by Generation Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.6.7.1, Voltage Support Service Payments. Payment for VSS is made to the Combined Cycle Train. | |
| VSSEAMT *q, r, i* | $ | *Voltage Support Service Energy Amount by interval*—The lost opportunity payment to the QSE for ERCOT-directed VSS from the Generation Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.6.7.1. Payment for VSS is made to the Combined Cycle Train.   |  | | --- | | ***[NPRR1009 and NPRR1014: Replace applicable portions of the definition above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009; or upon system implementation for NPRR1014:]***  *Voltage Support Service Energy Amount*—The lost opportunity payment to the QSE for ERCOT-directed VSS from the Generation Resource *r* for the 15-minute Settlement Interval *i*. See Section 6.6.7.1. Payment for VSS is made to the Combined Cycle Train. | |
| EMREAMT *q, r, i* | $ | *Emergency Energy Amount by interval*—The payment to the QSE as additional compensation for the additional energy produced by the Generation Resource *r* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. See Section 6.6.9.1, Payment for Emergency Power Increase Directed by ERCOT. Payment for emergency energy is made to the Combined Cycle Train.   |  | | --- | | ***[NPRR1009 and NPRR1014: Replace applicable portions of the definition above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009; or upon system implementation for NPRR1014:]***  *Emergency Energy Amount*—The payment to the QSE as additional compensation for the additional energy or Ancillary Services produced or consumed by the Resource *r* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. See Section 6.6.9.1, Payment for Emergency Operations Settlement. Payment for emergency energy is made to the Combined Cycle Train. | |
| *q* | none | A QSE. |
| *r* | none | A RUC-committed Generation Resource. |
| *d* | none | An Operating Day containing the RUC-commitment. |
| *p* | none | A Resource Node Settlement Point. |
| *i* | none | A 15-minute Settlement Interval within the hour that is identified as a QSE-Clawback Interval. |

***5.7.2*** ***RUC Clawback Charge***

(1) A QSE for a Resource shall pay a RUC Clawback Charge for the Operating Day if the RUC Guarantee is less than the sum of:

(a) RUC Minimum-Energy Revenue calculated in Section 5.7.1.2, RUC Minimum-Energy Revenue;

(b) Revenue Less Cost Above LSL During RUC-Committed Hours calculated in Section 5.7.1.3, Revenue Less Cost Above LSL During RUC-Committed Hours; and

(c) Revenue Less Cost During QSE-Clawback Intervals calculated in Section 5.7.1.4, Revenue Less Cost During QSE Clawback Intervals.

(2) The amount of the RUC Clawback Charge is 100% of the difference calculated in paragraph (1) above.

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| ***[NPRR1172: Delete paragraph (2) above upon system implementation and renumber accordingly.]*** |

(3) The RUC Clawback Charge for a Resource, including RMR Units, for each Operating Day is allocated evenly over the RUC-Committed Hours for that Resource.

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| ***[NPRR1014: Insert paragraph (4) below upon system implementation and renumber accordingly:]***  (4) Energy Storage Resources (ESRs) and DRRS deployments are not subject to RUC Clawback Charges. |

(4) For each RUC-committed Resource, the RUC Clawback Charge for each RUC-Committed Hour of the Operating Day is calculated as follows:

If (RUCMEREV *q, r, d* + RUCEXRR *q, r, d* – RUCACREV *q, r, d* – RUCG *q, r, d*) > 0,

Then,

**RUCCBAMT *q, r, h* = [(RUCMEREV *q, r, d* + RUCEXRR *q, r, d* – RUCACREV *q, r, d* – RUCG *q, r, d*) \* RUCCBFR *q, r, d* + RUCEXRQC *q, r, d* \* RUCCBFC *q, r, d*] / RUCHR *q, r, d***

Otherwise,

**RUCCBAMT *q, r, h* = [Max (0, RUCMEREV *q, r, d* + RUCEXRR *q, r, d* + RUCEXRQC *q, r, d* – RUCACREV *q, r, d* – RUCG *q, r, d*) \* RUCCBFC *q, r, d*] / RUCHR *q, r, d***

Where,

The RUCAC revenue is calculated for a Combined Cycle Train as follows:

**RUCACREV *q, r, d* = Max{0, RUCMEREV96 *q, r, i* + Max(0, RUCEXRR96 *q, r, i*)}**



The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RUCCBAMT *q, r, h* | $ | *RUC Clawback Charge*––The RUC Clawback Charge to a QSE for Resource *r* represented by QSE *q* as described in this Section, for each RUC-Committed Hour *h* of the Operating Day for that Resource. When one or more Combined Cycle Generation Resources are committed by RUC, a charge is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCG *q, r, d* | $ | *RUC Guarantee*—The sum of eligible Startup Costs and Minimum-Energy Costs for Resource *r* represented by QSE *q* during all RUC-Committed Hours, for the Operating Day *d*. See Section 5.7.1.1, RUC Guarantee. When one or more Combined Cycle Generation Resources are committed by RUC, guaranteed costs are calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCMEREV *q, r, d* | $ | *RUC Minimum-Energy Revenue*—The sum of the energy revenues for generation of Resource *r* represented by QSE *q* up to LSL during all RUC-Committed Hours, for the Operating Day *d*. See Section 5.7.1.2. When one or more Combined Cycle Generation Resources are committed by RUC, RUC Minimum-Energy Revenue is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCEXRR *q, r, d* | $ | *Revenue Less Cost Above LSL During RUC-Committed Hours*—The sum of the total revenue for Resource *r* represented by QSE *q* above the LSL less the cost during all RUC-Committed Hours, for the Operating Day *d*. See Section 5.7.1.3. When one or more Combined Cycle Generation Resources are committed by RUC, Revenue Less Cost Above LSL During RUC-Committed Hours is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCEXRQC *q, r, d* | $ | *Revenue Less Cost from QSE-Clawback Intervals*—The sum of the total revenue for Resource *r* represented by QSE *q* less the cost during all QSE-Clawback Intervals for the Operating Day *d*. See Section 5.7.1.4. When one or more Combined Cycle Generation Resources are committed by RUC, Revenue Less Cost from QSE-Clawback Intervals is calculated for the Combined Cycle Train for all Combined Cycle Generation Resources earning revenue in QSE Clawback Intervals. |
| RUCACREV *q, r, d* | $ | *Revenue from RUCAC Hours*—The net positive sum for the energy revenues for generation of Resource *r* represented by QSE *q* up to LSL and the total revenue for Resource *r* operating above its LSL less the cost during all RUCAC-Hours, for the Operating Day *d*. When one or more Combined Cycle Generation Resources are RUCAC, revenue from RUCAC Hours is calculated for the Combined Cycle Train for all Combined Cycle Generation Resources that were RUC-committed during the RUCAC-Hours. |
| RUCMEREV96 *q, r, i* | $ | *RUC Minimum-Energy Revenue by Interval*—The energy revenues for generation of Resource *r* represented by QSE *q* up to LSL during all RUC-Committed Hours, for the Settlement Interval *i*. When one or more Combined Cycle Generation Resources are committed by RUC, RUC Minimum-Energy Revenue is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. During RUCAC-Intervals for a Combined Cycle Train, the minimum energy revenue is calculated as the difference between the minimum energy revenue of the RUC-committed configuration and the QSE-committed configuration. |
| RUCEXRR96 *q, r, i* | $ | *Revenue Less Cost Above LSL During RUC-Committed Hours by Interval*—The total revenue for Resource *r* represented by QSE *q* operating above its LSL less the cost during all RUC-Committed hours, for the Settlement Interval *i*. When one or more Combined Cycle Generation Resources are committed by RUC, revenue less cost above LSL is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCCBFR *q, r, d* | none | *RUC Clawback Factor for RUC-Committed Hours*—The Clawback Factor for Resource *r* represented by QSE *q* for RUC-Committed Hours, as specified in paragraph (2) above, for the Operating Day *d*. When one or more Combined Cycle Generation Resources are committed by RUC, the RUC Clawback Factor for RUC-Committed Hours is determined for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCCBFC *q, r, d* | none | *RUC Clawback Factor for QSE Clawback Intervals*—The Clawback Factor for Resource *r* represented by QSE *q* for QSE Clawback Intervals, as specified in paragraph (2) above, for the Operating Day *d*. When one or more Combined Cycle Generation Resources are committed by RUC, the RUC Clawback Factor for QSE Clawback Intervals is determined for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCHR *q, r, d* | none | *RUC Hour*—The total number of RUC-Committed Hours, for Resource *r* represented by QSE *q* for the Operating Day *d*. When one or more Combined Cycle Generation Resources are committed by RUC, the total number of RUC-Committed Hours is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| *q* | none | A QSE. |
| *r* | none | A RUC-committed Generation Resource. |
| *d* | none | An Operating Day containing the RUC-commitment. |
| *h* | none | An hour in the RUC-commitment period. |
| *i* | none | A 15-minute Settlement Interval within the hour that includes a RUCAC instruction. |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1172: Replace paragraph (4) above with the following upon system implementation:]***  (4) For each RUC-committed Resource, the RUC Clawback Charge for each RUC-Committed Hour of the Operating Day is calculated as follows:  **RUCCBAMT *q, r, h***  **=** **Max (0, RUCMEREV *q, r, d* + RUCEXRR *q, r, d* + RUCEXRQC *q, r, d* – RUCACREV *q, r, d* – RUCG *q, r, d*) / RUCHR *q, r, d***  Where,  The RUCAC revenue is calculated for a Combined Cycle Train as follows:  **RUCACREV *q, r, d* = Max{0, RUCMEREV96 *q, r, i* + Max(0, RUCEXRR96 *q, r, i*)}**  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | RUCCBAMT *q, r, h* | $ | *RUC Clawback Charge*––The RUC Clawback Charge to a QSE for Resource *r* represented by QSE *q* as described in this Section, for each RUC-Committed Hour *h* of the Operating Day for that Resource. When one or more Combined Cycle Generation Resources are committed by RUC, a charge is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. | | RUCG *q, r, d* | $ | *RUC Guarantee*—The sum of eligible Startup Costs and Minimum-Energy Costs for Resource *r* represented by QSE *q* during all RUC-Committed Hours, for the Operating Day *d*. See Section 5.7.1.1, RUC Guarantee. When one or more Combined Cycle Generation Resources are committed by RUC, guaranteed costs are calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. | | RUCMEREV *q, r, d* | $ | *RUC Minimum-Energy Revenue*—The sum of the energy revenues for generation of Resource *r* represented by QSE *q* up to LSL during all RUC-Committed Hours, for the Operating Day *d*. See Section 5.7.1.2. When one or more Combined Cycle Generation Resources are committed by RUC, RUC Minimum-Energy Revenue is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. | | RUCEXRR *q, r, d* | $ | *Revenue Less Cost Above LSL During RUC-Committed Hours*—The sum of the total revenue for Resource *r* represented by QSE *q* above the LSL less the cost during all RUC-Committed Hours, for the Operating Day *d*. See Section 5.7.1.3. When one or more Combined Cycle Generation Resources are committed by RUC, Revenue Less Cost Above LSL During RUC-Committed Hours is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. | | RUCEXRQC *q, r, d* | $ | *Revenue Less Cost from QSE-Clawback Intervals*—The sum of the total revenue for Resource *r* represented by QSE *q* less the cost during all QSE-Clawback Intervals for the Operating Day *d*. See Section 5.7.1.4. When one or more Combined Cycle Generation Resources are committed by RUC, Revenue Less Cost from QSE-Clawback Intervals is calculated for the Combined Cycle Train for all Combined Cycle Generation Resources earning revenue in QSE Clawback Intervals. | | RUCACREV *q, r, d* | $ | *Revenue from RUCAC Hours*—The net positive sum for the energy revenues for generation of Resource *r* represented by QSE *q* up to LSL and the total revenue for Resource *r* operating above its LSL less the cost during all RUCAC-Hours, for the Operating Day *d*. When one or more Combined Cycle Generation Resources are RUCAC, revenue from RUCAC Hours is calculated for the Combined Cycle Train for all Combined Cycle Generation Resources that were RUC-committed during the RUCAC-Hours. | | RUCMEREV96 *q, r, i* | $ | *RUC Minimum-Energy Revenue by Interval*—The energy revenues for generation of Resource *r* represented by QSE *q* up to LSL during all RUC-Committed Hours, for the Settlement Interval *i*. When one or more Combined Cycle Generation Resources are committed by RUC, RUC Minimum-Energy Revenue is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. During RUCAC-Intervals for a Combined Cycle Train, the minimum energy revenue is calculated as the difference between the minimum energy revenue of the RUC-committed configuration and the QSE-committed or DRRS-deployed configuration. | | RUCEXRR96 *q, r, i* | $ | *Revenue Less Cost Above LSL During RUC-Committed Hours by Interval*—The total revenue for Resource *r* represented by QSE *q* operating above its LSL less the cost during all RUC-Committed hours, for the Settlement Interval *i*. When one or more Combined Cycle Generation Resources are committed by RUC, revenue less cost above LSL is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. | | RUCHR *q, r, d* | none | *RUC Hour*—The total number of RUC-Committed Hours, for Resource *r* represented by QSE *q* for the Operating Day *d*. When one or more Combined Cycle Generation Resources are committed by RUC, the total number of RUC-Committed Hours is calculated for the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. | | *q* | none | A QSE. | | *r* | none | A RUC-committed Generation Resource. | | *d* | none | An Operating Day containing the RUC-commitment. | | *h* | none | An hour in the RUC-commitment period. | | *i* | none | A 15-minute Settlement Interval within the hour that includes a RUCAC instruction. | |

***5.7.4.1.1 Capacity Shortfall Ratio Share***

(1) In calculating the amount short for each QSE, the available capacity of an IRR when determining responsibility for the corresponding RUC charges shall be the lesser of the HSL value as reflected in the COP and the Wind-powered Generation Resource Production Potential (WGRPP), as described in Section 4.2.2, Wind-Powered Generation Resource Production Potential, for a Wind-powered Generation Resource (WGR), or the PhotoVoltaic Generation Resource Production Potential (PVGRPP), as described in Section 4.2.3, PhotoVoltaic Generation Resource Production Potential, for a PhotoVoltaic Generation Resource (PVGR), at the time of RUC execution. For an IRR, the HASLSNAP variable used below shall be equal to the minimum of the WGRPP or PVGRPP described above and the HSL value as reflected in the QSE’s COP, at the time of the RUC execution.

(2) In calculating the amount short for each QSE, the QSE must be given a capacity credit for non-Intermittent Renewable Resources (IRRs) that were given notice of decommitment within the two hours before the Operating Hour as a result of the RUC process by setting the HASLSNAP and HASLADJ variables used below equal to the HASLSNAP value for the Resource immediately before the decommitment instruction was given.

(3) In calculating the short amount for each QSE, if the High Ancillary Service Limit (HASL) for a Resource was credited to the QSE during the RUC snapshot but the Resource experiences a Forced Outage within two hours before the start of the Settlement Interval, then the HASL for that Resource is also credited to the QSE in the HASLADJ.

(4) In calculating the short amount for each QSE, if the DCIMPSNAP was credited to the QSE during the RUC snapshot but the entire Direct Current Tie (DC Tie) experiences a Forced Outage within two hours before the start of the Settlement Interval, then the DCIMPSNAP is also credited to the QSE in the DCIMPADJ.

(5) For Combined Cycle Generation Resources, if more than one Combined Cycle Generation Resource is shown On-Line in its COP for the same Settlement hour, then the provisions of paragraph (6)(a) of Section 3.9.1, Current Operating Plan (COP) Criteria, apply in the determination of the On-Line Combined Cycle Generation Resource for that Settlement hour.

(6) The capacity shortfall ratio share of a specific QSE for a particular RUC process is calculated, for a 15-minute Settlement Interval, as follows:

**RUCSFRS *ruc, i, q*** **=** **RUCSF *ruc, i, q* / RUCSFTOT *ruc, i***

Where:

**RUCSFTOT *ruc, i* = RUCSF *ruc, i, q***

(7) The RUC Shortfall in MW for one QSE for one 15-minute Settlement Interval is:

**RUCSF *ruc, i, q* = Max (0, Max (RUCSFSNAP *ruc, q, i*, RUCSFADJ *ruc, q, i*) – RUCCAPCREDIT *q, i, z*)**

(8) The RUC Shortfall in MW for one QSE for one 15-minute Settlement Interval, as measured at the snapshot, is:

**RUCSFSNAP *ruc ,q ,i* = Max (0, ((RTAML *q, p, i* \* 4) – RUCCAPSNAP *ruc, q, i*))**

(9) The amount of capacity that a QSE had according to the RUC snapshot for a 15-minute Settlement Interval is:

**RUCCAPSNAP *ruc, q, i* = HASLSNAP *q, r, h* + (RUCCPSNAP *q, h* – RUCCSSNAP *q, h*) + (DAEP *q, p, h* –DAES *q, p, h*) + (RTQQEPSNAP *q, p, i* – RTQQESSNAP *q, p, i*) +  DCIMPSNAP *q, p, i***

(10) The RUC Shortfall in MW for one QSE for one 15-minute Settlement Interval, as measured at Real-Time, but including capacity from IRRs as seen in the RUC snapshot, is:

**RUCSFADJ *ruc, q, i* = Max (0, ((RTAML *q, p, i*) \*4) – (HASLSNAP *ruc, q, r, h* + RUCCAPADJ *q, i*))**

(11) The amount of capacity that a QSE had in Real-Time for a 15-minute Settlement Interval, excluding capacity from IRRs, is:

**RUCCAPADJ *q, i* = HASLADJ *q, r, h* + (RUCCPADJ *q, h* – RUCCSADJ *q, h*) + (DAEP *q, p, h* – DAES *q, p, h*) + (RTQQEPADJ *q, p, i* – RTQQESADJ *q, p, i*) +  DCIMPADJ *q, p, i***

**The above variables are defined as follows:**

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RUCSFRS *ruc, i, q* | none | *RUC Shortfall Ratio Share*—The ratio of the QSE *q*’s capacity shortfall to the sum of all QSEs’ capacity shortfalls, for the RUC process *ruc*, for the 15-minute Settlement Interval *i*. |
| RUCSF *ruc, i, q* | MW | *RUC Shortfall*—The QSE *q*’s capacity shortfall for the RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| RUCSFTOT *ruc, i* | MW | *RUC Shortfall Total*—The sum of all QSEs’ capacity shortfalls, for a RUC process *ruc*, for a 15-minute Settlement Interval *i*. |
| RUCSFSNAP *ruc, q, i* | MW | *RUC Shortfall at Snapshot*—The QSE *q*’s capacity shortfall according to the snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| RUCSFADJ *ruc, q, i* | MW | *RUC Shortfall at Adjustment Period*—The QSE *q*’s Adjustment Period capacity shortfall, including capacity from IRRs as seen in the snapshot for the RUC process *ruc*, for the 15-minute Settlement Interval *i*. |
| RUCCAPCREDIT *q, i, z* | MW | *RUC Capacity Credit by QSE*—The QSE *q*’s capacity credit resulting from capacity paid through the RUC Capacity-Short Amount for RUC process *z* for the 15-minute Settlement Interval *i*. |
| RTAML *q, p, i* | MWh | *Real-Time Adjusted Metered Load*—The QSE *q*’s Adjusted Metered Load (AML) at the Settlement Point *p* for the 15-minute Settlement Interval *i*. |
| RUCCAPSNAP *ruc, q, i* | MW | *RUC Capacity Snapshot at time of RUC*—The amount of the QSE *q*’s calculated capacity in the COP and Trades Snapshot for the RUC process *ruc* for a 15-minute Settlement Interval *i*. |
| HASLSNAP *q, r, h* | MW | *High Ancillary Services Limit at Snapshot*—The HASL of the Resource *r* represented by the QSE *q*, according to the COP and Trades Snapshot for the RUC process for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| DCIMPADJ *q, p, i* | MW | *DC Import per QSE per Settlement Point*—The approved aggregated DC Tie Schedule submitted by QSE *q* as an importer into the ERCOT System through DC Tie *p* according to the Adjustment Period snapshot, for the 15-minute Settlement Interval *i*. |
| DCIMPSNAP *q, p, i* | MW | *DC Import per QSE per Settlement Point*—The approved aggregated DC Tie Schedule submitted by QSE *q* as an importer into the ERCOT System through DC Tie *p*, according to the snapshot for the RUC process for the hour that includes the 15-minute Settlement Interval *i*. |
| RUCCPSNAP *q, h* | MW | *RUC Capacity Purchase at Snapshot*—The QSE *q*’s capacity purchase, according to the COP and Trades Snapshot for the RUC process for the hour *h* that includes the 15-minute Settlement Interval. |
| RUCCSSNAP *q, h* | MW | *RUC Capacity Sale at Snapshot*—The QSE *q*’s capacity sale, according to the COP and Trades Snapshot for the RUC process for the hour *h* that includes the 15-minute Settlement Interval. |
| RUCCAPADJ *q, i* | MW | *RUC Capacity Snapshot during Adjustment Period*—The amount of the QSE *q*’s calculated capacity in the RUC according to the COP and Trades Snapshot, excluding capacity for IRRs, at the end of the Adjustment Period for a 15-minute Settlement Interval *i.* |
| HASLADJ *q, r, h* | MW | *High Ancillary Services Limit at Adjustment Period*—The HASL of a non-IRR *r* represented by the QSE *q*, according to the Adjustment Period snapshot, for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RUCCPADJ *q, h* | MW | *RUC Capacity Purchase at Adjustment Period*—The QSE *q*’s capacity purchase, according to the Adjustment Period COP and Trades Snapshot for the hour *h* that includes the 15-minute Settlement Interval. |
| RUCCSADJ *q, h* | MW | *RUC Capacity Sale at Adjustment Period*—The QSE *q*’s capacity sale, according to the Adjustment Period COP and Trades Snapshot for the hour *h* that includes the 15-minute Settlement Interval. |
| DAEP *q, p, h* | MW | *Day-Ahead Energy Purchase*—The QSE *q*’s energy purchased in the DAM at the Settlement Point *p* for the hour *h* that includes the 15-minute Settlement Interval. |
| DAES *q, p, h* | MW | *Day-Ahead Energy Sale*—The QSE *q*’s energy sold in the DAM at the Settlement Point *p* for the hour *h* that includes the 15-minute Settlement Interval. |
| RTQQEPSNAP *q, p, i* | MW | *QSE-to-QSE Energy Purchase by QSE by point*—The QSE *q*’s Energy Trades in which the QSE is the buyer at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, in the COP and Trades Snapshot. |
| RTQQESSNAP *q, p, i* | MW | *QSE-to-QSE Energy Sale by QSE by point*—The QSE *q*’s Energy Trades in which the QSE is the seller at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, in the COP and Trades Snapshot. |
| RTQQEPADJ *q, p, i* | MW | *QSE-to-QSE Energy Purchase by QSE by point*—The QSE *q*’s Energy Trades in which the QSE is the buyer at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, in the last COP and Trades Snapshot at the end of the Adjustment Period for that Settlement Interval. |
| RTQQESADJ *q, p, i* | MW | *QSE-to-QSE Energy Sale by QSE by point*—The QSE *q*’s Energy Trades in which the QSE is the seller at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, in the last COP and Trades Snapshot at the end of the Adjustment Period for that Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *r* | none | A Generation Resource that is QSE-committed or planning to operate as a Quick Start Generation Resource (QSGR) for the Settlement Interval as shown by the Resource Status of OFFQS in the COP and Trades Snapshot and/or Adjustment Period snapshot; or RUC-decommitted for the Settlement Interval (subject to paragraphs (1) and (2) above); or a Switchable Generation Resource (SWGR) released by a non-ERCOT Control Area Operator (CAO) to operate in the ERCOT Control Area due to an ERCOT RUC instruction for an actual or anticipated EEA condition. If the Settlement Interval is a RUCAC-Interval, *r* represents the Combined Cycle Generation Resource that was QSE-committed at the time the RUCAC was issued. |
| *z* | none | A previous RUC process for the Operating Day. |
| *i* | none | A 15-minute Settlement Interval. |
| *h* | none | The hour that includes the Settlement Interval *i*. |
| *ruc* | none | The RUC process for which this RUC Shortfall Ratio Share is calculated. |

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| ***[NPRR1009, NPRR1014, NPRR1029, NPRR1032, and NPRR1236: Replace applicable portions of Section 5.7.4.1.1 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009 and NPRR1236; or upon system implementation for NPRR1014, NPRR1029, or NPRR1032:]***  5.7.4.1.1 Capacity Shortfall Ratio Share  (1) In calculating the shortfall amount for each QSE, the Resource capacity (RCAPSNAP and RCAPADJ) shall be calculated for a Generation Resource that meets any of the following conditions:  (a) QSE-committed;  (b) Planning to operate as a Quick Start Generation Resource (QSGR) for the Settlement Interval as shown by the COP Status of OFFQS in the RUC Snapshot for the RUC Process and/or Adjustment Period; or  (c) A Switchable Generation Resource (SWGR) that is released by a non-ERCOT Control Area Operator (CAO) to operate in the ERCOT Control Area due to an ERCOT RUC instruction for an actual or anticipated EEA condition and that is shown as On-Line in its COP; or  (d) If the Settlement Interval is a RUCAC-Interval, the Combined Cycle Generation Resource that was QSE-committed at the time the RUCAC was issued, excluding the condition for SWGRs as describe in paragraph (c) above.  (2) In calculating the amount short for each QSE, the available capacity of an IRR when determining responsibility for the corresponding RUC charges shall be the lesser of the HSL value, as reflected in the COP, and the Wind-powered Generation Resource Production Potential (WGRPP), as described in Section 4.2.2, Wind-Powered Generation Resource Production Potential, for a Wind-powered Generation Resource (WGR), or the PhotoVoltaic Generation Resource Production Potential (PVGRPP), as described in Section 4.2.3, PhotoVoltaic Generation Resource Production Potential, for a PhotoVoltaic Generation Resource (PVGR), at the time of RUC execution. For an IRR, the RCAPSNAP variable used below shall be equal to the minimum of the WGRPP or PVGRPP described above and the HSL value as reflected in the QSE’s COP, at the time of the RUC execution.  (3) In calculating the amount short for each QSE, the QSE must be given a capacity credit for non-Intermittent Renewable Resources (IRRs) that were given notice of decommitment within the two hours before the Operating Hour as a result of the RUC process by setting the RCAPSNAP and RCAPADJ variables used below set equal to the RCAPSNAP value for the Resource immediately before the decommitment instruction was given.  (4) In calculating the short amount for each QSE, if the RCAPSNAP for a non-IRR was credited to the QSE during the RUC Snapshot but the Resource experiences a Forced Outage within two hours before the start of the Settlement Interval, then the RCAPSNAP for that Resource is also credited to the QSE in the RCAPADJ.  (5) In calculating the short amount for each QSE, if the DCIMPSNAP was credited to the QSE during the RUC Snapshot but the entire Direct Current Tie (DC Tie) experiences a Forced Outage within two hours before the start of the Settlement Interval, then the DCIMPSNAP is also credited to the QSE in the RTDCIMP.  (6) For Combined Cycle Generation Resources, if more than one Combined Cycle Generation Resource is shown On-Line in its COP for the same Settlement hour, then the provisions of paragraph (6)(a) of Section 3.9.1, Current Operating Plan (COP) Criteria, apply in the determination of the On-Line Combined Cycle Generation Resource for that Settlement hour.  (7) The QSE Ancillary Service shortfall calculation in MW for each hour in the RUC Snapshot or for the end of the Adjustment Period involves solving an optimization that minimizes any potential Ancillary Service shortfall for a QSE. This is done by determining the optimal utilization of Ancillary Service capabilities within each QSE’s portfolio of Resources to meet its net Ancillary Service position for each Ancillary Service sub-type. A QSE’s Ancillary Service shortfall for an hour is the difference between the QSE’s net Ancillary Service position and its coverage of Ancillary Services using the outputs of this optimization based on the QSE’s Resource Ancillary Service capabilities for that hour as reflected in the COPs submitted by the QSE.  (a) For each Ancillary Service sub-type, the Ancillary Service MW capability for each Resource in the QSE’s portfolio for a given hour in the RUC Snapshot or at the end of the Adjustment Period (ASMWCAPSNAP and ASMWCAPADJ) is calculated as the minimum of:  (i) HSL minus LSL in the COP if the Resource is On-Line (ON, ONOS, ONSC, ONEMR, ONRUC, ONOPTOUT, and ONL). If a Generation Resource COP Resource Status is OFF, OFFQS, or DRRS, only the COP HSL is used. For a Combined Cycle Train, the Resource refers to a particular Combined Cycle Generation Resource belonging to that Combined Cycle Train. For a Combined Cycle Train, select the Combined Cycle Generation Resource that is On-Line (ON, ONEMR, ONRUC, ONOPTOUT, or ONOS) with the highest HSL. If none of the Combined Cycle Generation Resources of a Combined Cycle Train are On-Line, then select the Combined Cycle Generation Resource that has the highest HSL and a COP Resource Status of OFF and that can be started up within 30 minutes;  (ii) Submitted Ancillary Service Offer MW quantity for the Ancillary Service type/sub-type;  (iii) Submitted COP Ancillary Service MW capability; and  (iv) Qualified Ancillary Service MW amount for the Ancillary Service sub-type. For Resources with COP Resource Status of OFFQS, the qualified MW amounts for Reg-Up, Reg-Down, and RRS will be set to zero. For Resources with a COP Resource Status of OFF, the qualified MW amounts for Reg-Up, Reg-Down, RRS, and ECRS will be set to zero. For Resources with a COP Resource Status of DRRS, the qualified MW amounts for Reg-Up, Reg-Down, RRS, ECRS, and Non-Spin will be set to zero.  (b) The QSE Ancillary Service shortfall calculation enforces the following constraints for each hour using data from the RUC Snapshot or the end of the Adjustment Period:  (i) Ensure that a QSE’s portfolio of Resource capacities are only used to cover that QSE’s net Ancillary Service position by each Ancillary Service sub-type.  (ii) A QSE’s Fast Frequency Response Service (FFRS) position can be covered by the QSE’s portfolio of Energy Storage Resources (ESRs) qualified to provide FFRS, Load Resources having a high-set under-frequency Relay that are qualified for Responsive Reserve (RRS) or Controllable Load Resources (CLRs), Generation Resources, and ESRs that are qualified to provide RRS as Primary Frequency Response.  (iii) A QSE’s RRS position of the type provided by Load Resources having a high-set under-frequency Relay that are qualified for RRS can be covered by the QSE’s portfolio of Load Resources qualified to provide this type of RRS or CLRs, Generation Resources, and ESRs that are qualified to provide RRS as Primary Frequency Response.  (iv) A QSE’s ERCOT Contingency Reserve Service (ECRS) position of the type that is not SCED-dispatchable can be covered by the QSE’s portfolio of Load Resources that are qualified to provide non-SCED dispatchable ECRS, or by CLRs, Generation Resources, and ESRs that are qualified to provide ECRS of the type that is SCED-dispatchable.  (v) A QSE’s Non-Spinning Reserve (Non-Spin) position of the type that is not SCED-dispatchable can be covered by the QSE’s portfolios of Load Resources that are qualified to provide non-SCED dispatchable Non-Spin, or by CLRs, Generation Resources, and ESRs that are qualified to provide Non-Spin of the type that is SCED-dispatchable.  (vi) For each Resource and Ancillary Service sub-type:  (A) Ancillary Service capacity used for each Ancillary Service sub-type cannot exceed that Resource’s Ancillary Service capability for that Ancillary Service sub-type. For Ancillary Service type of DRRS, the Ancillary Service capacity used from a Resource cannot exceed that Resource’s HSL.  (B) The sum of all the Ancillary Service capacities used for each Ancillary Service sub-type cannot exceed the COP HSL minus LSL limits. In the accounting of Ancillary Service capacity used for DRRS, the DRRS Release Factor (DRRSRF) for that particular Operating Hour is used. For Generation Resources that have a Resource Status of OFF and the Ancillary Service type is Non-Spin, consider LSL to be zero. For Generation Resources that have a Resource Status of OFFQS and the Ancillary Service type is Non-Spin or ECRS, consider LSL to be zero. For Generation Resources that have a Resource Status of DRRS and the Ancillary Service type is DRRS, consider LSL to be zero.  (C) For ESRs, consider:  (1) Duration requirements for each Ancillary Service type and the submitted COP values for Hour Beginning Planned State of Charge (SOC), Minimum SOC (MinSOC) and Maximum SOC (MaxSOC). In accounting for SOC for DRRS, the DRRSRF for that particular Operating Hour is used and there is an additional check in which the DRRS Ancillary Service capacity used, without consideration of the DRRSRF, must satisfy the duration requirement for DRRS;  (2) Ancillary Service deployment factors, duration requirements for different Ancillary Service types or sub-types, and the difference between the submitted COP Hour Beginning Planned SOC for the hour under consideration and the next hour; and  (3) The charge or discharge MW required to satisfy the above constraints.  (c) The outputs of the optimization for each Resource are:  (i) The Resource’s MW capacity used to cover its QSE’s net Ancillary Service position by Ancillary Service sub-type for a given hour. These values are ASMWCAPUSNAP for a given hour in the RUC Snapshot and ASMWCAPUADJ for the end of the Adjustment Period.  (ii) For an ESR, the MW discharge (positive) or charge (negative) required to support the ESR’s calculated Ancillary Service coverage of its QSE’s net Ancillary Service position, considering the submitted COP values for MinSOC, MaxSOC, and the difference in the Hour Beginning Planned SOC for the hour under consideration and the next hour. This value will also account for Ancillary Service deployment factors and the duration requirements for energy and different Ancillary Service types. These values are MWSNAP for a given hour in the RUC Snapshot and MWADJ for the end of the Adjustment Period.  (8) The capacity shortfall ratio share of a specific QSE for a particular RUC process is calculated, for a 15-minute Settlement Interval, as follows:  **RUCSFRS *ruc, i, q* = RUCSF *ruc, i, q* / RUCSFTOT *ruc, i***  Where:  RUCSFTOT *ruc, i* = RUCSF *ruc, i, q*  (9) The RUC Shortfall in MW for one QSE for one 15-minute Settlement Interval is:  **RUCSF *ruc, i, q* = Max (0, Max (RUCSFSNAP *ruc, q, i*, RUCSFADJ *ruc, q, i*) – RUCCAPCREDIT *q, i, z*)**  (10) The RUC Shortfall in MW for one QSE for one 15-minute Settlement Interval, as measured at the RUC Snapshot, is:  **RUCSFSNAP *ruc ,q ,i* = Max (RUCOSFSNAP *ruc, q, i* , RUCASFSNAP *ruc, q, i*)**  (11) The overall shortfall in MW that a QSE had according to the RUC Snapshot for a 15-minute Settlement Interval is:  **RUCOSFSNAP *ruc, q, i* = Max (0, ((RTAML *q, p, i* \* 4) + ASONPOSSNAP *ruc, q, i* – RUCCAPSNAP *ruc, q, i*))**  The QSE’s On-Line Ancillary Service Position according to the RUC Snapshot for a 15-minute Settlement Interval is:  **ASONPOSSNAP *ruc, q, i* = RUPOSSNAP *ruc, q, h* + RRPOSSNAP *ruc, q, h* + ECRPOSSNAP *ruc, q, h***  **+ Max (0, ((NSPOSSNAP *ruc, q, h* + DRPOSSNAP *ruc, q, h* )**  **– ASOFFOFRSNAP *ruc, q, r, h*))**  The amount of capacity that a QSE had according to the RUC Snapshot for a 15-minute Settlement Interval is:  **RUCCAPSNAP *ruc, q, i* = RCAPSNAP *ruc, q, r, h* + (RUCCPSNAP *ruc, q, h* – RUCCSSNAP *ruc, q, h*) + (DAEP *q, p, h* –DAES *q, p, h*) + (RTQQEPSNAP *ruc, q, p, i* – RTQQESSNAP *ruc, q, p, i*) +  DCIMPSNAP *ruc, q, p, i* + ASOFRLRSNAP *ruc, q, r, h* + ESRMWSNAP *ruc, q, h* + ESRASSNAP *ruc, q, h***  Where:  The QSE’s net up Ancillary Service position (Reg-Up + RRS + ECRS + Non-Spin + DRRS) covered by the QSE’s portfolio of ESRs is:  ESRASSNAP *ruc, q, h* = ASMWCAPUSNAP *ruc, q, h, ASSubType, r*  The sum of the QSE’s ESR discharging (positive) or charging (negative) output is:  ESRMWSNAP *ruc, q, h* = MWSNAP *ruc, q, h, r*  (12) The Ancillary Service shortfall in MW that a QSE had according to the RUC Snapshot for a 15-minute Settlement Interval is:  **RUCASFSNAP *ruc, q, i* = RUPOSSNAP *ruc, q, h*** + **RDPOSSNAP *ruc, q, h***  + **RRPOSSNAP *ruc, q, h*** + **ECRPOSSNAP *ruc, q, h***  + **NSPOSSNAP *ruc, q, h*** + **DRPOSSNAP *ruc, q, h***  **– ASMWCAPUQSNAP *ruc, q, h***  Where:  ASMWCAPUQSNAP *ruc, q, h*  = ASMWCAPUSNAP *ruc, q, h, ASSubType, r*  RRPOSSNAP *ruc, q, h* = Max(0, PFPOSSNAP *ruc, q, h* + Max(0, UFPOSSNAP *ruc, q, h* + FFPOSSNAP *ruc, q, h*))  ECRPOSSNAP *ruc, q, h* = Max(0, ECSPOSSNAP *ruc, q, h* + ECMPOSSNAP *ruc, q, h*)  NSPOSSNAP *ruc, q, h* = Max(0, NSSPOSSNAP *ruc, q, h* + NSMPOSSNAP *ruc, q, h*)  (13) The RUC Shortfall in MW for one QSE for one 15-minute Settlement Interval, as measured at the end of the Adjustment Period, is:  **RUCSFADJ *ruc, q, i* = Max (RUCOSFADJ *ruc, q, i*, RUCASFADJ *q, i* )**  (14) The overall shortfall in MW that a QSE had at the end of the Adjustment Period for a 15-minute Settlement Interval, but including capacity from IRRs as seen in the RUC Snapshot, is:  **RUCOSFADJ *ruc, q, i*  = Max (0, ((RTAML *q, p, i* \*4) + ASONPOSADJ *q, i* – (RCAPSNAP *ruc, q, r, h* + RUCCAPADJ *q, i*)))**  Where:  The On-Line Ancillary Service Position the QSE had at the end of the Adjustment Period for a 15-minute Settlement Interval is:  ASONPOSADJ *q ,i* = RUPOSADJ *q, h* + RRPOSADJ *q, h* + ECRPOSADJ *q, h* + Max (0, ((NSPOSADJ *q, h* + DRPOSADJ *q, h* ) – ASOFFOFRADJ *q, r, h*))  The amount of capacity that a QSE had at the end of the Adjustment Period for a 15-minute Settlement Interval, excluding capacity from IRRs, is:  RUCCAPADJ *q, i* = RCAPADJ *q, r, h* + (RUCCPADJ *q, h* – RUCCSADJ *q, h*) + (DAEP *q, p, h* – DAES *q, p, h*) + (RTQQEPADJ *q, p, i* – RTQQESADJ *q, p, i*) +  RTDCIMP *q, p* + ASOFRLRADJ *q, r, h* + ESRMWADJ *q, h* + ESRASADJ *q, h*  Where:  The QSE’s net up Ancillary Service position (Reg-Up + RRS + ECRS + Non-Spin + DRRS) covered by the QSE’s portfolio of ESRs is:  ESRASADJ *q, h* = ASMWCAPUADJ *q, h, ASSubType, r*  The sum of the QSE’s ESR discharging (positive) or charging (negative) output is:  ESRMWADJ *q, h* = MWADJ *q, h, r*  (15) The Ancillary Service shortfall in MW that a QSE had at the end of the Adjustment Period for a 15-minute Settlement Interval is:  **RUCASFADJ *q, i* = RUPOSADJ *q, h*** + **RDPOSADJ *q, h***  + **RRPOSADJ *q, h*** + **ECRPOSADJ *q, h*** + **NSPOSADJ *q, h***  + **DRPOSADJ *q, h*** – **ASMWCAPUQADJ *q, h***  Where:  ASMWCAPUQADJ *q, h* = ASMWCAPUADJ  *q, h, ASSubType, r*  RRPOSADJ *q, h* = Max(0, PFPOSADJ *q, h* + Max(0,UFPOSADJ *q, h* + FFPOSADJ *q, h*))  ECRPOSADJ *q, h* = Max(0, ECSPOSADJ *q, h* + ECMPOSADJ *q, h*)  NSPOSADJ *q, h* = Max(0,NSSPOSADJ *q, h* + NSMPOSADJ *q, h*)  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | RUCSFRS *ruc, i, q* | none | *RUC Shortfall Ratio Share*—The ratio of the QSE *q*’s capacity shortfall to the sum of all QSEs’ capacity shortfalls, for the RUC process *ruc*, for the 15-minute Settlement Interval *i*. | | RUCSF *ruc, i, q* | MW | *RUC Shortfall*—The QSE *q*’s capacity shortfall for the RUC process *ruc* for the 15-minute Settlement Interval *i*. | | RUCSFTOT *ruc, i* | MW | *RUC Shortfall Total*—The sum of all QSEs’ capacity shortfalls, for a RUC process *ruc*, for a 15-minute Settlement Interval *i*. | | RUCSFSNAP *ruc, q, i* | MW | *RUC Shortfall at Snapshot*—The QSE *q*’s capacity shortfall will be the maximum of the QSE’s overall shortfall or Ancillary Service shortfall, as calculated for the RUC process *ruc* for the 15-minute Settlement Interval *i*. | | RUCSFADJ *ruc, q, i* | MW | *RUC Shortfall at End of Adjustment Period*—The QSE *q*’s end of Adjustment Period capacity shortfall will be the maximum of the QSE’s overall shortfall or Ancillary Service shortfall, as calculated for the RUC process *ruc*, for the 15-minute Settlement Interval *i*. | | RUCCAPCREDIT *q, i, z* | MW | *RUC Capacity Credit*—The QSE *q*’s capacity credit resulting from capacity paid through the RUC Capacity-Short Amount for RUC process *z* for the 15-minute Settlement Interval *i*. | | RUCOSFSNAP *ruc, q, i* | MW | *RUC Overall Shortfall at Snapshot* —The QSE *q*’s overall capacity shortfall according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*. | | RUCASFSNAP *ruc, q, i* | MW | *RUC Ancillary Service Shortfall at Snapshot* —The QSE *q*’s Ancillary Service capacity shortfall according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*. | | ASONPOSSNAP *ruc ,q ,i* | MW | *Ancillary Service On-Line Position at Snapshot –* The QSE *q’s* total On-Line Ancillary Service position according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i.* | | RUPOSSNAP *ruc, q, h* | MW | *Regulation Up Position at Snapshot* ¾The QSE *q’s* net positive Real-Time Reg-Up Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. | | RRPOSSNAP *ruc, q, h* | MW | *Responsive Reserve Service Position at Snapshot* ¾The QSE *q’s* net positive Real-Time RRS Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. | | ECRPOSSNAP *ruc, q, h* | MW | *ERCOT Contingency Reserve Service Position at Snapshot* ¾The QSE *q’s* net positive Real-Time ECRS Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. | | NSPOSSNAP *ruc, q, h* | MW | *Non-Spin Reserve Service Position at Snapshot* ¾The QSE *q’s* net positive Real-Time Non-Spin Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. | | RDPOSSNAP *ruc, q, h* | MW | *Regulation Down Position at Snapshot* ¾The QSE *q’s* net positive Real-Time Regulation Down Service (Reg-Down) Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. | | DRPOSSNAP *ruc, q, h* | MW | *Dispatchable Reliability Reserve Service Position at Snapshot* ¾The QSE *q’s* net positive Real-Time DRRS Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. | | ASOFFOFRSNAP *ruc, q, r, h* | MW | *Ancillary Service Offline Offers at Snapshot –*The capacity represented by validated Ancillary Service Offers for Non-Spin for Resource *r* with COP status of “OFF”, and capacity represented by validated Ancillary Service Offers for DRRS for Resource *r* with COP status of “DRRS”, represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. | | ASOFRLRSNAP *ruc, q, r, h* | MW | *Ancillary Service Offer per Load Resource at Snapshot –* The capacity represented by validated Ancillary Service Offers for Reg-Up, Non-Spin, RRS, and ECRS for the Load Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. | | PFPOSSNAP *ruc, q, h* | MW | *Responsive Reserve (Governor Response or Governor-Like Response) Position at Snapshot*¾The QSE *q’s* net Real-Time RRS-PFR Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. This value can be positive or negative. | | UFPOSSNAP *ruc, q, h* | MW | *Responsive Reserve (Under Frequency trigger at 59.7 Hz.) Position at Snapshot*¾The QSE *q’s* net Real-Time RRS-UFR Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. This value can be positive or negative. | | FFPOSSNAP *ruc, q, h* | MW | *Responsive Reserve (Fast Frequency Response) Position at Snapshot*¾The QSE *q’s* net positive Real-Time RRS-FFR Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. | | ECSPOSSNAP *ruc, q, h* | MW | *ERCOT Contingency Reserve Service (SCED Dispatchable) Position at Snapshot*¾The QSE *q’s* net ECRS Ancillary Service Position that is SCED-dispatchable according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. This value can be positive or negative. | | ECMPOSSNAP *ruc, q, h* | MW | *ERCOT Contingency Reserve Service (Non-SCED Dispatchable) Position at Snapshot*¾The QSE *q’s* net positive ECRS Ancillary Service Position that is non-SCED-dispatchable according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. | | NSSPOSSNAP *ruc, q, h* | MW | *Non-Spin Reserve Service (SCED Dispatchable) Position at Snapshot*¾The QSE *q’s* net Non-Spin Ancillary Service Position that is SCED-dispatchable according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. This value can be positive or negative. | | NSMPOSSNAP *ruc, q, h* | MW | *Non-Spin Reserve Service (Non-SCED Dispatchable) Position at Snapshot*¾The QSE *q’s* net positive Non-Spin Ancillary Service Position that is non-SCED-dispatchable according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. | | ASMWCAPUQSNAP *ruc, q, h* | MW | *Calculated Total MW Capacity used to cover the QSE’s Ancillary Service Position at Snapshot*—The calculated total MW capacity for a QSE *q* that represents the amount of the QSE’s Ancillary Service Position covered by its Resourcesfor the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. | | ASMWCAPUSNAP *ruc, q, h, ASSubtype, r* | MW | *Calculated MW Capacity used to cover the QSE’s ‘AStype’ Ancillary Service Position at Snapshot*—The calculated MW Capacity of a Resource *r* represented by QSE *q* that is used to cover its QSE’s “ASSubtype” Ancillary Service Positionfor the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. | | MWSNAP *ruc, q, h, r* | MW | *Calculated MW required to support ESR’s calculated Ancillary Service coverage at Snapshot*—The MW discharge (positive) or charge (negative) required to support the ESR’s calculated Ancillary Service coverage considering the submitted COP values for Hour Beginning Planned SOC, MinSOC, MaxSOC and the difference in the Hour Beginning Planned SOC for the hour under consideration and the next hour while accounting for Ancillary Service deployment factors and the duration requirements for energy and different Ancillary Service types Positionfor the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. | | ESRASSNAP ***ruc, q, h*** | MW | *Calculated Ancillary Service MW Capacity Provided By QSE’s ESR Portfolio at Snapshot*—The total ESR MW capacity used to cover the QSE *q’s* Upward Ancillary Service position for Reg-Up, RRS, ECRS, Non-Spin, and DRRS in the RUC Snapshot for the RUC process *ruc*, for the hour *h* that includes the 15-minute Settlement Interval. | | ESRMWSNAP ***ruc, q, h*** | MW | *Calculated QSE Total ESR MW Discharging or Charging Required To Support Ancillary Service at Snapshot*—The total net ESR MW discharging or charging required to cover the QSE *q’s* Ancillary Service position provided by the QSE ESR portfolio in the RUC Snapshot for the RUC process *ruc*, for the hour *h* that includes the 15-minute Settlement Interval, taking into account the COP SOC values from COP. | | RUCOSFADJ *ruc, q, i* | MW | *RUC Overall Shortfall at End of Adjustment Period* —The QSE *q’s* overall capacity shortfall at the end of the Adjustment Period, including capacity from IRRs as seen in the RUC Snapshot for the RUC process *ruc*, for the 15-minute Settlement Interval *i*. | | RUCASFADJ *q, i* | MW | *RUC Ancillary Service Shortfall at End of Adjustment Period* —The QSE *q’s* Ancillary Service capacity shortfall at the end of the Adjustment Period for the 15-minute Settlement Interval *i*. | | ASONPOSADJ *q ,i* | MW | *Ancillary Service On-Line Position at End of Adjustment Period –* The QSE *q’s* total On-Line Ancillary Service position at the end of the Adjustment Periodfor the 15-minute Settlement Interval *i.* | | RUPOSADJ *q, h* | MW | *Regulation Up Position at End of Adjustment Period* ¾The QSE *q’s* net positive Reg-Up Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. | | RRPOSADJ *q, h* | MW | *Responsive Reserve Service Position at End of Adjustment Period* ¾The QSE *q’s* net positiveRRS Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. | | ECRPOSADJ *q, h* | MW | *ERCOT Contingency Reserve Service Position at End of Adjustment Period* ¾The QSE *q’s* net positive ECRS Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. | | NSPOSADJ *q, h* | MW | *Non-Spin Reserve Service Position at End of Adjustment Period* ¾The QSE *q’s* net positive Non-Spin Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. | | RDPOSADJ *q, h* | MW | *Regulation Down Position at End of Adjustment Period* ¾The QSE *q’s* net positive Reg-Down Ancillary Service Position at the end of the Adjustment period for the hour *h* that includes the 15-minute Settlement Interval. | | DRPOSADJ *q, h* | MW | *Dispatchable Reliability Reserve Service Position at End of Adjustment Period* ¾The QSE *q’s* net positive DRRS Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. | | ASOFFOFRADJ *q, r, h* | MW | *Ancillary Service Offline Offers at End of Adjustment Period –*The capacity represented by validated Ancillary Service Offers for Non-Spin for Resource *r* with COP status of “OFF”, and capacity represented by validated Ancillary Service Offers for DRRS for Resource *r* with COP status of “DRRS”,represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. | | ASOFRLRADJ *q, r, h* | MW | *Ancillary Service Offer per Load Resource at End of Adjustment Period –* The capacity represented by validated Ancillary Service Offers for Reg-Up, Non-Spin, RRS, and ECRS for the Load Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h.* | | PFPOSADJ *q, h* | MW | *Responsive Reserve (Governor Response or Governor-Like Response) Position at End of Adjustment Period*—The QSE *q’s* net RRS-PFR Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. This value can be positive or negative. | | UFPOSADJ *q, h* | MW | *Responsive Reserve (Under Frequency trigger at 59.7 Hz.) Position at End of Adjustment Period*—The QSE *q’s* net RRS-UFR Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. This value can be positive or negative. | | FFPOSADJ *q, h* | MW | *Responsive Reserve (Fast Frequency Response) Position at End of Adjustment Period*—The QSE *q’s* net positive RRS-FFR Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. | | ECSPOSADJ *q, h* | MW | *ERCOT Contingency Reserve Service (SCED Dispatchable) Position at End of Adjustment Period*—The QSE *q’s* net ECRS SCED Dispatchable Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. This value can be positive or negative. | | ECMPOSADJ *q, h* | MW | *ERCOT Contingency Reserve Service (Non-SCED Dispatchable) Position at End of Adjustment Period*—The QSE *q’s* net positive ECRS non-SCED-dispatchable Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. | | NSSPOSADJ *q, h* | MW | *Non-Spin Reserve Service (SCED Dispatchable) Position at End of Adjustment Period*¾The QSE *q’s* net Non-Spin SCED-dispatchable Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. This value can be positive or negative. | | NSMPOSADJ *q, h* | MW | *Non-Spin Reserve Service (Non-SCED Dispatchable) Position at End of Adjustment Period*—The QSE *q’s* net positive Non-Spin non-SCED-dispatchable Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. | | ASMWCAPUQADJ *q, h* | MW | *Calculated Total MW Capacity used to cover the QSE’s Ancillary Service Position at End of Adjustment Period*—The calculated total MW capacity for a QSE *q* that represents the amount of the QSE’s Ancillary Service Position covered by its Resourcesat the end of Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. | | ASMWCAPUADJ *q, h, ASSubtype, r* | MW | *Calculated MW Capacity used to cover the QSE’s ‘AStype’ Ancillary Service Position at End of Adjustment Period*—The calculated MW Capacity of a Resource *r* represented by QSE *q* that is used to cover its QSE’s “ASSubtype” Ancillary Service Positionat the end of Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. | | MWADJ *q, h, r* | MW | *Calculated MW discharge (positive) or charge (negative) required to support ESR’s calculated Ancillary Service coverage at End of Adjustment Period*—The MW discharge (positive) or charge (negative) required to support the ESR’s calculated Ancillary Service coverage considering the submitted COP values for Hour Beginning Planned SOC, MinSOC, MaxSOC and the difference in the Hour Beginning Planned SOC for the hour under consideration and the next hour while accounting for Ancillary Service deployment factors and the duration requirements for energy and different Ancillary Service types Positionat the end of Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. | | ESRASADJ *q, h* | MW | *Calculated Ancillary Service MW Capacity Provided By QSE’s ESR Portfolio at the End of Adjustment Period*—The total ESR MW capacity used to cover the QSE *q’s* Upward Ancillary Service position for Reg-Up, RRS, ECRS, Non-Spin, and DRRS at the end of Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. | | ESRMWADJ *q, h* | MW | *Calculated QSE Total ESR MW Discharging or Charging Required To Support Ancillary Service at End of Adjustment Period*—The total net ESR MW discharging or charging required to cover the QSE *q’s* Ancillary Service position provided by the QSE ESR portfolio at the end of Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval, taking into account the COP SOC values from COP. | | RTAML *q, p, i* | MWh | *Real-Time Adjusted Metered Load*—The QSE *q*’s Adjusted Metered Load (AML) at the Settlement Point *p* for the 15-minute Settlement Interval *i*. | | RUCCAPSNAP *ruc, q, i* | MW | *RUC Capacity Snapshot at time of RUC*—The amount of the QSE *q*’s calculated capacity in the RUC Snapshot for the RUC process *ruc* for a 15-minute Settlement Interval *i*. | | RCAPSNAP *ruc, q, r, h* | MW | *Resource Capacity at Snapshot*—The available capacity of Generation Resource *r* represented by the QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. For Generation Resources that are not IRRs, the available capacity shall be equal to HSL. For WGRs and PVGRs, the available capacity shall be equal to the lesser of the HSL or the WGRPP and the PVGRPP, respectively. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DCIMPSNAP *ruc, q, p, i* | MW | *DC Import at Snapshot*—The approved aggregated DC Tie Schedule submitted by QSE *q* as an importer into the ERCOT System through DC Tie *p*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*. | | RTDCIMP *q, p* | MW | *Real-Time DC Import per QSE per Settlement Point*—The aggregated final, approved DC Tie Schedule submitted by QSE *q* as an importer into the ERCOT System through DC Tie *p*, for the 15-minute Settlement Interval. | | RUCCPSNAP *ruc, q, h* | MW | *RUC Capacity Purchase at Snapshot*—The QSE *q*’s capacity purchase, according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. | | RUCCSSNAP *ruc, q, h* | MW | *RUC Capacity Sale at Snapshot*—The QSE *q*’s capacity sale, according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. | | RUCCAPADJ *q, i* | MW | *RUC Capacity at End of Adjustment Period*—The amount of the QSE *q*’s calculated capacity, excluding capacity for IRRs, at the end of the Adjustment Period for a 15-minute Settlement Interval *i.* | | RCAPADJ *q, r, h* | MW | *Resource Capacity at End of Adjustment Period*—The HSL of a non-IRR Generation Resource *r* represented by the QSE *q* at the end of the Adjustment Period, for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RUCCPADJ *q, h* | MW | *RUC Capacity Purchase at End of Adjustment Period*—The QSE *q*’s capacity purchase, at the end of Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. | | RUCCSADJ *q, h* | MW | *RUC Capacity Sale at End of Adjustment Period*—The QSE *q*’s capacity sale, at the end of Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. | | DAEP *q, p, h* | MW | *Day-Ahead Energy Purchase*—The QSE *q*’s energy purchased in the DAM at the Settlement Point *p* for the hour *h* that includes the 15-minute Settlement Interval. | | DAES *q, p, h* | MW | *Day-Ahead Energy Sale*—The QSE *q*’s energy sold in the DAM at the Settlement Point *p* for the hour *h* that includes the 15-minute Settlement Interval. | | RTQQEPSNAP *ruc, q, p, i* | MW | *Real-Time QSE-to-QSE Energy Purchase at Snapshot*—The QSE *q*’s Energy Trades in which the QSE is the buyer at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, in the RUC Snapshot for the RUC process *ruc*. | | RTQQESSNAP *ruc, q, p, i* | MW | *Real-Time QSE-to-QSE Energy Sale at Snapshot*—The QSE *q*’s Energy Trades in which the QSE is the seller at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, in the RUC Snapshot for the RUC process *ruc*. | | RTQQEPADJ *q, p, i* | MW | *Real-Time QSE-to-QSE Energy Purchase at End of Adjustment Period*—The QSE *q*’s Energy Trades in which the QSE is the buyer at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, at the end of the Adjustment Period for that Settlement Interval. | | RTQQESADJ *q, p, i* | MW | *Real-Time QSE-to-QSE Energy Sale at End of Adjustment Period*—The QSE *q*’s Energy Trades in which the QSE is the seller at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, at the end of the Adjustment Period for that Settlement Interval. | | *q* | none | A QSE. | | *p* | none | A Settlement Point. | | *r* | none | A Generation Resource, an ESR, or a Load Resource. | | *ASSubType* | none | Ancillary Service Sub-Type: Reg-Up, Reg-Down, RRS provided as Primary Frequency Response, RRS provided via a high-set under-frequency relay, Fast Frequency Response (FFR), ECRS that is SCED-dispatchable, ECRS that is non-SCED dispatchable, Non-Spin that is SCED-dispatchable, Non-Spin that is non-SCED-dispatchable, and DRRS. | | *z* | none | A previous RUC process for the Operating Day. | | *i* | none | A 15-minute Settlement Interval. | | *h* | none | The hour that includes the Settlement Interval *i*. | | *ruc* | none | The RUC process for which this RUC Shortfall Ratio Share is calculated. | |

6.1 Introduction

(1) This Section addresses the following components: the Adjustment Period and Real-Time Operations, including Emergency Operations.

(2) The Adjustment Period provides each Qualified Scheduling Entity (QSE) the opportunity to adjust its trades, Self-Schedules, and Resource commitments as more accurate information becomes available under Section 6.4, Adjustment Period. During the Adjustment Period, ERCOT continues to evaluate system sufficiency and security by use of Hour-Ahead Reliability Unit Commitment (RUC) processes, as described in Section 5, Transmission Security Analysis and Reliability Unit Commitment. Under certain conditions during the Adjustment Period, ERCOT may also open one or more Supplemental Ancillary Service Markets (SASMs), as described in Section 6.4.9.2, Supplemental Ancillary Services Market.

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| [NPRR1010: Replace paragraph (2) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (2) The Adjustment Period provides each Qualified Scheduling Entity (QSE) the opportunity to adjust its trades, Self-Schedules, and Resource commitments as more accurate information becomes available under Section 6.4, Adjustment Period. During the Adjustment Period, ERCOT continues to evaluate system sufficiency and security by use of Hour-Ahead Reliability Unit Commitment (RUC) processes, as described in Section 5, Transmission Security Analysis and Reliability Unit Commitment. |

(3) During Real-Time operations,ERCOT dispatches Resources under normal system conditions and behavior based on economics and reliability to match system Load with On-Line generation while observing Resource and transmission constraints. The Security-Constrained Economic Dispatch (SCED) process produces Base Points for Resources. ERCOT uses the Base Points from the SCED process and uses the deployment of Regulation Up Service (Reg-Up), Regulation Down Service (Reg-Down), ERCOT Contingency Reserve Service (ECRS), Responsive Reserve (RRS), and Non-Spinning Reserve (Non-Spin) to control frequency and solve potential reliability issues.

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| [NPRR1010: Replace paragraph (3) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (3) During Real-Time operations,ERCOT dispatches Resources under normal system conditions and behavior based on economics and reliability to match system Load with On-Line generation while observing Resource and transmission constraints. The Security-Constrained Economic Dispatch (SCED) process produces Base Points and Ancillary Service awards for Resources. ERCOT uses the Base Points from the SCED process and uses the deployment of Regulation Up Service (Reg-Up), Regulation Down Service (Reg-Down), ERCOT Contingency Reserve Service (ECRS), Responsive Reserve (RRS), Non-Spinning Reserve (Non-Spin), and Dispatchable Reliability Reserve Service (DRRS) to control frequency and solve potential reliability issues. |

(4) 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, using the Locational Marginal Prices (LMPs) from all of the executions of SCED in the Settlement Interval. In contrast, the Day-Ahead Market (DAM) energy settlements will use DAM Settlement Point Prices that are calculated for Resource Nodes, Load Zones, and Hubs for a one-hour Settlement Interval.

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| [NPRR1010: Replace paragraph (4) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (4) 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, using the Locational Marginal Prices (LMPs) from all of the executions of SCED in the Settlement Interval. Similarly, Real-Time Ancillary Service Settlements use Real-Time Market Clearing Prices for Capacity (MCPCs) for a 15-minute Settlement Interval, using the MCPCs from all of the executions of SCED in the Settlement Interval. In contrast, the Day-Ahead Market (DAM) energy settlements will use DAM Settlement Point Prices that are calculated for Resource Nodes, Load Zones, and Hubs for a one-hour Settlement Interval, and DAM Ancillary Service Settlements will use DAM MCPCs for a one-hour Settlement Interval. |

(5) 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.

**6.5.7.3 Security Constrained Economic Dispatch**

(1) The SCED process is designed to simultaneously manage energy, the system power balance and network congestion through Resource Base Points and calculation of LMPs every five minutes. The SCED process uses a two-step methodology that applies mitigation prospectively to resolve Non-Competitive Constraints for the current Operating Hour. The SCED process evaluates Energy Offer Curves, Output Schedules and Real-Time Market (RTM) Energy Bids to determine Resource Dispatch Instructions by maximizing bid-based revenues minus offer-based costs, subject to power balance and network constraints. The SCED process uses the Resource Status provided by SCADA telemetry under Section 6.5.5.2, Operational Data Requirements, and validated by the Real-Time Sequence, instead of the Resource Status provided by the COP.

(2) The SCED solution must monitor cumulative deployment of Regulation Services and ensure that Regulation Services deployment is minimized over time.

(3) In the Generation To Be Dispatched (GTBD) determined by LFC, ERCOT shall subtract the sum of the telemetered net real power consumption from all CLRs available to SCED.

(4) For use as SCED inputs, ERCOT shall use the available capacity of all committed Generation Resources by creating proxy Energy Offer Curves for certain Resources as follows:

(a) Non-IRRs and Dynamically Scheduled Resources (DSRs) without Energy Offer Curves

(i) ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below for:

(A) Each non-IRR for which its QSE has submitted an Output Schedule instead of an Energy Offer Curve; and

(B) Each DSR that has not submitted incremental and decremental Energy Offer Curves.

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL | SWCAP |
| Output Schedule MW plus 1 MW | SWCAP minus $0.01 |
| Output Schedule MW | -$249.99 |
| LSL | -$250.00 |

(b) DSRs with Energy Offer Curves

(i) For each DSR that has submitted incremental and decremental Energy Offer Curves, ERCOT shall create a monotonically increasing proxy Energy Offer Curve. That curve must consist of the incremental Energy Offer Curve that reflects the available capacity above the Resource’s Output Schedule to its HSL and the decremental Energy Offer Curve that reflects the available capacity below the Resource’s Output Schedule to the LSL. The curve must be created as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| Output Schedule MW plus 1 MW to HSL | Incremental Energy Offer Curve |
| LSL to Output Schedule MW | Decremental Energy Offer Curve |

(c) Non-IRRs without full-range Energy Offer Curves

(i) For each non-IRR for which its QSE has submitted an Energy Offer Curve that does not cover the full range of the Resource’s available capacity, ERCOT shall create a proxy Energy Offer Curve that extends the submitted Energy Offer Curve to use the entire available capacity of the Resource above the highest point on the Energy Offer Curve to the Resource’s HSL and the offer floor from the lowest point on the Energy Offer Curve to its LSL, using these points:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL (if more than highest MW in submitted Energy Offer Curve) | Price associated with highest MW in submitted Energy Offer Curve |
| Energy Offer Curve | Energy Offer Curve |
| 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 |
| LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |

(d) IRRs

(i) For each IRR that has not submitted an Energy Offer Curve, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL | $1,500 |
| HSL minus 1 MW | -$249.99 |
| LSL | -$250.00 |

(ii) For each IRR for which its QSE has submitted an Energy Offer Curve that does not cover the full range of the IRR’s available capacity, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL (if more than highest MW in submitted Energy Offer Curve) | Price associated with the highest MW in submitted Energy Offer Curve |
| Energy Offer Curve | Energy Offer Curve |
| 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 |
| LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |

(e) RUC-committed Resources

(i) For each RUC-committed Resource that has not submitted an Energy Offer Curve, ERCOT shall create a proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL | $250 |
| Zero | $250 |

(ii) For each RUC-committed Resource that has submitted an Energy Offer Curve, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL (if more than highest MW in Energy Offer Curve) | Greater of $250 or price associated with the highest MW in QSE submitted Energy Offer Curve |
| Energy Offer Curve | Greater of $250 or the QSE submitted Energy Offer Curve |
| Zero | Greater of $250 or the first price point of the QSE submitted Energy Offer Curve |

(iii) For each Combined Cycle Generation Resource that was RUC-committed from one On-Line configuration in order to transition to a different configuration with additional capacity, as instructed by ERCOT, that has not submitted an Energy Offer Curve for the RUC-committed configuration, ERCOT shall create a proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL of RUC-committed configuration | $250 |
| Zero | $250 |

(iv) For each Combined Cycle Generation Resource that was RUC-committed from one On-Line configuration in order to transition to a different configuration with additional capacity, as instructed by ERCOT, that has submitted an Energy Offer Curve for the RUC-committed configuration, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL of RUC-committed configuration (if more than highest MW in Energy Offer Curve) | Greater of $250 or price associated with the highest MW in QSE submitted Energy Offer Curve |
| Energy Offer Curve for MW at and above HSL of QSE-committed configuration | Greater of $250 or the QSE submitted Energy Offer Curve |
| HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve and price associated with highest MW in Energy Offer Curve is less than $250) | $250 |
| HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve) | Price associated with the highest MW in QSE submitted Energy Offer Curve |
| Energy Offer Curve for MW at and below HSL of QSE-committed configuration | The QSE submitted Energy Offer Curve |
| 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 |
| LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |

(5) The Entity with decision making authority, as more fully described in Section 3.19.1, Constraint Competitiveness Test Definitions, over how a Resource or Split Generation Resource is offered or scheduled, shall be responsible for all offers associated with each Resource, including offers represented by a proxy Energy Offer Curve.

(6) For a CLR whose QSE has submitted an RTM Energy Bid that does not cover the full range of the Resource’s available Demand response capability, consistent with the CLR’s telemetered quantities, ERCOT shall create a proxy energy bid as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| LPC to MPC minus maximum MW of RTM Energy Bid | Price associated with the lowest MW in submitted RTM Energy Bid curve |
| MPC minus maximum MW of RTM Energy Bid to MPC | RTM Energy Bid curve |
| MPC | Right-most point (lowest price) on RTM Energy Bid curve |

(7) ERCOT shall ensure that any RTM Energy Bid is monotonically non-increasing. The QSE representing the CLR shall be responsible for all RTM Energy Bids, including bids updated by ERCOT as described above.

(8) If a CLR telemeters a status of OUTL, it is not considered as dispatchable capacity by SCED. A QSE may use this function to inform ERCOT of instances when the CLR is unable to follow SCED Dispatch Instructions. Under all telemetered statuses including OUTL, the remaining telemetry quantities submitted by the QSE shall represent the operating conditions of the CLR that can be verified by ERCOT. A QSE representing a CLR with a telemetered status of OUTL is still obligated to provide any applicable Ancillary Service Resource Responsibilities previously awarded to that CLR. This paragraph does not apply to ESRs.

(9) Energy Offer Curves that were constructed in whole or in part with proxy Energy Offer Curves shall be so marked in all ERCOT postings or references to the energy offer.

(10) The two-step SCED methodology referenced in paragraph (1) above is:

(a) The first step is to execute the SCED process to determine Reference LMPs. In this step, ERCOT executes SCED using the full Network Operations Model while only observing limits of Competitive Constraints. Energy Offer Curves for all On-Line Generation Resources and RTM Energy Bids from available CLRs, whether submitted by QSEs or created by ERCOT under this Section, are used in the SCED to determine “Reference LMPs.”

(b) The second step is to execute the SCED process to produce Base Points, Shadow Prices, and LMPs, subject to security constraints (including Competitive and Non-Competitive Constraints) and other Resource constraints. The second step must:

(i) Use Energy Offer Curves for all On-Line Generation Resources, whether submitted by QSEs or created by ERCOT. Each Energy Offer Curve must be bounded at the lesser of the Reference LMP (from Step 1) or the appropriate Mitigated Offer Floor. In addition, each Energy Offer Curve subject to mitigation under the criteria described in Section 3.19.4, Security-Constrained Economic Dispatch Constraint Competitiveness Test, must be capped at the greater of the Reference LMP (from Step 1) at the Resource Node plus a variable not to exceed 0.01 multiplied by the value of the Resource’s Mitigated Offer Cap (MOC) curve at the LSL or the appropriate MOC;

(ii) Use RTM Energy Bid curves for all available CLRs, whether submitted by QSEs or created by ERCOT. There is no mitigation of RTM Energy Bids. An RTM Energy Bid from a CLR represents the bid for energy distributed across all nodes in the Load Zone in which the CLR is located. For an ESR, an RTM Energy Bid represents a bid for energy at the ESR’s Resource Node; and

(iii) Observe all Competitive and Non-Competitive Constraints.

(c) ERCOT shall archive information and provide monthly summaries of security violations and any binding transmission constraints identified in Step 2 of the SCED process. The summary must describe the limiting element (or identified operator-entered constraint with operator’s comments describing the reason and the Resource-specific impacts for any manual overrides). ERCOT shall provide the summary to Market Participants on the MIS Secure Area and to the Independent Market Monitor (IMM).

(11) For each SCED process, in addition to the binding Base Points and LMPs, ERCOT shall calculate a non-binding projection of the Base Points and Resource Node LMPs, Real-Time Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders, Real-Time Off-Line Reserve Price Adders, Hub LMPs and Load Zone LMPs at a frequency of every five minutes for at least 15 minutes into the future based on the same inputs to the SCED process as described in this Section, except that the Resource’s HDL and LDL and the total generation requirement will be as estimated at future intervals. The Resource’s HDL and LDL will be calculated for each interval of the projection based on the ramp rate capability over the study period. ERCOT shall estimate the projected total generation requirement by calculating a Load forecast for the study period. In lieu of the steps described in Section 6.5.7.3.1, Determination of Real-Time On-Line Reliability Deployment Price Adder, the non-binding projection of Real-Time Reliability Deployment Price Adders shall be estimated based on GTBD, reliability deployments MWs, and aggregated offers. The Energy Offer Curve from SCED Step 2, the virtual offers for Load Resources deployed and the power balance penalty curve will be compared against the updated GTBD to get an estimate of the System Lambda from paragraph (2)(m) of Section 6.5.7.3.1. ERCOT shall post the projected non-binding Base Points for each Resource for each interval study period on the MIS Certified Area and the projected non-binding LMPs for Resource Nodes, Real-Time Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders, Real-Time Off-Line Reserve Price Adders, Hub LMPs and Load Zone LMPs on the ERCOT website pursuant to Section 6.3.2, Activities for Real-Time Operations.

(12) For each SCED process, ERCOT shall calculate a Real-Time On-Line Reserve Price Adder and a Real-Time Off-Line Reserve Price Adder based on the On-Line and Off-Line available reserves in the ERCOT System and the Operating Reserve Demand Curve (ORDC). The Real-Time Off-Line available reserves shall be administratively set to zero when the SCED snapshot of the Physical Responsive Capability (PRC) is equal to or below the PRC MW at which Energy Emergency Alert (EEA) Level 1 is initiated. In addition, for each SCED process, ERCOT shall calculate a Real-Time On-Line Reliability Deployment Price Adder. The sum of the Real-Time Reliability Deployment Price Adder and the Real-Time On-Line Reserve Price Adder shall be averaged over the 15-minute Settlement Interval and added to the Real-Time LMPs to determine the Real-Time Settlement Point Prices. The price after the addition of the sum of the Real-Time On-Line Reliability Deployment Price Adder and the Real-Time On-Line Reserve Price Adder to LMPs approximates the pricing outcome of the impact to energy prices from reliability deployments and the Real-Time energy and Ancillary Service co-optimization since the Real-Time On-Line Reserve Price Adder captures the value of the opportunity cost of reserves based on the defined ORDC. An Ancillary Service imbalance Settlement shall be performed pursuant to Section 6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge, to make Resources indifferent to the utilization of their capacity for energy or Ancillary Service reserves.

(13) ERCOT shall determine the methodology for implementing the ORDC to calculate the Real-Time On-Line Reserve Price Adder and Real-Time Off-Line Reserve Price Adder. Following review by TAC, the ERCOT Board shall review the recommendation and approve a final methodology. Within two Business Days following approval by the ERCOT Board, ERCOT shall post the methodology on the ERCOT website.

(14) At the end of each season, ERCOT shall determine the ORDC for the same season in the upcoming year, based on historic data using the ERCOT Board-approved methodology for implementing the ORDC. Annually, ERCOT shall verify that the ORDC is adequately representative of the loss of Load probability for varying levels of reserves. Twenty days after the end of the Season, ERCOT shall post the ORDC for the same season of the upcoming year on the ERCOT website.

(15) ERCOT may override one or more of a CLR’s parameters in SCED if ERCOT determines that the CLR’s participation is having an adverse impact on the reliability of the ERCOT System.

(16) The QSE representing an ESR, in order to charge the ESR, must submit RTM Energy Bids, and the ESR may withdraw energy from the ERCOT System only when dispatched by SCED to do so. An ESR may telemeter a status of OUTL only if the ESR is in Outage status.

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| [NPRR930, NPRR1000, NPRR1010, NPRR1014, NPRR1019, NPRR1188, NPRR1204, NPRR1268, and NPRR1269: Replace applicable portions of Section 6.5.7.3 above with the following upon system implementation for NPRR930, NPRR1000, NPRR1014, NPRR1019, or NPRR1188; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010, NPRR1204, NPRR1268, and NPRR1269:]  **6.5.7.3 Security Constrained Economic Dispatch**  (1) The SCED process is designed to simultaneously manage energy, Ancillary Services, the system power balance and network congestion through Resource Base Points, Ancillary Service awards, and the calculation of LMPs and Real-Time MCPCs approximately every five minutes, or more frequently if necessary. The SCED process uses a two-step methodology that applies mitigation to offers for energy prospectively to resolve Non-Competitive Constraints for the current Operating Hour. The SCED process evaluates Energy Offer Curves, Energy Bid/Offer Curves, Ancillary Service Offers, Output Schedules, and Energy Bid Curves to determine Resource Dispatch Instructions and Ancillary Service awards by maximizing bid-based revenues minus offer-based costs, subject to power balance, Ancillary Service Demand Curves (ASDCs), and network constraints. The SCED process uses the Resource Status provided by SCADA telemetry under Section 6.5.5.2, Operational Data Requirements, and validated by the Real-Time Sequence, instead of the Resource Status provided by the COP. In addition, the SCED process accounts for each ESR’s State of Charge (SOC) and SOC operating limits. This is to ensure that the SCED process will issue ESR Base Points and Ancillary Services that are feasible taking into account SCED duration requirements for energy and Ancillary Services and also that do not violate the ESR’s Minimum State of Charge (MinSOC) and Maximum State of Charge (MaxSOC) limits. SCED will also account for any DRRS awards that can ‘overlap’ with energy and other Ancillary Service awards as a function of the DRRS Release Factor (DRRSRF) whenever DRRSRF is greater than 0.  (2) The SCED solution must monitor cumulative deployment of Regulation Services and ensure that Regulation Services deployment is minimized over time.  (3) In the Generation To Be Dispatched (GTBD) determined by LFC, ERCOT shall subtract the sum of the telemetered net real power consumption from all CLRs available to SCED.  (4) For use as SCED inputs for determining energy dispatch and Ancillary Service awards, ERCOT shall use the available capacity of all committed Generation Resources by creating proxy Energy Offer Curves for certain Resources as follows:  (a) Non-IRRs without Energy Offer Curves  (i) ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below for:  (A) Each non-IRR for which its QSE has submitted an Output Schedule instead of an Energy Offer Curve.   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL | RTSWCAP | | Output Schedule MW plus 1 MW | RTSWCAP minus $0.01 | | Output Schedule MW | -$249.99 | | LSL | -$250.00 |   (b) Non-IRRs without full-range Energy Offer Curves  (i) For each non-IRR for which its QSE has submitted an Energy Offer Curve that does not cover the full range of the Resource’s available capacity, ERCOT shall create a proxy Energy Offer Curve that extends the submitted Energy Offer Curve to use the entire available capacity of the Resource above the highest point on the Energy Offer Curve to the Resource’s HSL and the offer floor from the lowest point on the Energy Offer Curve to its LSL, using these points:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL (if more than highest MW in submitted Energy Offer Curve) | Price associated with highest MW in submitted Energy Offer Curve | | Energy Offer Curve | Energy Offer Curve | | 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 | | LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |   (c) IRRs  (i) For each IRR that has not submitted an Energy Offer Curve, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL | $1,500 | | HSL minus 1 MW | -$249.99 | | LSL | -$250.00 |   (ii) For each IRR for which its QSE has submitted an Energy Offer Curve that does not cover the full range of the IRR’s available capacity, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL (if more than highest MW in submitted Energy Offer Curve) | Price associated with the highest MW in submitted Energy Offer Curve | | Energy Offer Curve | Energy Offer Curve | | 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 | | LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |   (d) RUC-committed Resources  (i) For each RUC-committed Resource that has not submitted an Energy Offer Curve, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL | $250 | | Zero | $250 |   (ii) For each RUC-committed Resource that has submitted an Energy Offer Curve, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL (if more than highest MW in Energy Offer Curve) | Greater of $250 or price associated with the highest MW in QSE submitted Energy Offer Curve | | Energy Offer Curve | Greater of $250 or the QSE submitted Energy Offer Curve | | Zero | Greater of $250 or the first price point of the QSE submitted Energy Offer Curve |   (iii) For each RUC-committed Resource during the time period stated in the Advance Action Notice (AAN) if any Resource received an Outage Schedule Adjustment, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL | $4,500 or the effective Value of Lost Load (VOLL), whichever is less. | | Zero | $4,500 or the effective VOLL, whichever is less. |   (iv) For each Combined Cycle Generation Resource that was RUC-committed from one On-Line configuration in order to transition to a different configuration with additional capacity, as instructed by ERCOT, that has not submitted an Energy Offer Curve for the RUC-committed configuration, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL of RUC-committed configuration | $250 | | Zero | $250 |   (v) For each Combined Cycle Generation Resource that was RUC-committed from one On-Line configuration in order to transition to a different configuration with additional capacity, as instructed by ERCOT, that has submitted an Energy Offer Curve for the RUC-committed configuration, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL of RUC-committed configuration (if more than highest MW in Energy Offer Curve) | Greater of $250 or price associated with the highest MW in QSE submitted Energy Offer Curve | | Energy Offer Curve for MW at and above HSL of QSE-committed configuration | Greater of $250 or the QSE submitted Energy Offer Curve | | HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve and price associated with highest MW in Energy Offer Curve is less than $250) | $250 | | HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve) | Price associated with the highest MW in QSE submitted Energy Offer Curve | | Energy Offer Curve for MW at and below HSL of QSE-committed configuration | The QSE submitted Energy Offer Curve | | 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 | | LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |   (vi) For each RUC-committed Switchable Generation Resource (SWGR) that is not part of a Combined Cycle Train already operating in ERCOT, that has not submitted an Energy Offer Curve, and that has a COP Resource Status of EMRSWGR for the instructed Operating Hour at the time of the RUC instruction, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL | $4,500 or the effective Value of Lost Load (VOLL), whichever is less | | Zero | $4,500 or the effective VOLL, whichever is less |   (vii) For each RUC-committed SWGR that is not part of a Combined Cycle Train already operating in ERCOT, that has submitted an Energy Offer Curve, and that has a COP Resource Status of EMRSWGR for the instructed Operating Hour at the time of the RUC instruction, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL (if more than highest MW in Energy Offer Curve) | Greater of: $4,500 or the effective VOLL, whichever is less; and the price associated with the highest MW in QSE-submitted Energy Offer Curve | | Energy Offer Curve | Greater of: $4,500 or the effective VOLL, whichever is less; and the QSE-submitted Energy Offer Curve | | Zero | Greater of: $4,500 or the effective VOLL, whichever is less; and the first price point of the QSE-submitted Energy Offer Curve |   (viii) For each Combined Cycle Train configuration that includes at least one SWGR that is operating in a non-ERCOT Control Area as part of a configuration with a COP Resource Status of EMRSWGR for the instructed Operating Hour at the time of a RUC instruction requiring the switching of the SWGR into the ERCOT Control Area, if the QSE for the Combined Cycle Train has not submitted an Energy Offer Curve for the RUC-committed configuration, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL of RUC-committed configuration | $4,500 or the effective VOLL, whichever is less | | Zero | $4,500 or the effective VOLL, whichever is less |   (ix) For each Combined Cycle Train configuration that includes at least one SWGR that is operating in a non-ERCOT Control Area as part of a configuration with a COP Resource Status of EMRSWGR for the instructed Operating Hour at the time of a RUC instruction requiring the switching of the SWGR into the ERCOT Control Area, if the QSE for the Combined Cycle Train has submitted an Energy Offer Curve for the RUC-committed configuration, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL of RUC-committed configuration (if more than highest MW in Energy Offer Curve) | Greater of: $4,500 or the effective VOLL, whichever is less; and the price associated with the highest MW in QSE-submitted Energy Offer Curve | | Energy Offer Curve for MW at and above HSL of QSE-committed configuration | Greater of: $4,500 or the effective VOLL, whichever is less; and the QSE-submitted Energy Offer Curve | | HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve and price associated with highest MW in Energy Offer Curve is less than $4,500) | $4,500 or the effective VOLL, whichever is less | | HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve) | Price associated with the highest MW in QSE-submitted Energy Offer Curve | | Energy Offer Curve for MW at and below HSL of QSE-committed configuration | The QSE-submitted Energy Offer Curve | | 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 | | LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |   (5) For use as SCED inputs for determining energy dispatch and Ancillary Service awards, ERCOT shall use the available Ancillary Service MW capacity of all Resources by creating a proxy Ancillary Service Offer for qualified Resources as follows:  (a) The proxy Ancillary Service Offer shall be a linked Ancillary Service Offer across all Ancillary Service products for which a Resource is qualified to provide. For Generation Resources, the proxy Ancillary Service Offer MW shall be equal to the Resource’s telemetered HSL. For ESRs, the proxy Ancillary Service Offer MW shall be equal to the difference between the Resource’s telemetered HSL and LSL. For Load Resources, the proxy Ancillary Service Offer MW shall be equal to the Resource’s telemetered Maximum Power Consumption (MPC).  (b) For Resources that are not RUC-committed, the price in the proxy Ancillary Service Offer shall be set to:  (i) For Reg-Up and RRS, the maximum of:  (A) The proxy Ancillary Service Offer price floor for Reg-Up or RRS, respectively;  (B) The Resource’s highest submitted Ancillary Service Offer price for Reg-Up or RRS, respectively;  (C) The Resource’s highest Ancillary Service Offer price for ECRS (submitted or proxy); or  (D) The Resource’s highest Ancillary Service Offer price for Non-Spin (submitted or proxy).  (ii) For ECRS, the maximum of:  (A) The proxy Ancillary Service Offer price floor for ECRS;  (B) The Resource’s highest submitted Ancillary Service Offer price for ECRS; or  (C) The Resource’s highest Ancillary Service Offer price for Non-Spin (submitted or proxy).  (iii) For Non-Spin, the maximum of:  (A) The proxy Ancillary Service Offer price floor for Non-Spin; or  (B) The Resource’s highest submitted Ancillary Service Offer price for Non-Spin.  (iv) For Reg-Down, the maximum of:  (A) The proxy Ancillary Service Offer price floor for Reg-Down; or  (B) The Resource’s highest submitted Ancillary Service Offer price for Reg-Down.  (vi) For DRRS, the maximum of:  (A) The proxy Ancillary Service price floor for DRRS; or  (B) The Resource’s highest submitted Ancillary Service Offer price for DRRS.  (c) The proxy Ancillary Service Offer price floors for each SCED-interval shall be derived from the effective ASDCs and Ancillary Service Plan using the following logic:  (i) The proxy Ancillary Service Offer price floor for Reg-Up is equal to the lesser of the values below minus $0.01 per MW per hour:  (A) $2,000 per MW per hour; or  (B) The point on the ASDC for Reg-Up that intersects with a quantity that is 95% of the Ancillary Service Plan for Reg-Up.  (ii) The proxy Ancillary Service Offer price floor for RRS is equal to the lesser of the values below minus $0.01 per MW per hour:  (A) $2,000 per MW per hour; or  (B) The point on the ASDC for RRS that intersects with a quantity that is 95% of the Ancillary Service Plan for RRS.  (iii) The proxy Ancillary Service Offer price floor for ECRS is equal to the lesser of the values below minus $0.01 per MW per hour:  (A) $2,000 per MW per hour; or  (B) The point on the ASDC for ECRS that intersects with a quantity that is 95% of the Ancillary Service Plan for ECRS.  (iv) The proxy Ancillary Service Offer price floor for Non-Spin is equal to the lesser of the values below minus $0.01 per MW per hour:  (A) $2,000 per MW per hour; or  (B) The point on the ASDC for Non-Spin that intersects with a quantity that is 95% of the Ancillary Service Plan for Non-Spin.  (v) The proxy Ancillary Service Offer price floor for Reg-Down is equal to the lesser of the values below minus $0.01 per MW per hour:  (A) $2,000 per MW per hour; or  (B) The point on the ASDC for Reg-Down that intersects with a quantity that is 95% of the Ancillary Service Plan for Reg-Down.  (vi) The proxy Ancillary Service Offer price floor for DRRS is equal to the lesser of the values below minus $0.01 per MW per hour:  (A) $2,000 per MW per hour; or  (B) The point on the ASDC for DRRS that intersects with a quantity that is 95% of the Ancillary Service Plan for DRRS.  (d) ERCOT systems shall be designed to allow for proxy Ancillary Service Offer price floors to differ when the same Ancillary Service product can be provided by either On-Line or Off-Line Resources, and/or an Ancillary Service product has sub-types.  (e) For RUC-committed Resources:  (i) If a RUC-committed Resource does not have an Ancillary Service Offer for an Ancillary Service product that the Resource is qualified to provide, ERCOT shall create an Ancillary Service Offer for that Ancillary Service product at a value of $250 per MWh for the full operating range of the Resource up to its telemetered HSL.  (ii) For each Ancillary Service product for which a RUC-committed Resource has an Ancillary Service Offer, the Ancillary Service Offer used by SCED for that Ancillary Service product across the full operating range of the Resource up to its telemetered HSL shall be the maximum of:  (A) The Resource’s highest submitted Ancillary Service Offer price; or  (B) $250 per MWh.  (6) For use as SCED inputs for determining energy Dispatch and Ancillary Service awards, ERCOT shall use the available capacity of all On-Line ESRs by creating proxy Energy Bid/Offer Curves for certain Resources as follows:  (a) For each ESR for which its QSE has submitted an Energy Bid/Offer Curve that does not cover the full offer range (LSL to HSL) of the Resource’s available capacity, ERCOT shall create a proxy Energy Bid/Offer Curve that extends the submitted Energy Bid/Offer Curve to use the entire available capacity of the Resource above the highest MW point on the Energy Bid/Offer Curve to the Resource’s HSL and from the lowest MW point on the Energy Bid/Offer Curve to LSL, using these prices for the corresponding MW segments:   |  |  |  | | --- | --- | --- | | **Scenario** | **MW Segment** | **Price (per MWh)** | | HSL MW and the highest MW point on the Energy Bid/Offer are both greater than or equal to zero,  and,  HSL is greater than the highest MW in submitted Energy Bid/Offer Curve | From highest MW point on submitted Energy Bid/Offer Curve to HSL MW | RTSWCAP | | HSL MW is greater than or equal to zero,  and,  the highest MW point on the Energy Bid/Offer is less than zero | From highest MW point on submitted Energy Bid/Offer Curve to 0 MW  From 0 MW to HSL | Price associated with the highest MW in submitted Energy Bid/Offer Curve  RTSWCAP | | HSL is less than zero and is also greater than the highest MW in submitted Energy Bid/Offer Curve | From highest MW point on submitted Energy Bid/Offer Curve to HSL MW | Price associated with the highest MW in submitted Energy Bid/Offer Curve | | Energy Bid/Offer Curve |  | Energy Bid/Offer Curve | | LSL MW and the lowest MW point on the Energy Bid/Offer Curve are both greater than or equal to zero,  and,  LSL is less than the lowest MW in submitted Energy Bid/Offer Curve | From LSL to lowest MW point on submitted Energy Bid/Offer Curve | Price associated with the lowest MW in submitted Energy Bid/Offer Curve | | LSL MW is less than zero,  and,  the lowest MW point on the Energy Bid/Offer Curve is greater than zero | From LSL to 0 MW  From 0 MW to lowest MW point on submitted Energy Bid/Offer Curve | -$250.00  Price associated with the lowest MW in submitted Energy Bid/Offer Curve | | LSL and the lowest MW point on the Energy Bid/Offer Curve are both less than or equal to zero,  and,  LSL is less than the lowest MW point on the Energy Bid/Offer Curve | From LSL to lowest MW point on submitted Energy Bid/Offer Curve | -$250.00 |   (b) 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 MW portion of the curve less than zero MW, and priced at the RTSWCAP for the MW portion of the curve greater than zero MW.  (c) At the time of SCED execution, if a QSE representing an ESR has submitted an Output Schedule instead of an Energy Bid/Offer Curve, ERCOT shall create a proxy Energy Bid/Offer Curve priced at -$250 per MWh for the MW portion of the curve from its LSL to the MW amount on the Output Schedule, and priced at the RTSWCAP for the MW portion of the curve from the MW amount on the Output Schedule to its HSL.  (7) The Entity with decision-making authority, as more fully described in Section 3.19.1, Constraint Competitiveness Test Definitions, over how a Resource or Split Generation Resource is offered or scheduled, shall be responsible for all offers associated with each Resource, including offers represented by a proxy Energy Offer Curve, proxy Energy Bid/Offer Curve, or proxy Ancillary Service Offer.  (8) For a CLR whose QSE has submitted an Energy Bid Curve that does not cover the full range of the Resource’s available Demand response capability, consistent with the CLR’s telemetered quantities, ERCOT shall create a proxy energy bid as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | LPC to MPC minus maximum MW of Energy Bid Curve | Price associated with the lowest MW in submitted Energy Bid Curve | | MPC minus maximum MW of Energy Bid Curve to MPC | Energy Bid Curve | | MPC | Right-most point (lowest price) on Energy Bid Curve |   (9) For a CLR whose QSE has not submitted an Energy Bid Curve, consistent with the CLR’s telemetered quantities, ERCOT shall create a proxy Energy Bid Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | LPC to MPC | SWCAP |   (10) ERCOT shall ensure that any Energy Bid Curve is monotonically non-increasing. The QSE representing the CLR shall be responsible for all Energy Bid Curves, including Energy Bid Curves updated by ERCOT as described above.  (11) A CLR may consume energy only when dispatched by SCED to do so. A CLR may telemeter a status of OUTL only if the Resource is Off-Line and unavailable with its energy consumption at zero. In instances when the CLR is unable to follow SCED Dispatch Instructions but still consumes energy, the CLR must submit a Resource Status of ONHOLD. Under all telemetered statuses, including OUTL, the remaining telemetry quantities submitted by the QSE shall represent the operating conditions of the CLR that can be verified by ERCOT. A QSE representing a CLR with a telemetered status of OUTL or ONHOLD is still obligated to provide any applicable Ancillary Services awarded to the Resource. This paragraph does not apply to ESRs.  (12) Energy Offer Curves that were constructed in whole or in part with proxy Energy Offer Curves shall be so marked in all ERCOT postings or references to the energy offer.  (13) SCED will enforce Resource-specific Ancillary Service constraints to ensure that Ancillary Service awards are aligned with a Resource’s qualifications and telemetered Ancillary Service capabilities.  (a) A scaling factor of 5/7 shall be used for Reg-Up award when ensuring that the SCED Base Point plus the product of this scaling factor and the Reg-Up award does not exceed HDL.  (b) A scaling factor of 5/7 shall be used for Reg-Down award when ensuring that the SCED Base Point minus the product of this scaling factor and the Reg-Down award does not go below LDL.  (14) Energy Bid/Offer Curves that were constructed in whole or in part with proxy Energy Bid/Offer Curves shall be so marked in all ERCOT postings or references to the energy bid/offer.  (15) The following Resource-level constraints will apply to DRRS Real-Time awards.  (a) To be eligible for a Real-Time DRRS award, the QSE for a Resource must have submitted and maintained a Resource Status in the COP of any of ON, ONOS, ONOPTOUT, ONRUC, OFFQS, ONSC, ONEMR, OFF (if eligible for Non-Spin), or DRRS for DRUC and for each subsequent run of HRUC for a given Operating Hour.  (b) Where a Resource has an OFF Resource Status and is qualified to provide Non-Spin, or a DRRS Resource Status, the DRRS capability must be less than or equal to the Off-Line Non-Spin and Off-Line DRRS qualified MW respectively.  (16) The following QSE-level constraints will apply to DRRS Real-Time awards:  (a) For a given Operating Hour, the absolute minimum validated DRRS MW capability in MW submitted in a COP as accounted for in paragraph (15)(a) above shall constitute the maximum capability for which a Resource can be considered for a Real-Time DRRS Ancillary Service Award.  (17) The two-step SCED methodology referenced in paragraph (1) above is:  (a) The first step is to execute the SCED process to determine Reference LMPs. In this step, ERCOT executes SCED using the full Network Operations Model while only observing limits of Competitive Constraints in addition to power balance and Ancillary Service constraints. Energy Offer Curves for all On-Line Generation Resources, Energy Bid/Offer Curves for all On-Line ESRs, and Energy Bid Curves from available CLRs, whether submitted by QSEs or created by ERCOT under this Section, are used in the SCED to determine “Reference LMPs.”  (b) The second step is to execute the SCED process to produce Base Points, Ancillary Service awards, Shadow Prices, Real-Time MCPCs, and LMPs, subject to security constraints (including Competitive and Non-Competitive Constraints) and other Resource constraints. The second step must:  (i) Use Energy Offer Curves for all On-Line Generation Resources, whether submitted by QSEs or created by ERCOT. Each Energy Offer Curve must be bounded at the lesser of the Reference LMP (from Step 1) or the appropriate Mitigated Offer Floor. In addition, each Energy Offer Curve subject to mitigation under the criteria described in Section 3.19.4, Security-Constrained Economic Dispatch Constraint Competitiveness Test, must be capped at the greater of the Reference LMP (from Step 1) at the Resource Node plus a variable not to exceed 0.01 multiplied by the value of the Resource’s Mitigated Offer Cap (MOC) curve at the LSL or the appropriate MOC;  (ii) Use Energy Bid/Offer Curves for all On-Line ESRs, whether submitted by QSEs or created by ERCOT. Each Energy Bid/Offer Curve must be bounded at the lesser of the Reference LMP (from Step 1) or the appropriate Mitigated Offer Floor. The offer portion of each Energy Bid/Offer Curve subject to mitigation under the criteria described in Section 3.19.4, Security-Constrained Economic Dispatch Constraint Competitiveness Test, must be capped at the greater of the Reference LMP (from Step 1) at the Resource Node plus a variable not to exceed 0.01 multiplied by the value of the Resource’s MOC curve at the LSL or the appropriate MOC;  (iii) Use Energy Bid Curves for all available CLRs, whether submitted by QSEs or created by ERCOT. There is no mitigation of Energy Bid Curves. An Energy Bid Curve from an Aggregate Load Resource (ALR) represents the bid for energy distributed across all nodes in the Load Zone in which the ALR is located. For an ESR or a CLR that is not an ALR, an Energy Bid Curve represents a bid for energy at the applicable Resource Node;  (iv) Observe all Competitive and Non-Competitive Constraints; and  (v) Use Ancillary Service Offers to determine Ancillary Service awards.  (c) ERCOT shall archive information and provide monthly summaries of security violations and any binding transmission constraints identified in Step 2 of the SCED process. The summary must describe the limiting element (or identified operator-entered constraint with operator’s comments describing the reason and the Resource-specific impacts for any manual overrides). ERCOT shall provide the summary to Market Participants on the MIS Secure Area and to the Independent Market Monitor (IMM).  (d) The System Lambda used to determine LMPs and the Real-Time MCPCs from SCED Step 2 shall be capped at the effective VOLL.  (18) For each SCED process, in addition to the binding Base Points, Ancillary Service awards, Real-Time MCPCs, and LMPs, ERCOT shall calculate a non-binding projection of the Base Points, Ancillary Service awards, MCPCs, Resource Node LMPs, Real-Time Reliability Deployment Price Adders, Hub LMPs, and Load Zone LMPs at a frequency of every five minutes for at least 15 minutes into the future based on the same inputs to the SCED process as described in this Section, except that the Resource’s HDL and LDL and the total generation requirement will be as estimated at future intervals. The Resource’s HDL and LDL will be calculated for each interval of the projection based on the ramp rate capability over the study period. ERCOT shall estimate the projected total generation requirement by calculating a Load forecast for the study period. In lieu of the steps described in Section 6.5.7.3.1, Determination of Real-Time Reliability Deployment Price Adders, the non-binding projection of Real-Time Reliability Deployment Price Adders shall be estimated based on GTBD, reliability deployments MWs, and aggregated offers. The Energy Offer Curve and Energy Bid/Offer Curves from SCED Step 2, the virtual offers for Load Resources deployed and the power balance penalty price will be compared against the updated GTBD to get an estimate of the System Lambda from paragraph (2)(m) of Section 6.5.7.3.1. ERCOT shall post the projected non-binding Base Points and Ancillary Service awards for each Resource for each interval study period on the MIS Certified Area and the projected non-binding LMPs for Resource Nodes, Real-Time MCPCs, Real-Time Reliability Deployment Price Adders, Hub LMPs and Load Zone LMPs on the ERCOT website pursuant to Section 6.3.2, Activities for Real-Time Operations.  (19) ERCOT may override one or more of a CLR’s parameters in SCED if ERCOT determines that the CLR’s participation is having an adverse impact on the reliability of the ERCOT System.  (20) The QSE representing an ESR may withdraw energy from the ERCOT System only when dispatched by SCED to do so. An ESR may telemeter a status of OUT only if the ESR is in Outage status. |

6.5.7.3.1 Determination of Real-Time On-Line Reliability Deployment Price Adder

(1) The following categories of reliability deployments are considered in the determination of the Real-Time On-Line Reliability Deployment Price Adder:

(a) RUC-committed Resources, except for those whose QSEs have opted out of RUC Settlement in accordance with paragraph (14) of Section 5.5.2, Reliability Unit Commitment (RUC) Process;

(b) RMR Resources that are On-Line, including capacity secured to prevent an Emergency Condition pursuant to paragraph (4) of Section 6.5.1.1, ERCOT Control Area Authority;

(c) Deployed Load Resources other than CLRs;

(d) Deployed ERS;

(e) Real-Time DC Tie imports during an EEA where the total adjustment shall not exceed 1,250 MW in a single interval;

(f) Real-Time DC Tie exports to address emergency conditions in the receiving electric grid;

(g) Energy delivered to ERCOT through registered Block Load Transfers (BLTs) during an EEA;

(h) Energy delivered from ERCOT to another power pool through registered BLTs during emergency conditions in the receiving electric grid; and

(i) ERCOT-directed firm Load shed during EEA Level 3, as described in paragraph (3) of Section 6.5.9.4.2, EEA Levels.

(2) The Real-Time On-Line Reliability Deployment Price Adder is an estimation of the impact to energy prices due to the above categories of reliability deployments. For intervals where there are reliability deployments as described in paragraph (1) above, after the two-step SCED process and also after the Real-Time On-Line Reserve Price Adder and Real-Time Off-Line Reserve Price Adder have been determined, the Real-Time On-Line Reliability Deployment Price Adder is determined as follows:

(a) For RUC-committed Resources with a telemetered Resource Status of ONRUC and for RMR Resources that are On-Line, set the LSL, LASL, and LDL to zero.

(b) Notwithstanding item (a) above, for RUC-committed Combined Cycle Generation Resources with a telemetered Resource Status of ONRUC that were instructed by ERCOT to transition to a different configuration to provide additional capacity, set the LSL, LASL, and LDL equal to the minimum of their current value and the COP HSL of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction.

(c) For all other Generation Resources excluding ones with a telemetered status of ONRUC, ONTEST, STARTUP, SHUTDOWN, and also excluding RMR Resources that are On-Line and excluding Generation Resources with a telemetered output less than 95% of LSL:

(i) Set LDL to the greater of Aggregated Resource Output - (60 minutes \* SCED Down Ramp Rate), or LASL; and

(ii) Set HDL to the lesser of Aggregated Resource Output + (60 minutes\*SCED Up Ramp Rate), or HASL.

(d) For all CLRs excluding ones with a telemetered status of OUTL:

(i) Set LDL to the greater of Aggregated Resource Output - (60 minutes \* SCED Up Ramp Rate), or LASL; and

(ii) Set HDL to the lesser of Aggregated Resource Output + (60 minutes\*SCED Down Ramp Rate), or HASL.

(e) Add the deployed MW from Load Resources that are not CLRs and that are providing RRS or ECRS to GTBD linearly ramped over the ten-minute ramp period and add the deployed MW from Load Resources that are not CLRs providing Non-Spin to GTBD linearly ramped over the 30-minute ramp period. The amount of deployed MW is calculated from the Resource telemetry and from applicable deployment instructions in Extensible Markup Language (XML) messages. ERCOT shall generate a linear bid curve defined by a price/quantity pair of $300/MWh for the first MW of Load Resources deployed and a price/quantity pair of $700/MWh for the last MW of Load Resources deployed in each SCED execution. After recall instruction, the restoration period length and amount of MW added to GTBD during the restoration period will be determined by validated telemetry and the type of Ancillary Service deployed from the Resource. The TAC shall review the validity of the prices for the bid curve at least annually.

(f) Add the deployed MW from ERS to GTBD. The amount of deployed MW is determined from the XML messages and ERS contracted capacities for the ERS Time Periods when ERS is deployed. After recall, an approximation of the amount of un-restored ERS shall be used. After ERCOT recalls each group, GTBD shall be adjusted to reflect restoration on a linear curve over the assumed restoration period (“RHours”).

The above parameter is defined as follows:

| **Parameter** | **Unit** | **Current Value\*** |
| --- | --- | --- |
| RHours | Hours | 4.5 |
| \* Changes to the current value of the parameter(s) referenced in this table above may be recommended by TAC and the ERCOT Board and approved by the Public Utility Commission of Texas (PUCT). ERCOT shall update parameter values on the first day of the month following PUCT approval unless otherwise directed. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. | | |

(g) Add the MW from Real-Time DC Tie imports during an EEA to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator.

(h) Subtract the MW from Real-Time DC Tie exports to address emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator.

(i) Add the MW from energy delivered to ERCOT through registered BLTs during an EEA to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator.

(j) Subtract the MW from energy delivered from ERCOT to another power pool through registered BLTs during emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator.

(k) Perform a SCED with changes to the inputs in items (a) through (j) above, considering only Competitive Constraints and the non-mitigated Energy Offer Curves.

(l) Perform mitigation on the submitted Energy Offer Curves using the LMPs from the previous step as the reference LMP.

(m) Perform a SCED with the changes to the inputs in items (a) through (j) above, considering both Competitive and Non-Competitive Constraints and the mitigated Energy Offer Curves.

(n) Determine the positive difference between the System Lambda from item (m) above and the System Lambda of the second step in the two-step SCED process described in paragraph (10)(b) of Section 6.5.7.3, Security Constrained Economic Dispatch.

(o) Determine the amount given by the Value of Lost Load (VOLL) minus the sum of the System Lambda of the second step in the two step SCED process described in paragraph (10)(b) of Section 6.5.7.3 and the Real-Time On-Line Reserve Price Adder.

(p) The Real-Time On-Line Reliability Deployment Price Adder is the minimum of items (n) and (o) above except when ERCOT is directing firm Load shed during EEA Level 3. When ERCOT is directing firm Load shed during EEA Level 3 to either maintain sufficient PRC or stabilize grid frequency, as described in paragraph (3) of Section 6.5.9.4.2, the Real-Time On-Line Reliability Deployment Price Adder is the VOLL minus the sum of the System Lambda of the second step in the two-step SCED process described in paragraph (10)(b) of Section 6.5.7.3 and the Real-Time On-Line Reserve Price Adder. Once ERCOT is no longer directing firm Load shed, as described above, the Real-Time On-Line Reliability Deployment Price Adder will again be set as the minimum of items (n) and (o) above.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR904, NPRR1006, NPRR1010, NPRR1014, NPRR1091, NPRR1105, NPRR1188, NPRR1238, and NPRR1245: Replace applicable portions of Section 6.5.7.3.1 above with the following upon system implementation for NPRR904, NPRR1006, NPRR1014, NPRR1091, NPRR1105, NPRR1188, or NPRR1238; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010 and NPRR1245:]  **6.5.7.3.1Determination of Real-Time Reliability Deployment Price Adder**  (1) The following categories of reliability deployments are considered in the determination of the Real-Time Reliability Deployment Price Adder for Energy, and the Real-Time Reliability Deployment Price Adders for Ancillary Services:  (a) RUC-committed Resources, except for those whose QSEs have opted out of RUC Settlement in accordance with paragraph (14) of Section 5.5.2, Reliability Unit Commitment (RUC) Process;  (b) RMR Resources that are On-Line, including capacity secured to prevent an Emergency Condition pursuant to paragraph (4) of Section 6.5.1.1, ERCOT Control Area Authority;  (c) Deployed Load Resources other than CLRs;  (d) Deployed ERS;  (e) ERCOT-directed DC Tie imports during an EEA or transmission emergency where the total adjustment shall not exceed 1,250 MW in a single interval;  (f) ERCOT-directed curtailment of DC Tie imports below the higher of DC Tie advisory import limit as of 0600 in the Day-Ahead or subsequent advisory import limit to address local transmission system limitations where the total adjustment shall not exceed 1,250 MW in a single interval;  (g) ERCOT-directed curtailment of DC Tie imports below the higher of DC Tie advisory import limit as of 0600 in the Day-Ahead or subsequent advisory import limit due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT where the total adjustment shall not exceed 1,250 MW in a single interval;  (h) ERCOT-directed DC Tie exports to address emergency conditions in the receiving electric grid where the total adjustment shall not exceed 1,250 MW in a single interval;  (i) ERCOT-directed curtailment of DC Tie exports below the DC Tie advisory export limit as of 0600 in the Day-Ahead or subsequent advisory export limit during EEA, a transmission emergency, or to address local transmission system limitations where the total adjustment shall not exceed 1,250 MW in a single interval;  (j) Energy delivered to ERCOT through registered Block Load Transfers (BLTs) during an EEA;  (k) Energy delivered from ERCOT to another power pool through registered BLTs during emergency conditions in the receiving electric grid;  (l) ERCOT-directed deployment of TDSP standard offer Load management programs;  (m) ERCOT-directed deployment of distribution voltage reduction measures;  (n) ERCOT-directed deployment of Off-Line Non-Spin;  (o) ERCOT-directed firm Load shed during EEA Level 3, as described in paragraph (3) of Section 6.5.9.4.2, EEA Levels;  (p) Deployed Voluntary Early Curtailment Load (VECL) as described in Section 6.5.9.4.1, General Procedures Prior to EEA Operations; and  (q) ERCOT-directed deployment of Off-Line DRRS.  (2) The Real-Time Reliability Deployment Price Adder for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Services are estimations of the impact to energy prices and Real-Time MCPCs due to the above categories of reliability deployments. For intervals where there are reliability deployments as described in paragraph (1) above, the Real-Time Reliability Deployment Price Adder for Energy and Real-Time Reliability Deployment Price Adders for Ancillary Services are determined as follows:  (a) For Off-Line Non-Spin Resources that are brought On-Line by ERCOT deployment instruction, Off-Line Resources that are deployed for DRRS, RUC-committed Resources with a telemetered Resource Status of ONRUC and for RMR Resources that are On-Line:  (i) Set the LSL and LDL to zero;  (ii) Remove all Ancillary Service Offers; and  (iii) For the first step of SCED, administratively set the Energy Offer Curve for the Resource at a value equal to the power balance penalty price for all capacity between 0 MW and the HSL of the Resource.  (b) Notwithstanding item (a) above, for RUC-committed Combined Cycle Generation Resources with a telemetered Resource Status of ONRUC that were instructed by ERCOT to transition to a different configuration to provide additional capacity:  (i) Set the LSL and LDL equal to the minimum of their current value and the COP HSL of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction;  (ii) Set the maximum Ancillary Service capabilities of the Resource equal to the minimum of their current value and COP Ancillary Service capabilities of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction; and  (iii) For the first step of SCED, administratively set the Energy Offer Curve for the Resource at a value equal to the power balance penalty price for the additional capacity of the Resource, defined as the positive difference between the Resource’s current telemetered HSL and the COP HSL of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction.  (c) For all other Generation Resources excluding ones with a telemetered status of ONRUC, ONTEST, STARTUP, SHUTDOWN, and also excluding RMR Resources that are On-Line and excluding Generation Resources with a telemetered output less than 95% of LSL:  (i) If the Generation Resource SCED Base Point is not at LDL, set LDL to the greater of Aggregated Resource Output - (60 minutes \* Normal Ramp Rate down), or LSL; and  (ii) If the Generation Resource SCED Base Point is not at HDL, set HDL to the lesser of Aggregated Resource Output + (60 minutes \* Normal Ramp Rate up), or HSL.  (d) For all On-Line ESRs:  (i) If the ESR SCED Base Point is not at LDL, set LDL to the greater of Aggregated Resource Output - (60 minutes \* Normal Ramp Rate down), or LSL; and  (ii) If the ESR SCED Base Point is not at HDL, set HDL to the lesser of Aggregated Resource Output + (60 minutes \* Normal Ramp Rate up), or HSL.  (e) For all CLRs excluding ones with a telemetered status of OUTL, ONTEST, or ONHOLD:  (i) If the CLR SCED Base Point is not at LDL, set LDL to the greater of Aggregated Resource Output - (60 minutes \* Normal Ramp Rate down), or LSL; and  (ii) If the CLR SCED Base Point is not at HDL, set HDL to the lesser of Aggregated Resource Output + (60 minutes \* Normal Ramp Rate up), or HSL.  (f) Add the deployed MW from Load Resources that are not CLRs and that are providing RRS or ECRS to GTBD linearly ramped over the ten-minute ramp period and add the deployed MW from Load Resources that are not CLRs providing Non-Spin to GTBD linearly ramped over the 30-minute ramp period. The amount of deployed MW is calculated from the Resource telemetry and from applicable deployment instructions in Extensible Markup Language (XML) messages. ERCOT shall generate a linear bid curve defined by a price/quantity pair of $300/MWh for the first MW of Load Resources deployed and a price/quantity pair of $700/MWh for the last MW of Load Resources deployed in each SCED execution. After recall instruction, the restoration period length and amount of MW added to GTBD during the restoration period will be determined by validated telemetry and the type of Ancillary Service deployed from the Resource. The TAC shall review the validity of the prices for the bid curve at least annually.  (g) Add the deployed MW from VECL to GTBD linearly ramped over a 30-minute ramp period. The amount of deployed MW is calculated from the applicable deployment instructions in XML messages. ERCOT shall generate a linear bid curve defined by a price/quantity pair of $300/MWh for the first MW of VECL deployed and a price/quantity pair of $700/MWh for the last MW of VECL deployed in each SCED execution. After recall instruction, GTBD shall be adjusted to reflect restoration on a linear curve over a one-hour restoration period.  (h) Add the deployed MW from ERS to GTBD. The amount of deployed MW is determined from the XML messages and ERS contracted capacities for the ERS Time Periods when ERS is deployed. After recall, an approximation of the amount of un-restored ERS shall be used. After ERCOT recalls each group, GTBD shall be adjusted to reflect restoration on a linear curve over the assumed restoration period (“RHours”).  The above parameter is defined as follows:   | Parameter | Unit | Current Value\* | | --- | --- | --- | | RHours | Hours | 4.5 | | \* Changes to the current value of the parameter(s) referenced in this table above may be recommended by TAC and the ERCOT Board and approved by the Public Utility Commission of Texas (PUCT). ERCOT shall update parameter values on the first day of the month following PUCT approval unless otherwise directed. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. | | |   (i) Add the MW from DC Tie imports during an EEA or transmission emergency, to address local transmission system limitations, or due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator.  (j) Add the MW from DC Tie export curtailments during an EEA or transmission emergency, to address local transmission system limitations, or due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator. The MW added to GTBD associated with any individual DC Tie shall not exceed the higher of DC Tie advisory limit for exports on that tie as of 0600 in the Day-Ahead or subsequent advisory export limit minus the aggregate export on the DC Tie that remained scheduled following the Dispatch Instruction from the ERCOT Operator.  (k) Subtract the MW from DC Tie exports to address emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator.  (l) Subtract the MW from DC Tie import curtailments to address local transmission system limitations or emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator. The MW subtracted from GTBD associated with any individual DC Tie shall not exceed the higher of DC Tie advisory limit for imports on that tie as of 0600 in the Day-Ahead or subsequent advisory import limit minus the aggregate import on the DC Tie that remained scheduled following the Dispatch Instruction from the ERCOT Operator.  (m) Add the MW from energy delivered to ERCOT through registered BLTs during an EEA to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator.  (n) Subtract the MW from energy delivered from ERCOT to another power pool through registered BLTs during emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator.  (o) Add the deployed MWs from TDSP standard offer Load management programs to GTBD, if ERCOT instructs TDSPs to deploy their standard offer Load management programs. The amount of deployed MW is the value ERCOT provided for all TDSP standard offer Load management programs in the most current May Report on Capacity, Demand and Reserves in the ERCOT Region (CDR), unless modified as specified in this paragraph. If ERCOT is informed that all or a portion of a TDSP’s standard offer Load management program has been fully exhausted, or has been expanded as the result of a Public Utility Commission of Texas (PUCT) proceeding, ERCOT will remove the associated MW value of any exhausted capacity from the amount of deployed MW or, in the case of an expansion, ERCOT will request an updated MW value from the relevant TDSPs to use in place of the May CDR in the ERCOT Region value for that year. The initial value ERCOT will use for deployed MW under this paragraph for each calendar year, as well as any subsequent changes to this value, will be communicated to Market Participants in a Market Notice. After recall, an approximation of the amount of un-restored TDSP standard offer Load management programs shall be used. GTBD shall be adjusted to reflect restoration on a linear curve over the assumed restoration period (“RHours”) defined by item (h) above.  (p) Perform a SCED with changes to the inputs in items (a) through (n) above, considering only Competitive Constraints and the non-mitigated Energy Offer Curves.  (q) Perform mitigation on the submitted Energy Offer Curves using the LMPs from the previous step as the reference LMP.  (r) Perform a SCED with the changes to the inputs in items (a) through (n) above, considering both Competitive and Non-Competitive Constraints and the mitigated Energy Offer Curves.  (s) The Real-Time Reliability Deployment Price Adder for Energy is equal to the positive difference between the System Lambda from item (r) above and the System Lambda of the second step in the two-step SCED process described in paragraph (10)(b) of Section 6.5.7.3, Security Constrained Economic Dispatch, except when ERCOT is directing firm Load shed during EEA Level 3. When ERCOT is directing firm Load shed during EEA Level 3 to either maintain sufficient PRC or stabilize grid frequency, as described in paragraph (3) of Section 6.5.9.4.2, the Real-Time Reliability Deployment Price Adder for Energy is the VOLL used to determine the Ancillary Service Demand Curves (ASDCs) for the Real-Time Market (RTM) minus the System Lambda of the second step in the two-step SCED process described in paragraph (10)(b) of Section 6.5.7.3.  (t) For each individual Ancillary Service, the Real-Time Reliability Deployment Price Adder for Ancillary Service is equal to the positive difference between the MCPC for that Ancillary Service from item (r) above and the MCPC for that Ancillary Service, except when ERCOT is directing firm Load shed during EEA Level 3. When ERCOT is directing firm Load shed during EEA Level 3 to either maintain sufficient PRC or stabilize grid frequency, as described in paragraph (3) of Section 6.5.9.4.2, the Real-Time Reliability Deployment Price Adder for Ancillary Service is the maximum value on the ASDC for the Ancillary Service minus the MCPC for that Ancillary Service. |

**6.5.7.5 Ancillary Services Capacity Monitor**

(1) ERCOT shall calculate the following every ten seconds and provide Real-Time summaries to ERCOT Operators and all Market Participants using ICCP, giving updates of calculations every ten seconds, and posting on the ERCOT website, giving updates of calculations every five minutes, which show the Real-Time total system amount of:

(a) RRS capacity from:

(i) Generation Resources;

(ii) Load Resources excluding CLRs;

(iii) CLRs; and

(iv) Resources capable of Fast Frequency Response (FFR);

(b) Ancillary Service Resource Responsibility for RRS from:

(i) Generation Resources;

(ii) Load Resources excluding CLRs;

(iii) CLRs; and

(iv) Resources capable of FFR;

(c) ECRS capacity from:

(i) Generation Resources;

(ii) Load Resources excluding CLRs;

(iii) CLRs; and

(iv) Quick Start Generation Resources (QSGRs);

(d) Ancillary Service Resource Responsibility for ECRS from:

(i) Generation Resources;

(ii) Load Resources excluding CLRs; and

(iii) CLRs; and

(iv) QSGRs;

(e) ECRS deployed to Generation and Load Resources;

(f) Non-Spin available from:

(i) On-Line Generation Resources with Energy Offer Curves;

(ii) Undeployed Load Resources;

(iii) Off-Line Generation Resources; and

(iv) Resources with Output Schedules;

(g) Ancillary Service Resource Responsibility for Non-Spin from:

(i) On-Line Generation Resources with Energy Offer Curves;

(ii) On-Line Generation Resources with Output Schedules;

(iii) Load Resources;

(iv) Off-Line Generation Resources excluding QSGRs; and

(v) QSGRs;

(h) Undeployed Reg-Up and Reg-Down;

(i) Ancillary Service Resource Responsibility for Reg-Up and Reg-Down;

(j) Deployed Reg-Up and Reg-Down;

(k) Available capacity:

(i) With Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;

(ii) With Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED;

(iii) Without Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;

(iv) Without Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED;

(v) With RTM Energy Bid curves from available CLRs in the ERCOT System that can be used to decrease Base Points (energy consumption) in SCED;

(vi) With RTM Energy Bid curves from available CLRs in the ERCOT System that can be used to increase Base Points (energy consumption) in SCED;

(vii) From Resources participating in SCED plus the Reg-Up, ECRS, and RRS from Load Resources and the Net Power Consumption minus the Low Power Consumption from Load Resources with a validated Real-Time RRS and ECRS Schedule;

(viii) From Resources included in item (vii) above plus reserves from Resources that could be made available to SCED in 30 minutes;

(ix) In the ERCOT System that can be used to increase Generation Resource Base Points in the next five minutes in SCED; and

(x) In the ERCOT System that can be used to decrease Generation Resource Base Points in the next five minutes in SCED;

(l) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of EMR;

(m) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of OUT;

(n) Aggregate net telemetered consumption for Resources with a telemetered Resource Status of OUTL; and

(o) The ERCOT-wide PRC calculated as follows:

**PRC1 = Min(Max((RDF\*(HSL-NFRC) – Actual Net Telemetered Output)i , 0.0) , 0.2\*RDF\*(HSL-NFRC)i),**



where the included On-Line Generation Resources do not include WGRs, nuclear Generation

Resources, or Generation Resources with an output less than or equal to 95% of telemetered LSL or

with a telemetered status of ONTEST, ONHOLD, STARTUP, or SHUTDOWN.

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***WGRs***

***online***

***All***

***WGR***

***online***

***i***

**PRC2 = Min(Max((RDFW\*HSL – Actual Net Telemetered Output)i , 0.0) , 0.2\*RDFW\*HSLi),**

where the included On-Line WGRs only include WGRs that are Primary Frequency Response-capable.



**PRC3 = ((Synchronous condenser output)i as qualified by item (8) of Operating Guide Section 2.3.1.2, Additional Operational Details for Responsive Reserve and ERCOT Contingency Reserve Service Providers))**

**PRC4 = (Min(Max((Actual Net Telemetered Consumption – LPC), 0.0), ECRS and RRS Ancillary Service Resource Responsibility \* 1.5) from all Load Resources controlled by high-set under frequency relays carrying an ECRS and/or RRS Ancillary Service Resource Responsibility)i**

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***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***

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***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***

**PRC5 = Min(Max((LRDF\_1\*Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_1 \* Actual Net Telemetered Consumption)) from all CLRs active in SCED and carrying Ancillary Service Resource Responsibility**

**PRC6 = Min(Max((LRDF\_2 \* Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_2 \* Actual Net Telemetered Consumption)) from all CLRs active in SCED and not carrying Ancillary Service Resource Responsibility**

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***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***

**PRC7 = (Capacity from Resources capable of providing FFR)i**

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***resources***

***FFR***

***online***

***All***

***resource***

***FFR***

***online***

***i***

**PRC8 = (If discharging or idle, Min(X% of HSL based on droop, HSL-ESR-Gen “injection”, the capacity that can be sustained for 45 minutes per the State of Charge), else Min(X% of (HSL – LSL(ESR “charging”) based on droop, the capacity that can be sustained for 45 minutes per the State of Charge – LSL(ESR “charging”)))**

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***ESR***

***online***

***All***

***ESR***

***online***

***i***

**Excludes ESR capacity used to provide FFR**

**PRC = PRC1 + PRC2 + PRC3 + PRC4 + PRC5 + PRC6 + PRC7 + PRC8**

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| PRC1 | MW | Generation On-Line greater than 0 MW |
| PRC2 | MW | WGRs On-Line greater than 0 MW |
| PRC3 | MW | Synchronous condenser output |
| PRC4 | MW | Capacity from Load Resources carrying ECRS Ancillary Service Resource Responsibility |
| PRC5 | MW | Capacity from CLRs active in SCED and carrying Ancillary Service Resource Responsibility |
| PRC6 | MW | Capacity from CLRs active in SCED and not carrying Ancillary Service Resource Responsibility |
| PRC7 | MW | Capacity from Resources capable of providing FFR |
| PRC8 | MW | ESR capacity capable of providing Primary Frequency Response |
| PRC | MW | Physical Responsive Capability |
| X | Percentage | Percent threshold based on the Governor droop setting of ESRs |
| RDF |  | The currently approved Reserve Discount Factor |
| RDFW |  | The currently approved Reserve Discount Factor for WGRs |
| LRDF\_1 |  | The currently approved Load Resource Reserve Discount Factor for CLRs carrying Ancillary Service Resource Responsibility |
| LRDF\_2 |  | The currently approved Load Resource Reserve Discount Factor for CLRs not carrying Ancillary Service Resource Responsibility |
| NFRC | MW | Non-Frequency Responsive Capacity |

(2) Each QSE shall operate Resources providing Ancillary Service capacity to meet its obligations. If a QSE experiences temporary conditions where its total obligation for providing Ancillary Service cannot be met on the QSE’s Resources, then the QSE may add additional capability from other Resources that it represents. It adds that capability by changing the Resource Status and updating the Ancillary Service Schedules and Ancillary Services Resource Responsibility of the affected Resources and notifying ERCOT under Section 6.4.9.1, Evaluation and Maintenance of Ancillary Service Capacity Sufficiency. If the QSE is unable to meet its total obligations to provide committed Ancillary Services capacity, the QSE shall notify ERCOT immediately of the expected duration of the QSE’s inability to meet its obligations. ERCOT shall determine whether replacement Ancillary Services will be procured to account for the QSE’s shortfall according to Section 6.4.9.1.

(3) The Load Resource Reserve Discount Factors (RDFs) for CLRs (LRDF\_1 and LRDF\_2) shall be subject to review and approval by TAC.

(4) The RDFs used in the PRC calculation shall be posted to the ERCOT website no later than three Business Days after approval.

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| ***[NPRR1010, NPRR1014, NPRR1029, NPRR1188, NPRR1204, and NPRR1244: Replace applicable portions of Section 6.5.7.5 above with the following upon system implementation for NPRR1014, NPRR1029, NPRR1188, or NPRR1224; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010 and NPRR1204:]***  **6.5.7.5 Ancillary Services Capacity Monitor**  (1) Every ten seconds, ERCOT shall calculate the following and provide Real-Time summaries to ERCOT Operators and all Market Participants using ICCP and postings on the ERCOT website showing the Real-Time total system amount of:  (a) RRS capability from:  (i) Generation Resources and ESRs in the form of PFR that can be sustained for the SCED duration requirements of PFR;  (ii) Load Resources, excluding CLRs, capable of responding via under-frequency relay;  (iii) CLRs in the form of PFR;  (iv) Resources, other than ESRs, capable of Fast Frequency Response (FFR); and  (v) ESRs, in the form of FFR, that can be sustained for the SCED duration requirements of FFR;  (b) Ancillary Service Resource awards for RRS to:  (i) Generation Resources and ESRs in the form of PFR;  (ii) Load Resources, excluding CLRs, capable of responding by under-frequency relay;  (iii) CLRs in the form of PFR; and  (iv) Resources providing FFR;  (c) ECRS capability from:  (i) Generation Resources;  (ii) Load Resources excluding CLRs;  (iii) CLRs;  (iv) Quick Start Generation Resources (QSGRs); and  (v) ESRs that can be sustained for the SCED duration requirements of ECRS.  (d) Ancillary Service Resource awards for ECRS to:  (i) Generation Resources;  (ii) Load Resources excluding CLRs; and  (iii) CLRs;  (iv) QSGRs; and  (v) ESRs.  (e) ECRS manually deployed by Resources with a Resource Status of ONSC;  (f) Non-Spin available from:  (i) On-Line Generation Resources with Energy Offer Curves;  (ii) Undeployed Load Resources;  (iii) Off-Line Generation Resources and On-Line Generation Resources with power augmentation;  (iv) Resources with Output Schedules; and  (v) ESRs that can be sustained for the SCED duration requirements of Non-Spin.  (g) Ancillary Service Resource awards for Non-Spin to:  (i) On-Line Generation Resources with Energy Offer Curves;  (ii) On-Line Generation Resources with Output Schedules;  (iii) Load Resources;  (iv) Off-Line Generation Resources excluding Quick Start Generation Resources (QSGRs), including Non-Spin awards on power augmentation capacity that is not active on On-Line Generation Resources;  (v) QSGRs; and  (vi) ESRs.  (h) Ancillary Service Resource awards for DRRS to:(i) On-Line Generation Resources;  (ii) Off-Line Generation Resources excluding Quick Start Generation Resources (QSGRs);  (iii) QSGRs; and  (iv) ESRs;  (i) Reg-Up and Reg-Down capability (for ESRs, the SCED duration requirements of Reg-Up and Reg-Down are considered);  (j) Undeployed Reg-Up and Reg-Down;  (k) Ancillary Service Resource awards for Reg-Up and Reg-Down;  (l) Deployed Reg-Up and Reg-Down;  (m) Available capacity:  (i) With Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;  (ii) With Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED;  (iii) Without Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;  (iv) Without Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED;  (v) With Energy Bid Curves from available CLRs in the ERCOT System that can be used to decrease Base Points (energy consumption) in SCED;  (vi) With Energy Bid Curves from available CLRs in the ERCOT System that can be used to increase Base Points (energy consumption) in SCED;  (vii) From Resources participating in SCED plus the Reg-Up, RRS, and ECRS from Load Resources and the Net Power Consumption minus the Low Power Consumption from Load Resources with a validated Real-Time RRS and ECRS awards;  (viii) With Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to increase ESR Base Points in SCED while respecting SCED duration requirements for ESR Base Points in SCED;  (ix) With Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to decrease ESR Base Points in SCED while respecting SCED duration requirements for ESR Base Points in SCED;  (x) Without Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to increase ESR Base Points in SCED while respecting SCED duration requirements for ESR Base Points in SCED;  (xi) Without Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to decrease ESR Base Points in SCED while respecting SCED duration requirements for ESR Base Points in SCED;  (xii) From Resources included in item (vii) above plus reserves from Resources that could be made available to SCED in 30 minutes;  (xiii) In the ERCOT System that can be used to increase Generation Resource Base Points in the next five minutes in SCED; and  (xiv) In the ERCOT System that can be used to decrease Generation Resource Base Points in the next five minutes in SCED;  (xv) The total capability of Resources available to provide the following combinations of Ancillary Services, based on the Resource telemetry from the QSE and capped by the limits of the Resource:  (A) Capacity to provide Reg-Up, RRS, or both, irrespective of whether it is capable of providing ECRS or Non-Spin;  (B) Capacity to provide Reg-Up, RRS, ECRS, or any combination thereof, irrespective of whether it is capable of providing Non-Spin or DRRS; and  (C) Capacity to provide Reg-Up, RRS, ECRS, or Non-Spin, or any combination thereof, irrespective of whether it is capable of providing DRRS; and  (D) Capacity to provide Reg-Up, RRS, ECRS, Non-Spin, or DRRS, in any combination thereof.  (n) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of EMR;  (o) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of OUT;  (p) Aggregate net telemetered consumption for Resources with a telemetered Resource Status of OUTL; and  (q) The ERCOT-wide PRC calculated as follows:  **PRC1 = Min(Max((RDF\*FRCHL – FRCO)i , 0.0) , 0.2\*RDF\*FRCHLi),**  where the included On-Line Generation Resources do not include WGRs, nuclear Generation  Resources, or Generation Resources with an output less than or equal to 95% of telemetered LSL or  with a telemetered status of ONTEST, ONHOLD, STARTUP, or SHUTDOWN.      ***WGRs***  ***online***  ***All***  ***WGR***  ***online***  ***i***  **PRC2 = Min(Max((RDFW\*HSL – Actual Net Telemetered Output)i , 0.0) , 0.2\*RDFW\*HSLi),**  where the included On-Line WGRs only include WGRs that are Primary Frequency Response-capable.  **PRC3 = ((Synchronous condenser output)i as qualified by item (8) of Operating Guide Section 2.3.1.2, Additional Operational Details for Responsive Reserve and ERCOT Contingency Reserve Service Providers))**  **PRC4 = (Min(Max((Actual Net Telemetered Consumption – LPC), 0.0), ECRS and RRS Ancillary Service Resource award \* 1.5) from all Load Resources controlled by high-set under-frequency relays with an ECRS and/or RRS Ancillary Service Resource award)i**      ***resources***  ***load***  ***online***  ***All***  ***resource***  ***load***  ***online***  ***i***  **PRC5 = Min(Max((LRDF\_1\*Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_1 \* Actual Net Telemetered Consumption)) from all CLRs active in SCED and qualified for Regulation Service and/or RRS with an Ancillary Service Resource award**      ***resources***  ***load***  ***online***  ***All***  ***resource***  ***load***  ***online***  ***i***  **PRC6 = Min(Max((LRDF\_2 \* Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_2 \* Actual Net Telemetered Consumption)) from all CLRs active in SCED and qualified for Regulation Service and/or RRS without an Ancillary Service Resource award**      ***resources***  ***load***  ***online***  ***All***  ***resource***  ***load***  ***online***  ***i***  **PRC7 = (Capacity from Resources capable of providing FFR)i**      ***resources***  ***FFR***  ***online***  ***All***  ***resource***  ***FFR***  ***online***  ***i***  **PRC8 = (If discharging or idle, Min(X% of HSL based on droop, HSL-ESR-Gen “injection”, the capacity that can be sustained for 45 minutes per the State of Charge), else Min(X% of (HSL – LSL(ESR “charging”) based on droop, the capacity that can be sustained for 45 minutes per the State of Charge – LSL(ESR “charging”)))**      ***ESR***  ***online***  ***All***  ***ESR***  ***online***  ***i***  **Excludes ESR capacity used to provide FFR.**  **PRC9 = (If discharging or idle, Min(X% of HSL based on droop, HSL-Gen “injection”, the sum of the MW headroom available from the intermittent renewable generation component and the MW capacity that can be sustained for 45 minutes per the ESS State of Charge), else Min(X% of Real-Time Total Capacity based on droop, the sum of the MW headroom available from the intermittent renewable generation component and the MW capacity that can be sustained for 45 minutes per the ESS State of Charge))**      ***DC-Coupled Resources***  ***online***  ***All***  ***ESR***  ***online***  ***i***  **Excludes DC-Coupled Resource capacity used to provide FFR.**  **PRC = PRC1 + PRC2 + PRC3+ PRC4 + PRC5 + PRC6 + PRC7 + PRC8 + PRC9**  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | PRC1 | MW | Generation On-Line greater than 0 MW | | PRC2 | MW | WGRs On-Line greater than 0 MW | | PRC3 | MW | Synchronous condenser output | | PRC4 | MW | Capacity from Load Resources with an ECRS Ancillary Service Resource award | | PRC5 | MW | Capacity from CLRs active in SCED and qualified for Regulation Service and/or RRS with an Ancillary Service Resource award | | PRC6 | MW | Capacity from CLRs active in SCED and qualified for Regulation Service and/or RRS without an Ancillary Service Resource award | | PRC7 | MW | Capacity from Resources capable of providing FFR | | PRC8 | MW | ESR capacity capable of providing Primary Frequency Response | | PRC9 | MW | Capacity from DC-Coupled Resources capable of providing Primary Frequency Response | | PRC | MW | Physical Responsive Capability | | X | Percentage | Percent threshold based on the Governor droop setting of ESRs | | RDF |  | The currently approved Reserve Discount Factor | | RDFW |  | The currently approved Reserve Discount Factor for WGRs | | LRDF\_1 |  | The currently approved Load Resource Reserve Discount Factor for CLRs awarded an Ancillary Service Resource award | | LRDF\_2 |  | The currently approved Load Resource Reserve Discount Factor for CLRs not awarded an Ancillary Service Resource award | | FRCHL | MW | Telemetered High limit of the FRC for the Resource | | FRCO | MW | Telemetered output of FRC portion of the Resource |   (2) The Load Resource Reserve Discount Factors (RDFs) for CLRs (LRDF\_1 and LRDF\_2) shall be subject to review and approval by TAC.  (3) The RDFs used in the PRC calculation shall be posted to the ERCOT website no later than three Business Days after approval.  (4) ERCOT shall display on the ERCOT website and update every ten seconds a rolling view of the ERCOT-wide PRC, as defined in paragraph (1)(p) above, for the current Operating Day. |

**6.5.7.6.2.5** **Deployment of Dispatchable Reliability Reserve Service (DRRS)**

(1) DRRS is intended as a market mechanism to reduce RUC Commitments and manage uncertainty on the ERCOT System. As outlined in paragraph (17) of Section 5.5.2, Reliability Unit Commitment (RUC) Process, the RUC process will be relied upon to identify the need for deploying Off-Line DRRS.

(2) ERCOT shall deploy Off-Line DRRS by operator Dispatch Instruction. The deployment of DRRS must always be 100% of the Ancillary Service capability for DRRS on an individual Resource.

(3) Resources providing DRRS must provide an Energy Offer Curve for use by SCED.

(4) Off-Line Resources providing DRRS must be capable of being dispatched to their DRRS award within two hours of receiving a Dispatch Instruction from ERCOT.

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| ***[NPRR1010: Insert Section 6.6.1.6 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  **6.6.1.6 Real-Time Market Clearing Prices for Ancillary Services**  (1) The Real-Time Market Clearing Price for Capacity (MCPC) for Reg-Up is the time-weighted average of the sum of the Real-Time MCPCs for Reg-Up and Real-Time Reliability Deployment Price Adder for Ancillary Service for Reg-Up of each SCED interval in the 15-minute Settlement Interval. The Real-Time MCPC for Reg-Up for a 15-minute Settlement Interval is calculated as follows:  **RTMCPCRU =  (RNWF *y* \* (RTMCPCRUS *y* + RTRDPARUS *y*))**  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | RTMCPCRU | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Up -* The Real-Time MCPC for Reg-Up for the 15-minute Settlement Interval. | | RTMCPCRUS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Up per SCED interval -* The Real-Time MCPC for Reg-Up for the SCED interval *y.* | | RTRDPARUS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Reg-Up per SCED interval* - The Real-Time price adder for Reg-Up that captures the impact of reliability deployments on Reg-Up prices for the SCED interval y. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*¾The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*¾The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. |   (2) The Real-Time MCPC for Reg-Down is the time-weighted average of the sum of the Real-Time MCPCs for Reg-Down and Real-Time Reliability Deployment Price Adder for Ancillary Service for Reg-Down of each SCED interval in the 15-minute Settlement Interval. The Real-Time MCPC for Reg-Down for a 15-minute Settlement Interval is calculated as follows:  **RTMCPCRD =  (RNWF *y* \* (RTMCPCRDS *y*+ RTRDPARDS *y*))**  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | RTMCPCRD | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Down -* The Real-Time MCPC for Reg-Down for the 15-minute Settlement Interval. | | RTMCPCRDS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Down per SCED interval -* The Real-Time MCPC for Reg-Down for the SCED interval *y.* | | RTRDPARDS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Reg-Down per SCED interval* - The Real-Time price adder for Reg-Down that captures the impact of reliability deployments on Reg-Down prices for the SCED interval *y*. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*¾The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*¾The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. |   (3) The Real-Time MCPC for RRS is the time-weighted average of the sum of the Real-Time MCPCs for RRS and Real-Time Reliability Deployment Price Adder for Ancillary Service for RRS of each SCED interval in the 15-minute Settlement Interval. The Real-Time MCPC for RRS for a 15-minute Settlement Interval is calculated as follows:  **RTMCPCRR =  (RNWF *y* \* (RTMCPCRRS *y* + RTRDPARRS *y*))**  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | RTMCPCRR | $/MW | *Real-Time Market Clearing Price for Capacity for Responsive Reserve -* The Real-Time MCPC for RRS for the 15-minute Settlement Interval. | | RTMCPCRRS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for Responsive Reserve per SCED interval -* The Real-Time MCPC for RRS for the SCED interval *y.* | | RTRDPARRS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Responsive Reserve per SCED interval* - The Real-Time price adder for RRS that captures the impact of reliability deployments on RRS prices for the SCED interval y. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*¾The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*¾The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. |   (4) The Real-Time MCPC for ECRS is the time-weighted average of the sum of the Real-Time MCPC for ECRS and Real-Time Reliability Deployment Price Adder for Ancillary Service for ECRS of each SCED interval in the 15-minute Settlement Interval. The Real-Time MCPC for ECRS for a 15-minute Settlement Interval is calculated as follows:  **RTMCPCECR =  (RNWF *y* \* (RTMCPCECRS *y*+ RTRDPAECRS *y*))**  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | RTMCPCECR | $/MW | *Real-Time Market Clearing Price for Capacity for ERCOT Contingency Reserve* *-* The Real-Time MCPC for ECRS for the 15-minute Settlement Interval. | | RTMCPCECRS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for ERCOT Contingency Reserve* *per SCED interval -* The Real-Time MCPC for ECRS for the SCED interval *y.* | | RTRDPAECRS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for ECRS per SCED interval* - The Real-Time price adder for ECRS that captures the impact of reliability deployments on ECRS prices for the SCED interval y. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*¾The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*¾The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. |   (5) The Real-Time MCPC for Non-Spin is the time-weighted average of the sum of the Real-Time MCPC for Non-Spin and Real-Time Reliability Deployment Price Adders for Ancillary Service for Non-Spin of each SCED interval in the 15-minute Settlement Interval. The Real-Time MCPC for Non-Spin for a 15-minute Settlement Interval is calculated as follows:  **RTMCPCNS =  (RNWF *y* \* (RTMCPCNSS *y*+ RTRDPANSS *y*))**  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | RTMCPCNS | $/MW | *Real-Time Market Clearing Price for Capacity for Non-Spin* *-* The Real-Time MCPC for Non-Spin for the 15-minute Settlement Interval. | | RTMCPCNSS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for Non-Spin* *per SCED interval -* The Real-Time MCPC for Non-Spin for the SCED interval *y.* | | RTRDPANSS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Non-Spin per SCED interval* - The Real-Time price adder for Non-Spin that captures the impact of reliability deployments on Non-Spin prices for the SCED interval y. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*¾The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*¾The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. |   (5) The Real-Time MCPC for DRRS is the time-weighted average of the sum of the Real-Time MCPC for DRRS and Real-Time Reliability Deployment Price Adders for Ancillary Service for DRRS of each SCED interval in the 15-minute Settlement Interval. The Real-Time MCPC for DRRS for a 15-minute Settlement Interval is calculated as follows:  **RTMCPCDRR = (RNWF *y* \* (RTMCPCDRRS *y* + RTRDPADRRS *y*))**  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | RTMCPCDRR | $/MW | *Real-Time Market Clearing Price for Capacity for Dispatchable Reliability Reserve Service* *-* The Real-Time MCPC for DRRS for the 15-minute Settlement Interval. | | RTMCPCDRRS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for Dispatchable Reliability Reserve Service* *per SCED interval -* The Real-Time MCPC for DRRS for the SCED interval *y.* | | RTRDPADRRS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Dispatchable Reliability Reserve Service* *per SCED interval* - The Real-Time price adder for DRRS that captures the impact of reliability deployments on DRRS prices for the SCED interval y. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*¾The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*¾The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. | |

**6.6.9.1 Payment for Emergency Power Increase Directed by ERCOT**

(1) If the Emergency Base Point issued to a Generation Resource is higher than the SCED Base Point immediately before the Emergency Condition or Watch, then ERCOT shall pay the QSE an additional compensation for the Resource at its Resource Node Settlement Point. The payment for a given 15-minute Settlement Interval is calculated as follows:

**EMREAMT *q, r, p* = (-1) \* EMREPR *q, r, p* \* EMRE *q, r, p***

Where:

EMREPR *q, r, p* = Max (0, EBPWAPR *q, r, p* – RTSPP *p*)

EBPWAPR *q, r, p* = (EBPPR *q, r, p, y* \* EBP *q, r, p, y* \* TLMP *y*) **/**

(EBP*q, r, p, y* \* TLMP *y*)

EMRE *q, r, p* = Max (0, Min (AEBP*q, r, p*, RTMG *q, r, p*) – ¼ \* BP *q, r, p*)

AEBP*q, r, p* =  (EBP *q, r, p, y* \* TLMP*y* / 3600)

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| EMREAMT *q, r, p* | $ | *Emergency Energy Amount per QSE per Settlement Point per Resource*—The payment to QSE *q* as additional compensation for the additional energy produced by Generation Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| EMREPR *q, r, p* | $/MWh | *Emergency Energy Price per QSE per Settlement Point per Resource*—The compensation rate for the additional energy produced by Generation Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| EMRE *q, r, p* | MWh | *Emergency Energy per QSE per Settlement Point per Resource*—The additional energy produced by Generation Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| EBPWAPR *q, r, p* | $/MWh | *Emergency Base Point Weighted Average Price per QSE per Settlement Point per Resource*—The weighted average of the energy prices corresponding with the Emergency Base Points on the Energy Offer Curve for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| BP *q, r, p* | MW | *Base Point per QSE per Settlement Point per Resource*—The Base Point of Resource *r* at Resource Node *p* represented by QSE *q* from the SCED prior to the Emergency Condition or Watch. For a Combined Cycle Train, the Resource *r* must be one of the registered Combined Cycle Generation Resources within the Combined Cycle Train. |
| AEBP*q, r, p* | MWh | *Aggregated Emergency Base Point*—The Generation Resource’s aggregated Emergency Base Point, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, AEBP is calculated for the Combined Cycle Train considering all emergency Dispatch Instructions to any Combined Cycle Generation Resources within the Combined Cycle Train. |
| EBP *q, r, p, y* | MW | *Emergency Base Point per QSE per Settlement Point per Resource by interval*—The Emergency Base Point of Resource *r* at Resource Node *p* represented by QSE *q* for the Emergency Base Point interval or SCED interval *y*. If a Base Point instead of an Emergency Base Point is effective during the interval *y*, its value equals the Base Point. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| EBPPR *q, r, p, y* | $/MWh | *Emergency Base Point Price per QSE per Settlement Point per Resource by interval*—The average incremental energy cost calculated per the Energy Offer Curve, capped by the MOC pursuant to Section 4.4.9.4.1, Mitigated Offer Cap, for the output levels between the SCED Base Point immediately before the Emergency Condition or Watch and the Emergency Base Point of Resource *r* at Resource Node *p* represented by QSE *q* for the Emergency Base Point interval or SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.   |  | | --- | | ***[NPRR1216: Replace the definition above with the following upon system implementation:]***  *Emergency Base Point Price per QSE per Settlement Point per Resource by interval*—The average incremental energy cost calculated per the Energy Offer Curve, capped by the MOC pursuant to Section 4.4.9.4.1, Mitigated Offer Cap, and by the SWCAP, for the output levels between the SCED Base Point immediately before the Emergency Condition or Watch and the Emergency Base Point of Resource *r* at Resource Node *p* represented by QSE *q* for the Emergency Base Point interval or SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | |
| RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTMG *q, r, p* | MWh | *Real-Time Metered Generation per QSE per Settlement Point per Resource*—The metered generation of Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| TLMP *y* | second | *Duration of Emergency Base Point interval or SCED interval per interval*—The duration of the portion of the Emergency Base Point interval or SCED interval *y* within the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Resource Node Settlement Point. |
| *r* | none | A Generation Resource. |
| *y* | none | An Emergency Base Point interval or SCED interval that overlaps the 15-minute Settlement Interval. |
| 3600 | none | The number of seconds in one hour. |

(2) The extension of the Energy Offer Curve is used to calculate the Emergency Base Point Price. If the Emergency Base Point MW value is greater than the largest MW value on the Energy Offer Curve submitted by the QSE for the Resource, then the Energy Offer Curve is extended to the Emergency Base Point MW value with a $/MWh value that is the MOC (pursuant to Section 4.4.9.4.1) for the highest MW output on the Energy Offer Curve submitted by the QSE for the Resource.

Q1 Q2 SCED Q3 EBP MW

$/

MWh

P 3

P2

P1

The area under the capped Energy Offer Curve equals

(EBPPR \* (EBP – SCED BP))

Mitigated Offer Cap

Extended portion of Energy Offer Curve

Q1 Q2 SCED Q3 EBP MW

$/

MWh

P 3

P2

P1

The area under the capped Energy Offer Curve equals

(EBPPR \* (EBP – SCED BP))

Mitigated Offer Cap

Extended portion of Energy Offer Curve

(3) The total additional compensation to each QSE for emergency power increases of Generation Resources for the 15-minute Settlement Interval is calculated as follows:

**EMREAMTQSETOT *q* = EMREAMT *q, r, p***

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| EMREAMTQSETOT *q* | $ | *Emergency Energy Amount QSE Total per QSE*¾The total of the payments to QSE *q* as additional compensation for emergency power increases of the Generation Resources represented by this QSE for the 15-minute Settlement Interval. |
| EMREAMT *q, r, p* | $ | *Emergency Energy Amount per QSE per Settlement Point per Resource*—The payment to QSE *q* as additional compensation for the additional energy produced by Generation Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *p* | none | A Resource Node Settlement Point. |
| *r* | none | A Generation Resource. |

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| ***[NPRR1010, NPRR1014, and NPRR1245: Replace applicable portions of Section 6.6.9.1 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010 and NPRR1245; or upon system implementation for NPRR1014:]***  **6.6.9.1 Payment for Emergency Operations Settlement**  (1) ERCOT shall pay the QSE additional compensation for the Resource at its Resource Node Settlement Point during the Settlement Intervals that qualify for emergency Settlement as described in Section 6.6.9, Emergency Operations Settlement. The payment for a given 15-minute Settlement Interval is calculated as follows:  **EMREAMT *q, r, p* = (-1) \* (EMREPRGEN *q, r, p* \* EMREGEN *q, r, p*)**  **+ (EMREPRLOAD *q, r, p* \* EMRELOAD *q, r, p*)**  Where:  If any EBP > 0 then:  EMREPRGEN *q, r, p* = Max (0, EBPWAPRGEN *q, r, p* – RTSPP *p*)  EBPWAPRGEN *q, r, p* = (EBPPR *q, r, p, y* \* Max (0.001, EBP *q, r, p, y*) \* TLMP *y*) **/**  (Max (0.001, EBP *q, r, p, y*)\* TLMP *y*)  EMREGEN *q, r, p* = Max (0, Min (AEBPGEN*q, r, p*, RTMG *q, r, p*) – ¼ \* Max (0, BP *q, r, p*))  AEBPGEN*q, r, p* =  (Max (0, EBP *q, r, p, y*) \* TLMP *y* / 3600)  If any EBP < 0 then:  EMREPRLOAD *q, r, p* = Max (0, RTSPP *p* – EBPWAPRLOAD *q, r, p*)  EBPWAPRLOAD *q, r, p* = (EBPPR *q, r, p, y* \* Min (-0.001, EBP *q, r, p, y*) \* TLMP *y*) **/**  (Min (-0.001, EBP *q, r, p, y*)\* TLMP *y*)  EMRELOAD *q, r, p* = Min (0, Max (AEBPLOAD*q, r, p*, RTCL *q, r, p*) – ¼ \* Min (0, BP *q, r, p*))  AEBPLOAD *q, r, p* =  (Min (0, EBP *q, r, p, y*) \* TLMP*y* / 3600)  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | EMREAMT *q, r, p* | $ | *Emergency Energy Amount per QSE per Settlement Point per Resource*—The payment to QSE *q* as additional compensation for the additional energy or Ancillary Services produced or consumed by Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EMREPRGEN *q, r, p* | $/MWh | *Emergency Energy Price for Generation per QSE per Settlement Point per Resource*—The compensation rate for the generation produced by Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EMREPRLOAD *q, r, p* | $/MWh | *Emergency Energy Price for Charging Load per QSE per Settlement Point per Resource*—The compensation rate for the charging load for Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. | | EMREGEN *q, r, p* | MWh | *Emergency Energy for Generation per QSE per Settlement Point per Resource*—The generation produced by Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EMRELOAD *q, r, p* | MWh | *Emergency Energy for Charging Load per QSE per Settlement Point per Resource*—The charging load for Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. | | EBPWAPRGEN *q, r, p* | $/MWh | *Emergency Base Point Weighted Average Price for Generation per QSE per Settlement Point per Resource*—The weighted average of the Emergency Base Point Prices corresponding with the positive Emergency Base Points, for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EBPWAPRLOAD *q, r, p* | $/MWh | *Emergency Base Point Weighted Average Price for Charging Load per QSE per Settlement Point per Resource*—The weighted average of the Emergency Base Point Prices corresponding with the negative Emergency Base Points, for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. | | BP *q, r, p* | MW | *Base Point per QSE per Settlement Point per Resource*—The Base Point of Resource *r* at Resource Node *p* represented by QSE *q* from the SCED prior to the Emergency Condition or Watch. For a Combined Cycle Train, the Resource *r* must be one of the registered Combined Cycle Generation Resources within the Combined Cycle Train. | | AEBPGEN*q, r, p* | MWh | *Aggregated Emergency Base Point for Generation*—The aggregation of the positive Emergency Base Points for the Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, AEBP is calculated for the Combined Cycle Train considering all emergency Dispatch Instructions to any Combined Cycle Generation Resources within the Combined Cycle Train. | | AEBPLOAD*q, r, p* | MWh | *Aggregated Emergency Base Point for Charging Load*—The aggregation of the negative Emergency Base Points for the Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. | | EBP *q, r, p, y* | MW | *Emergency Base Point per QSE per Settlement Point per Resource by interval*—The Emergency Base Point of Resource *r* at Resource Node *p* represented by QSE *q* for the Emergency Base Point interval or SCED interval *y*. If a Base Point instead of an Emergency Base Point is effective during the interval *y*, its value equals the Base Point. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | EBPPR *q, r, p, y* | $/MWh | *Emergency Base Point Price per QSE per Settlement Point per Resource by interval*—The price on the Energy Offer Curve or Energy Bid/Offer Curve corresponding to the Emergency Base Point for Resource *r* at Resource Node *p* represented by QSE *q* for the Emergency Base Point interval or SCED interval *y*. The Energy Offer Curve shall be capped by the MOC pursuant to Section 4.4.9.4.1, Mitigated Offer Cap and the Energy Bid/Offer Curve shall be capped by the maximum RTSPP at the Settlement Point for the Operating Day, per paragraph (10)(b) of Section 6.6.9. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. | | RTMG *q, r, p* | MWh | *Real-Time Metered Generation per QSE per Settlement Point per Resource*—The metered generation of Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTCL *q, r, p* | MWh | *Real-Time Charging Load per QSE per Resource per Settlement Point*—The charging load for Resource *r* at Resource Node *p* represented by the QSE *q,* represented as a negative value,for the 15-minute Settlement Interval. | | TLMP *y* | second | *Duration of Emergency Base Point interval or SCED interval per interval*—The duration of the portion of the Emergency Base Point interval or SCED interval *y* within the 15-minute Settlement Interval. | | *q* | none | A QSE. | | *p* | none | A Resource Node Settlement Point. | | *r* | none | A Generation Resource or ESR. | | *y* | none | An Emergency Base Point interval or SCED interval that overlaps the 15-minute Settlement Interval. | | 3600 | none | The number of seconds in one hour. |   (2) ERCOT shall pay the QSE additional compensation for the Resource at its Resource Node Settlement Point during the Settlement Intervals that qualify for emergency Settlement as described in Section 6.6.9, Emergency Operations Settlement. The payment for a given 15-minute Settlement Interval is calculated as follows:  **EMREAMT *q, r, p*  = Min (0, RTENET *q, r, p* + RTASNET *q, r*)**  (a) Where the Real-Time Energy Net Revenue is calculated as follows:  RTENET *q, r, p* = RTEREV*q, r, p* - RTEREVT*q, r, p*  Where:  RTEREV*q, r, p* = RTSPP *p* \* (EMREGEN *q, r, p* + EMRELOAD *q, r, p*)  RTEREVT*q, r, p* = EBPWAPRGEN *q, r, p* \* EMREGEN *q, r, p* +  EBPWAPRLOAD *q, r, p* \* EMRELOAD *q, r, p*  If any EBP > 0 then:  EBPWAPRGEN *q, r, p* = (EBPPR *q, r, p, y* \* Max (0.001, EBP *q, r, p, y*) \* TLMP *y*) **/**  (Max (0.001, EBP *q, r, p, y*)\* TLMP *y*)  EMREGEN *q, r, p* = Max (0, Min (AEBPGEN*q, r, p*, RTMG *q, r, p*))  AEBPGEN*q, r, p* =  (Max (0, EBP *q, r, p, y*) \* TLMP*y* / 3600)  If any EBP < 0 then:  EBPWAPRLOAD *q, r, p* = (EBPPR *q, r, p, y* \* Min (-0.001, EBP *q, r, p, y*) \* TLMP *y*) **/**  (Min (-0.001, EBP *q, r, p, y*)\* TLMP *y*)  EMRELOAD *q, r, p* = Min (0, Max (AEBPLOAD*q, r, p*, RTCL *q, r, p*))  AEBPLOAD *q, r, p* =  (Min (0, EBP *q, r, p, y*) \* TLMP*y* / 3600)  (b) Where the Real-Time Ancillary Services Net Revenue is calculated as follows:  RTASNET*q, r* = RTRUNET *q, r*+ RTRDNET *q, r* + RTNSNET *q, r* + RTRRNET *q, r* + RTECRNET *q, r* + RTDRRNET *q, r*  Where for Reg-Up:  RTRUNET *q, r*  = RTRUREV *q, r* - (¼) \* RTRUREVT *q, r, p*  RTRUREVT*q, r, p* = RTRUWAPR *q, r, p* \* RTRUAWD *q, r*  RTRUWAPR *q, r, p* = (RTRUOPR *q, r, y* \* Max (0.001, RTRUAWDS *q, r, y*) \* TLMP *y*) **/**  (Max (0.001, RTRUAWDS *q, r, y*)\* TLMP *y*)  Where for Reg-Down:  RTRDNET *q, r* = RTRDREV *q, r* - (¼) \* RTRDREVT *q, r, p*  RTRDREVT*q, r, p* = RTRDWAPR *q, r, p* \* RTRDAWD *q, r*  RTRDWAPR *q, r, p* = (RTRDOPR *q, r, y* \* Max (0.001, RTRDAWDS *q, r, y*) \* TLMP *y*) **/**  (Max (0.001, RTRDAWDS *q, r, y*)\* TLMP *y*)  Where for RRS:  RTRRNET *q, r*  = RTRRREV *q, r* - (¼) \* RTRRREVT *q, r, p*  RTRRREVT*q, r, p* = RTRRWAPR *q, r, p* \* RTRRAWD *q, r*  RTRRWAPR *q, r, p* = (RTRROPR *q, r, y* \* Max (0.001, RTRRAWDS *q, r, y*) \* TLMP *y*) **/** (Max (0.001, RTRRAWDS *q, r, y*)\* TLMP *y*)  Where for Non-Spin:  RTNSNET *q, r*  = RTNSREV *q, r* - (¼) \* RTNSREVT *q, r, p*  RTNSREVT*q, r, p* = RTNSWAPR *q, r, p* \* RTNSAWD *q, r*  RTNSWAPR *q, r, p* = (RTNSOPR *q, r, y* \* Max (0.001, RTNSAWDS *q, r, y*) \* TLMP *y*) **/**(Max (0.001, RTNSAWDS *q, r, y*)\* TLMP *y*)  Where for ERCOT Contingency Reserve (ECRS):  RTECRNET *q, r*  = RTECRREV *q, r* - (¼) \* RTECRREVT *q, r, p*  RTECRREVT*q, r, p* = RTECRWAPR *q, r, p* \* RTECRAWD *q, r*  RTECRWAPR *q, r, p* = (RTECROPR *q, r, y* \* Max (0.001, RTECRAWDS *q, r, y*) \* TLMP *y*) **/** (Max (0.001, RTECRAWDS *q, r, y*)\* TLMP *y*)  Where for Dispatchable Reliability Reserve Service (DRRS):  RTDRRNET *q, r*  = RTDRRREV *q, r* - (¼) \* RTDRRREVT *q, r, p*  RTDRRREVT*q, r, p* = RTDRRWAPR *q, r, p* \* RTDRRAWD *q, r*  RTDRRWAPR *q, r, p* = (RTDRROPR *q, r, y* \* Max (0.001, RTDRRAWDS *q, r, y*) \* TLMP *y*) **/** (Max (0.001, RTDRRAWDS *q, r, y*)\* TLMP *y*)  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | EMREAMT *q, r, p* | $ | *Emergency Energy Amount per QSE per Settlement Point per Resource*—The payment to QSE *q* as additional compensation for the additional energy or Ancillary Services produced or consumed by Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTENET *q, r, p* | $ | *Real-Time Energy Net Revenue*—The net difference between the Real-Time Energy Revenue and the Real-Time Energy Revenue Target for QSE *q* for Resource *r* at Resource node *p* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTASNET *q, r* | $ | *Real-Time Ancillary Service Net Revenue*—The sum of the Ancillary Service net revenues for QSE *q* for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTEREV *q, r, p* | $ | *Real-Time Energy Revenue*—The calculated Real-Time energy revenue at the RTSPP for QSE *q* calculated forResource *r* at Resource node *p* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EMREGEN *q, r, p* | MWh | *Emergency Energy for Generation per QSE per Settlement Point per Resource*—The generation produced by Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EMRELOAD *q, r, p* | MWh | *Emergency Energy for Charging Load per QSE per Settlement Point per Resource*—The charging load for Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. | | RTEREVT *q, r, p* | $ | *Real-Time Energy Revenue Target*—The energy revenue target at the EBPWAPRGEN and EBPWAPRLOAD of the Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EBPWAPRGEN *q, r, p* | $/MWh | *Emergency Base Point Weighted Average Price for Generation per QSE per Settlement Point per Resource*—The weighted average of the Emergency Base Point Prices corresponding with the positive Emergency Base Points for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EBPWAPRLOAD *q, r, p* | $/MWh | *Emergency Base Point Weighted Average Price for Charging Load per QSE per Settlement Point per Resource*—The weighted average of the Emergency Base Point Prices corresponding with the negative Emergency Base Points, for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. | | AEBPGEN*q, r, p* | MWh | *Aggregated Emergency Base Point for Generation*—The aggregation of the positive Emergency Base Points for the Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, AEBP is calculated for the Combined Cycle Train considering all emergency Dispatch Instructions to any Combined Cycle Generation Resources within the Combined Cycle Train. | | AEBPLOAD*q, r, p* | MWh | *Aggregated Emergency Base Point for Charging Load*—The aggregation of the negative Emergency Base Points for the Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. | | EBP *q, r, p, y* | MW | *Emergency Base Point per QSE per Settlement Point per Resource by interval*—The Emergency Base Point of Resource *r* at Resource Node *p* represented by QSE *q* for the Emergency Base Point interval or SCED interval *y*. If a Base Point instead of an Emergency Base Point is effective during the interval *y*, its value equals the Base Point. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | EBPPR *q, r, p, y* | $/MWh | *Emergency Base Point Price per QSE per Settlement Point per Resource by interval*—The price on the Energy Offer Curve or Energy Bid/Offer Curve corresponding to the Emergency Base Point for Resource *r* at Resource Node *p* represented by QSE *q* for the Emergency Base Point interval or SCED interval *y*. The Energy Offer Curve shall be capped by the MOC pursuant to Section 4.4.9.4.1, Mitigated Offer Cap, and the Energy Bid/Offer Curve shall be capped by the maximum RTSPP at the Settlement Point for the Operating Day, per paragraph (10)(b) of Section 6.6.9. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. | | RTMG *q, r, p* | MWh | *Real-Time Metered Generation per QSE per Settlement Point per Resource*—The metered generation of Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTCL *q, r, p* | MWh | *Real-Time Charging Load per QSE per Resource per Settlement Point*—The charging load for Resource *r* at Resource Node *p* represented by the QSE *q,* represented as a negative value,for the 15-minute Settlement Interval. | | RTRUNET *q, r* | $ | *Real-Time Reg-Up Net Revenue*—The difference between the Real-Time Reg-Up Revenue and the Real-Time Reg-Up Revenue Target for QSE *q* for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDNET *q, r* | $ | *Real-Time Reg-Down Net Revenue*—The difference between calculated revenue for the Real-Time Reg-Down Revenue and the Real-Time Reg-Down Revenue Target for QSE *q* for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRNET *q, r* | $ | *Real-Time Responsive Reserve Net Revenue*—The difference between Real-Time RRS Revenue and the Real-Time RRS Revenue Target for QSE *q* for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSNET *q, r* | $ | *Real-Time Non-Spin Net Revenue*—The difference between Real-Time Non-Spin Revenue and the Real-Time Non-Spin Revenue Target for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRNET *q, r* | $ | *Real-Time ERCOT Contingency Reserve Service Net Revenue*—The difference between Real-Time ECRS Revenue and the Real-Time ECRS Revenue Target for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTDRRNET *q, r* | $ | *Real-Time Dispatchable Reliability Reserve Service Net Revenue*—The difference between Real-Time DRRS Revenue and the Real-Time DRRS Revenue Target for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRUREV *q, r* | $ | *Real-Time Reg-Up Revenue*—The calculated Real-Time Reg-Up revenue for QSE *q* calculated forResource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDREV *q, r* | $ | *Real-Time Reg-Down Revenue*—The calculated Real-Time Reg-Down revenue for QSE *q* calculated forResource *r* for the 15-minute Settlement interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRREV *q, r* | $ | *Real-Time Responsive Reserve Revenue*—The calculated Real-Time RRS revenue for QSE *q* calculated forResource *r* for the 15-minute Settlement interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSREV *q, r* | $ | *Real-Time Non-Spin Revenue*—The calculated Real-Time Non-Spin revenue for QSE *q* calculated forResource *r* for the 15-minute Settlement interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRREV *q, r* | $ | *Real-Time ERCOT Contingency Reserve Service Revenue*—The calculated Real-Time ECRS revenue for QSE *q* calculated forResource *r* for the 15-minute Settlement interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTDRRREV *q, r* | $ | *Real-Time Dispatchable Reliability Reserve Service Revenue*—The calculated Real-Time DRRS revenue for QSE *q* calculated forResource *r* for the 15-minute Settlement interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRUREVT *q, r, p* | $ | *Real-Time Reg-Up Revenue Target*—The revenue target of the Reg-Up award to Resource *r* at Resource Node *p* represented by QSE *q* based on the Ancillary Service Offer for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDREVT *q, r, p* | $ | *Real-Time Reg-Down Revenue Target*—The revenue target of the Reg-Down award to Resource *r* at Resource Node *p* represented by QSE *q* based on the Ancillary Service Offer for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRREVT *q, r, p* | $ | *Real-Time Responsive Reserve Revenue Target*—The revenue target of the RRS award to Resource *r* at Resource Node *p* represented by QSE *q* based on the Ancillary Service Offer for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSREVT *q, r, p* | $ | *Real-Time Non-Spin Revenue Target*—The revenue target of the Non-Spin award to Resource *r* at Resource Node *p* represented by QSE *q* based on the Ancillary Service Offer for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRREVT *q, r, p* | $ | *Real-Time ERCOT Contingency Reserve Service Revenue Target*—The revenue target of the ECRS award to Resource *r* at Resource Node *p* represented by QSE *q* based on the Ancillary Service Offer for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTDRRREVT *q, r, p* | $ | *Real-Time Dispatchable Reliability Reserve Service Revenue Target*—The revenue target of the DRRS award to Resource *r* at Resource Node *p* represented by QSE *q* based on the Ancillary Service Offer for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRUWAPR *q, r, p* | $/MW | *Real-Time Reg-Up Weighted-Average Price*—The weighted average of the Ancillary Service Offer prices corresponding with the Reg-Up awards on the Ancillary Service Offer curves for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDWAPR *q, r, p* | $/MW | *Real-Time Reg-Down Weighted-Average Price*—The weighted average of the Ancillary Service Offer prices corresponding with the Reg-Down awards on the Ancillary Service Offer curves for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRWAPR *q, r, p* | $/MW | *Real-Time Responsive Reserve Weighted-Average Price*—The weighted average of the Ancillary Service Offer prices corresponding with the RRS awards on the Ancillary Service Offer curves for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSWAPR *q, r, p* | $/MW | *Real-Time Non-Spin Weighted-Average Price*—The weighted average of the Ancillary Service Offer prices corresponding with the Non-Spin awards on the Ancillary Service Offer curves for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRWAPR *q, r, p* | $/MW | *Real-Time ERCOT Contingency Reserve Service Weighted-Average Price*—The weighted average of the Ancillary Service Offer prices corresponding with the ECRS awards on the Ancillary Service Offer curves for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTDRRWAPR *q, r, p* | $/MW | *Real-Time Dispatchable Reliability Reserve Service Weighted-Average Price*—The weighted average of the Ancillary Service Offer prices corresponding with the DRRS awards from the Ancillary Service Offer for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRUAWD *q, r* | MW | *Real-Time Reg-Up Award per Resource per QSE*—The Reg-Up amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDAWD *q, r* | MW | *Real-Time Reg-Down Award per Resource per QSE*—The Reg-Down amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRAWD *q, r* | MW | *Real-Time Responsive Reserve Award per Resource per QSE*—The RRS amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSAWD *q, r* | MW | *Real-Time Non-Spin Award per Resource per QSE*—The Non-Spin amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRAWD *q, r* | MW | *Real-Time ERCOT Contingency Reserve Service Award per Resource per QSE*—The ECRS amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTDRRAWD *q, r* | MW | *Real-Time Dispatchable Reliability Reserve Service Award per Resource per QSE*—The DRRS amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRUOPR *q, r, y* | $/MW | *Real-Time Reg-Up Offer Price*—The price on the Ancillary Service Offer curve at the Reg-Up award of Resource *r* represented by QSE *q* for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTRDOPR *q, r, y* | $/MW | *Real-Time Reg-Down Offer Price*—The price on the Ancillary Service Offer curve at the Reg-Down award of Resource *r* represented by QSE *q* for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTRROPR *q, r, y* | $/MW | *Real-Time Responsive Reserve Offer Price*—The price on the Ancillary Service Offer curve at the RRS award of Resource *r* represented by QSE *q* for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTNSOPR *q, r, y* | $/MW | *Real-Time Non-Spin Offer Price*—The price on the Ancillary Service Offer curve at the Non-Spin award of Resource *r* represented by QSE *q* for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTECROPR *q, r, y* | $/MW | *Real-Time ERCOT Contingency Reserve Service Offer Price*—The price on the Ancillary Service Offer curve at the ECRS award of Resource *r* represented by QSE *q* for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTDRROPR *q, r, y* | $/MW | *Real-Time Dispatchable Reliability Reserve Service Offer Price*—The price from the submitted Ancillary Service Offer at the DRRS award of Resource *r* represented by QSE *q* for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTRUAWDS *q, r, y* | MW | *Real-Time Reg-Up Award per Resource per QSE per SCED interval*—The Reg-Up amount awarded to QSE *q* for Resource *r* in Real-Timefor the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTRDAWDS *q, r, y* | MW | *Real-Time Reg-Down Award per Resource per QSE per SCED interval*—The Reg-Down amount awarded to QSE *q* for Resource *r* in Real-Timefor the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTRRAWDS *q, r, y* | MW | *Real-Time Responsive Reserve Award per Resource per QSE per SCED interval*—The RRS amount awarded to QSE *q* for Resource *r* in Real-Timefor the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTNSAWDS *q, r, y* | MW | *Real-Time Non-Spin Award per Resource per QSE per SCED interval*—The Non-Spin amount awarded to QSE *q* for Resource *r* in Real-Timefor the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTECRAWDS *q, r, y* | MW | *Real-Time ERCOT Contingency Reserve Service Award per Resource per QSE per SCED interval*—The ECRS amount awarded to QSE *q* for Resource *r* in Real-Timefor the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTDRRAWDS *q, r, y* | MW | *Real-Time Dispatchable Reliability Reserve Service Award per Resource per QSE per SCED interval*—The DRRS amount awarded to QSE *q* for Resource *r* in Real-Timefor the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | TLMP *y* | second | *Duration of Emergency Base Point interval or SCED interval per interval*—The duration of the portion of the Emergency Base Point interval or SCED interval *y* within the 15-minute Settlement Interval. | | *q* | none | A QSE. | | *p* | none | A Resource Node Settlement Point. | | *r* | none | A Generation Resource or ESR. | | *y* | none | An Emergency Base Point interval or SCED interval that overlaps the 15-minute Settlement Interval. | | 3600 | none | The number of seconds in one hour. |   (3) The extension of the Energy Offer Curve or Energy Bid/Offer Curve and Mitigated Offer Cap (MOC) is used to calculate the Emergency Base Point Price (EBPPR). If the Emergency Base Point MW value is greater than the largest MW value on the Energy Offer Curve or Energy Bid/Offer Curve submitted by the QSE for the Resource, or the Resource’s MOC, then the Energy Offer Curve, Energy Bid/Offer Curve, or MOC is extended to the Emergency Base Point MW value with a $/MWh value that is equal to the highest $/MWh value on the applicable curve. If the Emergency Base Point MW value is lower than the lowest MW value on the Energy Offer Curve or Energy Bid/Offer Curve submitted by the QSE for the Resource, or the Resource’s MOC, then the Energy Offer Curve, Energy Bid/Offer Curve or MOC is extended to the Emergency Base Point MW value with a $/MWh value that is equal to the lowest $/MWh value on the applicable curve.  (4) The total additional compensation to each QSE for emergency Settlement of Resources for the 15-minute Settlement Interval is calculated as follows:  **EMREAMTQSETOT *q* = EMREAMT *q, r, p***  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | EMREAMTQSETOT *q* | $ | *Emergency Energy Amount QSE Total per QSE*¾The total of the payments to QSE *q* as additional compensation for additional energy or Ancillary Services of the Resources represented by this QSE for the 15-minute Settlement Interval. | | EMREAMT *q, r, p* | $ | *Emergency Energy Amount per QSE per Settlement Point per Resource*—The payment to QSE *q* as additional compensation for the additional energy or Ancillary Services produced or consumed by Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *q* | none | A QSE. | | *p* | none | A Resource Node Settlement Point. | | *r* | none | A Generation Resource or ESR. | |

**6.6.12.1 Switchable Generation Make-Whole Payment**

(1) To compensate QSEs representing SWGRs that switch to the ERCOT Control Area from a non-ERCOT Control Area pursuant to an ERCOT RUC instruction for an actual or anticipated EEA condition, ERCOT shall calculate a Switchable Generation Make-Whole Payment (SWMWAMT) for an Operating Day, allocated to each instructed Operating Hour as follows:

**SWMWAMT *q, r* = (-1) \* Max (0, (SWCG *q, r, d* – SWRTREV *q, r, d*)) / SWIHR *q, r, d***

Where:

SWCG *q, r, d* = SWSUC *q, r, d* + SWMEC *q, r, d* + SWOC *q, r, d* + SWAC *q, r, d* +

SWPSLR *q, r, d*

SWRTREV *q, r, d* = Max [0, (RTSPP*p, i* \* RTMG*q, r, i* + (-1) \* (EMREAMT *q, r, p, i*  + VSSVARAMT *q, r, i*+ VSSEAMT *q, r, i*) + Max(0, (RTOLHSLRA *q, r, p, i* – RTMGA *q, r, p, i*) \* (RTRSVPOR *i* + RTRDP *i*)))]

SWAC *q, r, d* = SWFC *q, r, d* + SWEIC *q, r, d* + SWASIC *q, r, d* + SWMWDC *q, r, d* + SWFIPC *q, r, d*

SWPSLR *q, r, d* = (RTSPP*p, i* \* RTLPX *q, r, i* ) – (FIP+FA) \* SFC *d*

If ERCOT has approved verifiable costs for the SWGR:

SWSUC *q, r, d* =  [SWSF \* (DAFCRS *r, s* \* (GASPERSU *r, s* \* FIP + OILPERSU *r, s* \* FOP + SFPERSU *r, s* \* SFP) + VOMS *r, s*)] + ADJSWSUC *q, r, d*

SWMEC *q, r, d* = ((AHR *r, i* \* (GASPERME *r* \* FIP + OILPERME *r* \* FOP + SFPERME *r*\* SFP + FA *r*) + VOMLSL *r*) \* Min (LSL *q, r, i* \* (¼), RTMG *q, r, i*))

SWOC *q, r, d* = [(AHR *r, i* \* ((GASPEROL *r* \* FIP + OILPEROL *r* \* FOP + SFPEROL *r* \* SFP) + FA *r*) + OM *r*) \* Max(0, (RTMG *q, r, i* – LSL *q, r, i* \* (¼)))] *-* OPC *r, d*

Where,

OPC *r, d* = ((PAHR *r, i* \* (FIP + FA *r*) + OM *r*) \* AENG *r, i*)

If ERCOT has not approved verifiable costs for the SWGR:

SWSUC *q, r, d* =  (SWSF \* RCGSC *s, rc*) + ADJSWSUC *q, r, d*

SWMEC *q, r, d* = (RCGMEC *i, rc* \* Min (LSL *q, r, i* \* (¼), RTMG *q, r, i*))

SWOC *q, r, d* = ((PAHR *r, i* \* FIP + STOM *rc*) \* Max(0, (RTMG *q, r, i* – LSL *q, r, i* \* (¼)))) *-* OPC *r, d*

Where,

OPC *r, d* = ((PAHR *r, i* \* FIP + STOM *rc*) \* AENG *r, i*)

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| SWMWAMT *q, r* | $ | *Switchable Generation Make-Whole Payment*—The Switchable Generation Make-Whole Payment to the QSE *q,* for Resource *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| SWCG *q, r, d* | $ | *Switchable Generation Cost Guarantee*—The sum of eligible Startup Costs, minimum-energy costs, operating costs, and other Switchable Generation approved costs for Resource *r* represented by QSE *q* for all instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| OPC *r, d* | $ | *Operational Cost* – The operational cost for the Resource *r* for the Operating Day *d* in the non-ERCOT Control Area. The operating costs represent the costs the Resource would have incurred to generate the awarded energy in the non-ERCOT Control Area Day-Ahead market absent a request to switch to ERCOT. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| AENG *r, i* | MWh | *Awarded Energy Non-ERCOT Day-Ahead Market* – The awarded energy in the non-ERCOT Day-Ahead Market for the Resource *r* during the Interval *i*. The awarded energy in the non-ERCOT Control Area Day-Ahead market represents the energy award for the interval that was not generated by the Resource due to the switch to ERCOT. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| SWSUC *q ,r, d* | $ | *Switchable Generation* *Start-Up Cost* —The Startup Costs for Resource *r* represented by QSE *q* for startup hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| SWPSLR *q ,r, d* | $ | *Switchable Generation Physical Switch Lost Revenue –* The loss of revenue, net of any saved costs including avoided fuel consumption, experienced by the QSE when the Combined Cycle Generation Resource operating in ERCOT must reduce its output to accommodate a switch from a non-ERCOT Control Area of one or more turbines needed to achieve a Combined Cycle Generation Resource configuration instructed by ERCOT. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTLPX *q, r, i* | MWh | *Real-Time Proxy Generation per QSE per Resource by Settlement Interval*—The Real-Time energy that was not generated in ERCOT by Combined Cycle Train, *r*, represented by QSE *q*, for the 15-minute Settlement Interval *i*, due to a reduction in output that was necessary to facilitate a switch of another unit in the same Combined Cycle Train to the ERCOT System from a non-ERCOT Control Area, or to a non-ERCOT Control Area from the ERCOT System, when the switch is instructed by ERCOT.  During a shutdown to switch to ERCOT, the value of RTLPX will be determined based on the reduced generation, by interval, for the period starting from the commencement of the shutdown sequence in the non-ERCOT Control Area until breaker close in ERCOT. The reduction in generation shall be determined based on the last metered output value for the Combined Cycle Generation Resource operating in ERCOT immediately prior to the commencement of the shutdown sequence in the non-ERCOT Control Area as compared with the actual metered output during the relevant period, but only to the extent ERCOT determines the reduction in output was necessary to facilitate the switch.  During a shutdown after an ERCOT release of the SWGR, the value of RTLPX will be determined based on the reduced generation, by interval, for the period starting from the commencement of the shutdown sequence in the ERCOT Control Area until breaker close in the non-ERCOT Control Area, with a maximum duration equal to the duration of the switch from the non-ERCOT Control Area to ERCOT pursuant to the RUC instruction. This proxy value will apply only if the QSE shuts down the unit within 60 minutes after the ERCOT release. The reduction in generation shall be determined based on the last metered output value for the Combined Cycle Generation Resource operating in ERCOT immediately prior to the commencement of the shutdown sequence in ERCOT, as compared with the actual metered output during the relevant period, but only to the extent ERCOT determines the reduction in output was necessary to facilitate the switch. |
| SFC *d* | MMBtu | *Saved Fuel Consumption* — Fuel quantity saved due to an output reduction of the combustion turbine(s) operating in ERCOT during the relevant period if necessary to accommodate the switch to and from the ERCOT area. |
| SWSF | none | *Switchable Generation* *Startup Factor* —The Switchable Generation Startup Factor for an SWGR. The SWSF shall be set to a value of 2 if the SWGR has a COP Resource Status of EMRSWGR within 24 hours of being released by the ERCOT Operator. Otherwise, the SWSF shall be set to a value of 1. |
| SWMEC *q, r, d* | $ | *Switchable Generation* *Minimum Energy Cost* —The minimum energy costs for Resource *r* represented by QSE *q* during instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| SWOC *q, r, d* | $ | *Switchable Generation* *Operating Cost* —The operating costs for Resource *r* represented by QSE *q* during instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Switchable generation operating cost represents the Real-Time operating costs in ERCOT reduced by the savings in operating costs not incurred due to the switch from the non-ERCOT Control Area. |
| SWAC *q, r, d* | $ | *Switchable Generation Approved Costs –* The total amount of the calculation of financial loss, as submitted by the QSE *q* for the Resource *r,* as approved by ERCOT for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| SWFC *q, r, d* | $ | *Switchable Generator* *Fuel Cost* —The incremental fuel costs and fees for Resource *r* represented by QSE *q* for all instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Incremental fuel costs must be based on those costs incurred as described in Section 9.14.9, Incremental Fuel Costs for Switchable Generation Make-Whole Payment. |
| SWFIPC *q, r, d* | $ | *Switchable Generator Fuel Imbalance Penalty Cost* —The fuel imbalance penalty cost for Resource *r* represented by QSE *q*, for the Operating Day, arising from the SWGR not consuming its contracted fuel quantities as a result of a switch from a non-ERCOT Control Area as requested by ERCOT. Fuel imbalance penalty costs are limited to those costs assessed for the period starting at the initiation of the ramp-down in the non-ERCOT Control Area to two hours following the time ERCOT released the SWGR. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| SWEIC *q, r, d* | $ | *Switchable Generator* *Energy Imbalance Cost* —The energy imbalance costs for Resource *r* represented by QSE *q* for instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Energy imbalance costs represent Real-Time imbalance charges for the amount of energy the SWGR was not able to provide as required by its DAM commitment from the non-ERCOT Control Area, starting from the beginning of the ramp-down period in the other grid to two hours following the time ERCOT released the Resource. |
| SWASIC *q, r, d* | $ | *Switchable Generator* *Ancillary Services Imbalance Cost* —The Ancillary Service imbalance costs for Resource *r* represented by QSE *q* for instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Ancillary Service imbalance costs represent Real-Time imbalance charges for the amount of Ancillary Services the SWGR was not able to provide as required by its Day-Ahead commitment from the non-ERCOT Control Area, starting from the time of shutdown in the other grid to two hours following the time ERCOT released the Resource. |
| SWMWDC *q, r, d* | $ | *Switchable Generator* *Make-Whole Payment Distribution Cost* —The Make-Whole Payment distribution costsfor Resource *r* represented by QSE *q* for instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Make-Whole Payment distribution costs represent charges from non-ERCOT Control Area from the time of shutdown in the other grid to two hours following the time ERCOT released the Resource. |
| SWRTREV *q, r, d* | $ | *Switchable Generation Real-Time Revenues –* The sum of energy revenues for the Resource *r,* represented by QSE *q,* during all instructed hours for the Operating Day *d.*  Where for a Combined Cycle Train, Resource *r* is the Combined Cycle Train. |
| GASPERSU *r, s* | none | *Percent of Natural Gas to Operate per Start*—The percentage of natural gas used by Resource *r* to operate per start *s*, 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. |
| OILPERSU *r, s* | none | *Percent of Oil to Operate per Start*—The percentage of fuel oil used by Resource *r* to operate per start *s*, 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. |
| SFPERSU *r, s* | none | *Percent of Solid Fuel to Operate per Start*—The percentage of solid fuel used by Resource *r* to operate per start *s*, 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. |
| GASPERME *r* | None | *Percent of Natural Gas to Operate at LSL*—The percentage of natural gas used by Resource *r* to operate at 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. |
| OILPERME *r* | None | *Percent of Oil to Operate at LSL*—The percentage of fuel oil used by Resource *r* to operate at 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. |
| SFPERME *r* | None | *Percent of Solid Fuel to Operate at LSL*—The percentage of solid fuel used by Resource *r* to operate at 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. |
| DAFCRS *r, s* | MMBtu/Start | *Day-Ahead Actual Fuel Consumption Rate per Start*—The actual fuel consumption rate for Resource *r* to startup per start type *s*, adjusted by VOXR as defined in the Verifiable Cost Manual. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. For additional information, see Verifiable Cost Manual Section 3.3, Startup Fuel Consumption. |
| VOMS *r, s* | $/Start | *Variable Operations and Maintenance Cost per Start*—The operations and maintenance cost for Resource *r* to startup, per start *s*, including an adjustment for emissions costs. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. For additional information, see Verifiable Cost Manual Section 3.2, Submitting Startup Costs. |
| VOMLSL *r* | $/MWh | *Variable Operations and Maintenance Cost at LSL*—The operations and maintenance cost for Resource *r* to operate at LSL, including an adjustment for emissions costs. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. For additional information, see Verifiable Cost Manual Section 4.2, Submitting Minimum Energy Costs. |
| LSL *q, r, i* | MW | *Low Sustained Limit*—The LSL of Generation Resource *r* represented by QSE *q* for the hour that includes the Settlement Interval *i*, as submitted in the COP. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RTMG *q, r, i* | MWh | *Real-Time Metered Generation per QSE per Resource by Settlement Interval by hour*—The Real-Time energy from Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| AHR *r, i* | MMBtu / MWh | *Average Heat Rate per Resource*– The verifiable average heat rate for the Resource *r*, for the operating level, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| OM *r* | $/MWh | *Verifiable Operations and Maintenance Cost Above LSL*– The O&M cost for Resource *r* to operate above LSL. 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. |
| SWIHR *q, r, d* | none | *Switchable Generation Instructed Hours*—The total number of Switchable Generation instructed hours, for Resource *r* represented by QSE *q,* for the Operating Day *d*. When one or more Combined Cycle Generation Resources are committed by ERCOT, the total number of instructed hours is calculated for the Combined Cycle Train for all switchable instructed Combined Cycle Generation Resources. |
| SFP | $/MMBtu | *Solid Fuel Price*—The solid fuel index price is $1.50. |
| GASPEROL *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 *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 *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. |
| ADJSWSUC *q, r, d* | $ | *Adjustment to Switchable Generation* *Start-Up Cost* — Adjustment to Switchable Generation Start-up Cost for Resource *r* represented by QSE *q*, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. This adjustment may include eligible startup transition costs for a Combined Cycle Train or costs for any SWGR not captured in other billing determinants. |
| RCGSC s, *rc* | $/Start | *Resource Category Generic Startup Cost*—The Resource Category Generic Startup Cost cap for the category of the Resource *rc*, according to Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, for the Operating Day. |
| RCGMEC *i, rc* | $/MWh | *Resource Category Generic Minimum-Energy Cost*—The Resource Category Generic Minimum Energy Cost cap for the category of the Resource *rc*, according to Section 4.4.9.2.3, for the Operating Day. |
| PAHR *r, i* | MMBtu / MWh | *Proxy Average Heat Rate-* The proxy average heat rate for the Resource *r* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| STOM *rc* | $/MWh | *Standard Operations and Maintenance Cost -* The standard O&M cost for the Resource Category *rc* for operations above LSL, shall be set to the minimum energy variable O&M costs, as described in paragraph (6)(c) of Section 5.6.1, Verifiable Costs. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
| FIP | $/MMBtu | *Fuel Index Price*—As defined in Section 2.1, Definitions. |
| FOP | $/MMBtu | *Fuel Oil Price*—As defined in Section 2.1. |
| FA *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. |
| EMREAMT *q, r, p, i* | $ | *Emergency Energy Amount per QSE per Settlement Point per unit per interval*—The payment to QSE *q* for the additional energy produced by Generation Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. Payment for emergency energy is made to the Combined Cycle Train. |
| VSSVARAMT *q, r, i* | $ | *Voltage Support Service VAr Amount per QSE per Generation Resource -* The payment to QSE *q* for the VSS provided by Generation Resource *r,* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Resource *r* is a Combined Cycle Train. |
| VSSEAMT *q, r, i* | $ | *Voltage Support Service Energy Amount per QSE per Generation Resource*—The lost opportunity payment to QSE *q* for ERCOT-directed VSS from Generation Resource *r* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Resource *r* is a Combined Cycle Train. |
| RTOLHSLRA *q, r, p, i* | MWh | *Real-Time Adjusted On-Line High Sustained Limit for the Resource*¾The Real-Time telemetered HSL for the Resource *r* represented by QSE *q* at Resource Node *p* that is available to SCED, integrated over the 15-minute Settlement Interval *i*, as described in Section 6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMGA *q, r, p, i* | MWh | *Real-Time Adjusted Metered Generation per QSE per Settlement Point per Resource*—The adjusted metered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p* in Real-Time for the 15-minute Settlement Interval *i*, as described in Section 6.7.5. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTRSVPOR *i* | $/MWh | *Real-Time Reserve Price for On-Line Reserves*¾The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval *i*, as described in Section 6.7.5. |
| RTRDP *i* | $/MWh | *Real-Time On-Line Reliability Deployment Price*¾The Real-Time price for the 15-minute Settlement Interval *i*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder, as described in Section 6.7.5. |
| *q* | none | A QSE. |
| *r* | none | A Switchable Generation Resource. |
| *d* | none | An Operating Day containing the RUC instruction to the SWGR. |
| *i* | none | A 15-minute Settlement Interval within the hour of an Operating Day during which the SWGR is instructed by ERCOT. |
| *s* | none | An ERCOT area start that is eligible to have its costs included in the Switchable Generation Cost Guarantee. |
| *rc* | none | A Resource Category. |
| *p* | none | A Resource Node Settlement Point. |

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| ***[NPRR1010 and NPRR1014: Replace applicable portions of paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014:]***  (1) To compensate QSEs representing SWGRs that switch to the ERCOT Control Area from a non-ERCOT Control Area pursuant to an ERCOT RUC instruction for an actual or anticipated EEA condition, ERCOT shall calculate a Switchable Generation Make-Whole Payment (SWMWAMT) for an Operating Day, allocated to each instructed Operating Hour as follows:  **SWMWAMT *q, r* = (-1) \* Max (0, (SWCG *q, r, d* – SWRTREV *q, r, d*)) / SWIHR *q, r, d***  Where:  SWCG *q, r, d* = SWSUC *q, r, d* + SWMEC *q, r, d* + SWOC *q, r, d* + SWAC *q, r, d* +  SWPSLR *q, r, d*  SWRTREV *q, r, d* = Max [0, (RTSPP*p, i* \* RTMG*q, r, i* + (-1) \* (EMREAMT *q, r, p, i*  + VSSVARAMT *q, r, i*+ VSSEAMT *q, r, i*) + RTRUREV *q, r, i* + RTRDREV *q, r, i  +* RTRRREV *q, r, i  +* RTNSREV *q, r, i  +* RTECRREV *q, r, i +* RTDRRREV *q, r, i*)]  SWAC *q, r, d* = SWFC *q, r, d* + SWEIC *q, r, d* + SWASIC *q, r, d* + SWMWDC *q, r, d* + SWFIPC *q, r, d*  SWPSLR *q, r, d* = (RTSPP*p, i* \* RTLPX *q, r, i* ) – (FIP+FA) \* SFC *d*  If ERCOT has approved verifiable costs for the SWGR:  SWSUC *q, r, d* =  [SWSF \* (DAFCRS *r, s* \* (GASPERSU *r, s* \* FIP + OILPERSU *r, s* \* FOP + SFPERSU *r, s* \* SFP) + VOMS *r, s*)] + ADJSWSUC *q, r, d*  SWMEC *q, r, d* = ((AHR *r, i* \* (GASPERME *r* \* FIP + OILPERME *r* \* FOP + SFPERME *r*\* SFP + FA *r*) + VOMLSL *r*) \* Min (LSL *q, r, i* \* (¼), RTMG *q, r, i*))  SWOC *q, r, d* = [(AHR *r, i* \* ((GASPEROL *r* \* FIP + OILPEROL *r* \* FOP + SFPEROL *r* \* SFP) + FA *r*) + OM *r*) \* Max(0, (RTMG *q, r, i* – LSL *q, r, i* \* (¼)))] *-* OPC *r, d*  Where,  OPC *r, d* = ((PAHR *r, i* \* (FIP + FA *r*) + OM *r*) \* AENG *r, i*)  If ERCOT has not approved verifiable costs for the SWGR:  SWSUC *q, r, d* =  (SWSF \* RCGSC *s, rc*) + ADJSWSUC *q, r, d*  SWMEC *q, r, d* = (RCGMEC *i, rc* \* Min (LSL *q, r, i* \* (¼), RTMG *q, r, i*))  SWOC *q, r, d* = ((PAHR *r, i* \* FIP + STOM *rc*) \* Max(0, (RTMG *q, r, i* – LSL *q, r, i* \* (¼)))) *-* OPC *r, d*  Where,  OPC *r, d* = ((PAHR *r, i* \* FIP + STOM *rc*) \* AENG *r, i*)  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | SWMWAMT *q, r* | $ | *Switchable Generation Make-Whole Payment*—The Switchable Generation Make-Whole Payment to the QSE *q,* for Resource *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | SWCG *q, r, d* | $ | *Switchable Generation Cost Guarantee*—The sum of eligible Startup Costs, minimum-energy costs, operating costs, and other Switchable Generation approved costs for Resource *r* represented by QSE *q* for all instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | OPC *r, d* | $ | *Operational Cost* – The operational cost for the Resource *r* for the Operating Day *d* in the non-ERCOT Control Area. The operating costs represent the costs the Resource would have incurred to generate the awarded energy in the non-ERCOT Control Area Day-Ahead market absent a request to switch to ERCOT. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | AENG *r, i* | MWh | *Awarded Energy Non-ERCOT Day-Ahead Market* – The awarded energy in the non-ERCOT Day-Ahead Market for the Resource *r* during the Interval *i*. The awarded energy in the non-ERCOT Control Area Day-Ahead market represents the energy award for the interval that was not generated by the Resource due to the switch to ERCOT. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | SWSUC *q ,r, d* | $ | *Switchable Generation* *Start-Up Cost* —The Startup Costs for Resource *r* represented by QSE *q* for startup hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | SWPSLR *q ,r, d* | $ | *Switchable Generation Physical Switch Lost Revenue –* The loss of revenue, net of any saved costs including avoided fuel consumption, experienced by the QSE when the Combined Cycle Generation Resource operating in ERCOT must reduce its output to accommodate a switch from a non-ERCOT Control Area of one or more turbines needed to achieve a Combined Cycle Generation Resource configuration instructed by ERCOT. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTLPX *q, r, i* | MWh | *Real-Time Proxy Generation per QSE per Resource by Settlement Interval*—The Real-Time energy that was not generated in ERCOT by Combined Cycle Train, *r*, represented by QSE *q*, for the 15-minute Settlement Interval *i*, due to a reduction in output that was necessary to facilitate a switch of another unit in the same Combined Cycle Train to the ERCOT System from a non-ERCOT Control Area, or to a non-ERCOT Control Area from the ERCOT System, when the switch is instructed by ERCOT.  During a shutdown to switch to ERCOT, the value of RTLPX will be determined based on the reduced generation, by interval, for the period starting from the commencement of the shutdown sequence in the non-ERCOT Control Area until breaker close in ERCOT. The reduction in generation shall be determined based on the last metered output value for the Combined Cycle Generation Resource operating in ERCOT immediately prior to the commencement of the shutdown sequence in the non-ERCOT Control Area as compared with the actual metered output during the relevant period, but only to the extent ERCOT determines the reduction in output was necessary to facilitate the switch.  During a shutdown after an ERCOT release of the SWGR, the value of RTLPX will be determined based on the reduced generation, by interval, for the period starting from the commencement of the shutdown sequence in the ERCOT Control Area until breaker close in the non-ERCOT Control Area, with a maximum duration equal to the duration of the switch from the non-ERCOT Control Area to ERCOT pursuant to the RUC instruction. This proxy value will apply only if the QSE shuts down the unit within 60 minutes after the ERCOT release. The reduction in generation shall be determined based on the last metered output value for the Combined Cycle Generation Resource operating in ERCOT immediately prior to the commencement of the shutdown sequence in ERCOT, as compared with the actual metered output during the relevant period, but only to the extent ERCOT determines the reduction in output was necessary to facilitate the switch. | | SFC *d* | MMBtu | *Saved Fuel Consumption* — Fuel quantity saved due to an output reduction of the combustion turbine(s) operating in ERCOT during the relevant period if necessary to accommodate the switch to and from the ERCOT area. | | SWSF | None | *Switchable Generation* *Startup Factor* —The Switchable Generation Startup Factor for an SWGR. The SWSF shall be set to a value of 2 if the SWGR has a COP Resource Status of EMRSWGR within 24 hours of being released by the ERCOT Operator. Otherwise, the SWSF shall be set to a value of 1. | | SWMEC *q, r, d* | $ | *Switchable Generation* *Minimum Energy Cost* —The minimum energy costs for Resource *r* represented by QSE *q* during instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | SWOC *q, r, d* | $ | *Switchable Generation* *Operating Cost* —The operating costs for Resource *r* represented by QSE *q* during instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Switchable generation operating cost represents the Real-Time operating costs in ERCOT reduced by the savings in operating costs not incurred due to the switch from the non-ERCOT Control Area. | | SWAC *q, r, d* | $ | *Switchable Generation Approved Costs –* The total amount of the calculation of financial loss, as submitted by the QSE *q* for the Resource *r,* as approved by ERCOT for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | SWFC *q, r, d* | $ | *Switchable Generator* *Fuel Cost* —The incremental fuel costs and fees for Resource *r* represented by QSE *q* for all instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Incremental fuel costs must be based on those costs incurred as described in Section 9.14.9, Incremental Fuel Costs for Switchable Generation Make-Whole Payment. | | SWFIPC *q, r, d* | $ | *Switchable Generator Fuel Imbalance Penalty Cost* —The fuel imbalance penalty cost for Resource *r* represented by QSE *q*, for the Operating Day, arising from the SWGR not consuming its contracted fuel quantities as a result of a switch from a non-ERCOT Control Area as requested by ERCOT. Fuel imbalance penalty costs are limited to those costs assessed for the period starting at the initiation of the ramp-down in the non-ERCOT Control Area to two hours following the time ERCOT released the SWGR. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | SWEIC *q, r, d* | $ | *Switchable Generator* *Energy Imbalance Cost* —The energy imbalance costs for Resource *r* represented by QSE *q* for instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Energy imbalance costs represent Real-Time imbalance charges for the amount of energy the SWGR was not able to provide as required by its DAM commitment from the non-ERCOT Control Area, starting from the beginning of the ramp-down period in the other grid to two hours following the time ERCOT released the Resource. | | SWASIC *q, r, d* | $ | *Switchable Generator* *Ancillary Services Imbalance Cost* —The Ancillary Service imbalance costs for Resource *r* represented by QSE *q* for instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Ancillary Service imbalance costs represent Real-Time imbalance charges for the amount of Ancillary Services the SWGR was not able to provide as required by its Day-Ahead commitment from the non-ERCOT Control Area, starting from the time of shutdown in the other grid to two hours following the time ERCOT released the Resource. | | SWMWDC *q, r, d* | $ | *Switchable Generator* *Make-Whole Payment Distribution Cost* —The Make-Whole Payment distribution costsfor Resource *r* represented by QSE *q* for instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Make-Whole Payment distribution costs represent charges from non-ERCOT Control Area from the time of shutdown in the other grid to two hours following the time ERCOT released the Resource. | | SWRTREV *q, r, d* | $ | *Switchable Generation Real-Time Revenues –* The sum of energy revenues for the Resource *r,* represented by QSE *q,* during all instructed hours for the Operating Day *d.*  Where for a Combined Cycle Train, Resource *r* is the Combined Cycle Train. | | GASPERSU *r, s* | none | *Percent of Natural Gas to Operate per Start*—The percentage of natural gas used by Resource *r* to operate per start *s*, 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. | | OILPERSU *r, s* | none | *Percent of Oil to Operate per Start*—The percentage of fuel oil used by Resource *r* to operate per start *s*, 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. | | SFPERSU *r, s* | none | *Percent of Solid Fuel to Operate per Start*—The percentage of solid fuel used by Resource *r* to operate per start *s*, 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. | | GASPERME *r* | None | *Percent of Natural Gas to Operate at LSL*—The percentage of natural gas used by Resource *r* to operate at 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. | | OILPERME *r* | None | *Percent of Oil to Operate at LSL*—The percentage of fuel oil used by Resource *r* to operate at 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. | | SFPERME *r* | None | *Percent of Solid Fuel to Operate at LSL*—The percentage of solid fuel used by Resource *r* to operate at 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. | | DAFCRS *r, s* | MMBtu/Start | *Day-Ahead Actual Fuel Consumption Rate per Start*—The actual fuel consumption rate for Resource *r* to startup per start type *s*, adjusted by VOXR as defined in the Verifiable Cost Manual. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. For additional information, see Verifiable Cost Manual Section 3.3, Startup Fuel Consumption. | | VOMS *r, s* | $/Start | *Variable Operations and Maintenance Cost per Start*—The operations and maintenance cost for Resource *r* to startup, per start *s*, including an adjustment for emissions costs. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. For additional information, see Verifiable Cost Manual Section 3.2, Submitting Startup Costs. | | VOMLSL *r* | $/MWh | *Variable Operations and Maintenance Cost at LSL*—The operations and maintenance cost for Resource *r* to operate at LSL, including an adjustment for emissions costs. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. For additional information, see Verifiable Cost Manual Section 4.2, Submitting Minimum Energy Costs. | | LSL *q, r, i* | MW | *Low Sustained Limit*—The LSL of Generation Resource *r* represented by QSE *q* for the hour that includes the Settlement Interval *i*, as submitted in the COP. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTMG *q, r, i* | MWh | *Real-Time Metered Generation per QSE per Resource by Settlement Interval by hour*—The Real-Time energy from Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | AHR *r, i* | MMBtu / MWh | *Average Heat Rate per Resource*– The verifiable average heat rate for the Resource *r*, for the operating level, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | OM *r* | $/MWh | *Verifiable Operations and Maintenance Cost Above LSL*– The O&M cost for Resource *r* to operate above LSL. 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. | | SWIHR *q, r, d* | none | *Switchable Generation Instructed Hours*—The total number of Switchable Generation instructed hours, for Resource *r* represented by QSE *q,* for the Operating Day *d*. When one or more Combined Cycle Generation Resources are committed by ERCOT, the total number of instructed hours is calculated for the Combined Cycle Train for all switchable instructed Combined Cycle Generation Resources. | | SFP | $/MMBtu | Solid Fuel Price—The solid fuel index price is $1.50. | | GASPEROL *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 *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 *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. | | ADJSWSUC *q, r, d* | $ | *Adjustment to Switchable Generation* *Start-Up Cost* — Adjustment to Switchable Generation Start-up Cost for Resource *r* represented by QSE *q*, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. This adjustment may include eligible startup transition costs for a Combined Cycle Train or costs for any SWGR not captured in other billing determinants. | | RCGSC s, *rc* | $/Start | *Resource Category Generic Startup Cost*—The Resource Category Generic Startup Cost cap for the category of the Resource *rc*, according to Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, for the Operating Day. | | RCGMEC *i, rc* | $/MWh | *Resource Category Generic Minimum-Energy Cost*—The Resource Category Generic Minimum Energy Cost cap for the category of the Resource *rc*, according to Section 4.4.9.2.3, for the Operating Day. | | PAHR *r, i* | MMBtu / MWh | *Proxy Average Heat Rate-* The proxy average heat rate for the Resource *r* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | STOM *rc* | $/MWh | *Standard Operations and Maintenance Cost -* The standard O&M cost for the Resource Category *rc* for operations above LSL, shall be set to the minimum energy variable O&M costs, as described in paragraph (6)(c) of Section 5.6.1, Verifiable Costs. | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | | FIP | $/MMBtu | *Fuel Index Price*—As defined in Section 2.1, Definitions. | | FOP | $/MMBtu | *Fuel Oil Price*—As defined in Section 2.1. | | FA *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. | | EMREAMT *q, r, p, i* | $ | *Emergency Energy Amount per QSE per Settlement Point per unit per interval*—The payment to QSE *q* for the additional energy or Ancillary Services produced or consumed by Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. Payment for emergency energy is made to the Combined Cycle Train. | | VSSVARAMT *q, r, i* | $ | *Voltage Support Service VAr Amount per QSE per Generation Resource -* The payment to QSE *q* for the VSS provided by Generation Resource *r,* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Resource *r* is a Combined Cycle Train. | | VSSEAMT *q, r, i* | $ | *Voltage Support Service Energy Amount per QSE per Generation Resource*—The lost opportunity payment to QSE *q* for ERCOT-directed VSS from Generation Resource *r* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Resource *r* is a Combined Cycle Train. | | RTRUREV *q, r* | $ | *Real-Time Reg-Up Revenue*— The Real-Time Reg-Up revenue for QSE *q* calculated forResource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDREV *q, r* | $ | *Real-Time Reg-Down Revenue*— The Real-Time Reg-Down revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRREV *q, r* | $ | *Real-Time Responsive Reserve Revenue*— The Real-Time RRS revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSREV *q, r* | $ | *Real-Time Non-Spin Revenue*— The Real-Time Non-Spin revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRREV *q, r* | $ | *Real-Time ERCOT Contingency Reserve Service Revenue*— The Real-Time ECRS revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTDRRREV *q, r* | $ | *Real-Time Dispatchable Reliability Reserve Service Revenue*— The Real-Time DRRS revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *q* | none | A QSE. | | *r* | none | A Switchable Generation Resource. | | *d* | none | An Operating Day containing the RUC instruction to the SWGR. | | *i* | none | A 15-minute Settlement Interval within the hour of an Operating Day during which the SWGR is instructed by ERCOT. | | *s* | none | An ERCOT area start that is eligible to have its costs included in the Switchable Generation Cost Guarantee. | | *rc* | none | A Resource Category. | | *p* | none | A Resource Node Settlement Point. | |

(2) The total compensation to each QSE for the Switchable Generation Make-Whole Payment for a given hour in the Operating Day is calculated as follows:

**SWMWAMTQSETOT *q* =  SWMWAMT *q, r***

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| SWMWAMTQSETOT ***q*** | $ | *Switchable Generation Make-Whole Payment per QSE*—The total Switchable Generation Make-Whole Payment to the QSE *q*, for the hour. |
| SWMWAMT *q, r* | $ | *Switchable Generation Make-Whole Payment*—The Switchable Generation Make-Whole Payment to the QSE *q,* for Resource *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | A Switchable Generation Resource. |

6.7.4 Adjustments to Cost Allocations for Ancillary Services Procurement

(1) Each QSE for which ERCOT purchases Ancillary Service capacity in the DAM, a SASM, or an RSASM, is charged for the QSE’s share of the net costs incurred for each service. For each QSE, its share of the DAM costs has been calculated in Section 4.6.4, Settlement of Ancillary Services Procured in the DAM; its share of the net total costs incurred in the DAM, a SASM, or an RSASM less its DAM charge is calculated in this section.

(2) For Reg-Up, if applicable:

(a) The net total costs for Reg-Up for a given Operating Hour is calculated as follows:

**RUCOSTTOT = (-1) \* ((RTPCRUAMTTOT *m*) + PCRUAMTTOT + RUFQAMTTOT +**

**RUINFQAMTTOT)**

Where:

Total payment of SASM- and RSASM-procured capacity for Reg-Up by market

RTPCRUAMTTOT *m* = RTPCRUAMT *q, m*

Total payment of DAM-procured capacity for Reg-Up

PCRUAMTTOT = PCRUAMT *q*

Total charge of failure on Ancillary Service Supply Responsibility for Reg-Up

RUFQAMTTOT = RUFQAMTQSETOT *q*

Total payment of SASM- and RSASM-procured capacity for Reg-Up by QSE

RTPCRUAMTQSETOT *q* = RTPCRUAMT *q, m*

Total charge of infeasible Ancillary Service Supply Responsibility for Reg-Up

RUINFQAMTTOT =  RUINFQAMT *q*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RUCOSTTOT | $ | *Reg-Up Cost Total*—The net total costs for Reg-Up for the hour. |
| RTPCRUAMTTOT *m* | $ | *Procured Capacity for Reg-Up Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for Reg-Up, for the hour. |
| RTPCRUAMT *q, m* | $ | *Procured Capacity for Reg-Up Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for Reg-Up, for the hour. |
| RUFQAMTTOT | $ | *Reg-Up Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for Reg-Up, for the hour. |
| RUFQAMTQSETOT *q* | $ | *Reg-Up Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| RTPCRUAMTQSETOT *q* | $ | *Procured Capacity for Reg-Up Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for Reg-Up, 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. |
| RUINFQAMTTOT | $ | *Reg-Up Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Reg-Up, for the hour. |
| RUINFQAMT *q* | $ | *Reg-Up Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Reg-Up, 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. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR841: Replace paragraph (a) above with the following upon system implementation:]  (a) The net total costs for Reg-Up for a given Operating Hour is calculated as follows:  **RUCOSTTOT = (-1) \* ((RTPCRUAMTTOT *m*) + PCRUAMTTOT + RUFQAMTTOT +**  **RUINFQAMTTOT + RUMWINFATOT)**  Where:  Total payment of SASM- and RSASM-procured capacity for Reg-Up by market  RTPCRUAMTTOT *m* = RTPCRUAMT *q, m*  Total payment of DAM-procured capacity for Reg-Up  PCRUAMTTOT = PCRUAMT *q*  Total charge of failure on Ancillary Service Supply Responsibility for Reg-Up  RUFQAMTTOT = RUFQAMTQSETOT *q*  Total payment of SASM- and RSASM-procured capacity for Reg-Up by QSE  RTPCRUAMTQSETOT *q* = RTPCRUAMT *q, m*  Total charge of infeasible Ancillary Service Supply Responsibility for Reg-Up  RUINFQAMTTOT =  RUINFQAMT *q*  Total Real-Time DAM Make-Whole Payment for Reg-Up  RUMWINFATOT =  RUMWINFA *q, h*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | RUCOSTTOT | $ | *Reg-Up Cost Total*—The net total costs for Reg-Up for the hour. | | RTPCRUAMTTOT *m* | $ | *Procured Capacity for Reg-Up Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for Reg-Up, for the hour. | | RUMWINFATOT | $ | *Reg-Up Make-Whole Infeasible Amount total*¾ The total Real-Time calculated payment to all QSEs*,* for their contribution of Reg-Up, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour. | | RUMWINFA *q, h* | $ | *Reg-Up Make-Whole Infeasible Amount per QSE per hour*¾ The total Real-Time calculated payment to QSE *q,* for its contribution of Reg-Up, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour *h*. | | RTPCRUAMT *q, m* | $ | *Procured Capacity for Reg-Up Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for Reg-Up, for the hour. | | RUFQAMTTOT | $ | *Reg-Up Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for Reg-Up, for the hour. | | RUFQAMTQSETOT *q* | $ | *Reg-Up Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. | | RTPCRUAMTQSETOT *q* | $ | *Procured Capacity for Reg-Up Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for Reg-Up, 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. | | RUINFQAMTTOT | $ | *Reg-Up Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Reg-Up, for the hour. | | RUINFQAMT *q* | $ | *Reg-Up Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Reg-Up, 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. | | *q* | none | A QSE. | | *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. | |

(b) Each QSE’s share of the net total costs for Reg-Up for the Operating Hour is calculated as follows:

**RUCOST *q* = RUPR \* RUQ *q***

Where:

RUPR = RUCOSTTOT / RUQTOT

RUQTOT = RUQ *q*

RUQ *q* = RUO *q* – SARUQ *q*

RUO *q* = (SARUQ *q* + (RTPCRU *q, m*)+ PCRU *q* –

RUFQ *q* – RRUFQ *q*) \* HLRS *q*

SARUQ *q*= DASARUQ *q* + RTSARUQ *q*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RUCOST *q* | $ | *Reg-Up Cost per QSE*—QSE *q*’s share of the net total costs for Reg-Up, for the hour. |
| RUPR | $/MW per hour | *Reg-Up Price—*The price for Reg-Up calculated based on the net total costs for Reg-Up, for the hour. |
| RUCOSTTOT | $ | *Reg-Up Cost Total*—The net total costs for Reg-Up, for the hour. See item (2)(a) above. |
| RUQTOT | MW | *Reg-Up Quantity Total*—The sum of every QSE’s Ancillary Service Obligation minus its self-arranged Reg-Up quantity in the DAM and any and all SASMs, for the hour. |
| RUQ *q* | MW | *Reg-Up Quantity per QSE*—The QSE *q*’s Ancillary Service Obligation minus its self-arranged Reg-Up quantity in the DAM and any and all SASMs, for the hour. |
| RUO *q* | MW | *Reg-Up Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, 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. |
| RTSARUQ *q* | MW | *Self-Arranged Reg-Up Quantity per QSE for all SASMs*—The sum of all self-arranged Reg-Up quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1, Self-Arranged Ancillary Service Quantities. |
| RTPCRU *q, m* | MW | *Procured Capacity for Reg-Up per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide Reg-Up, for the hour. |
| RUFQ *q* | MW | *Reg-Up Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| RRUFQ *q* | MW | *Reconfiguration Reg-Up Failure Quantity per QSE—*QSE *q* total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour. |
| PCRU *q* | MW | *Procured Capacity for Reg-Up per QSE in DAM*—The total Reg-Up capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. |
| SARUQ*q* | MW | *Total Self-Arranged Reg-Up Quantity per QSE for all markets*—The sum of all self-arranged Reg-Up quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *m* | none | A SASM for the given Operating Hour. |

(c) The adjustment to each QSE’s DAM charge for the Reg-Up for the Operating Hour, due to changes during the Adjustment Period or Real-Time operations, is calculated as follows:

**RTRUAMT *q*= RUCOST *q* – DARUAMT *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RTRUAMT *q* | $ | *Real-Time Reg-Up Amount per QSE*—The adjustment to QSE *q*’s share of the costs for Reg-Up, for the hour. |
| RUCOST *q* | $ | *Reg-Up Cost per QSE*—QSE *q*’s share of the net total costs for Reg-Up, for the hour. |
| DARUAMT *q* | $ | *Day-Ahead Reg-Up Amount per QSE*—QSE *q*’s share of the DAM cost for Reg-Up, for the hour. |
| *q* | none | A QSE. |

(3) For Reg-Down, if applicable:

(a) The net total costs for Reg-Down for a given Operating Hour is calculated as follows:

**RDCOSTTOT = (-1) \* ((RTPCRDAMTTOT *m*) + PCRDAMTTOT + RDFQAMTTOT +**

**RDINFQAMTTOT)**

Where:

Total payment of SASM- and RSASM-procured capacity for Reg-Down by market

RTPCRDAMTTOT *m* = RTPCRDAMT *q, m*

Total payment of DAM-procured capacity for Reg-Down

PCRDAMTTOT= PCRDAMT *q*

Total charge of failure on Ancillary Service Supply Responsibility for Reg-Down

RDFQAMTTOT = RDFQAMTQSETOT *q*

Total payment of SASM- and RSASM-procured capacity for Reg-Down by QSE

RTPCRDAMTQSETOT *q* = RTPCRDAMT *q, m*

Total charge of infeasible Ancillary Service Supply Responsibility for Reg-Down

RDINFQAMTTOT =  RDINFQAMT *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RDCOSTTOT | $ | *Reg-Down Cost Total*—The net total costs for Reg-Down, for the hour. |
| RTPCRDAMTTOT *m* | $ | *Procured Capacity for Reg-Down Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for Reg-Down, for the hour. |
| RTPCRDAMT *q, m* | $ | *Procured Capacity for Reg-Down Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for Reg-Down, for the hour. |
| RDFQAMTTOT | $ | *Reg-Down Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures on their Ancillary Service Supply Responsibilities for Reg-Down, for the hour. |
| RDFQAMTQSETOT *q* | $ | *Reg-Down Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| RTPCRDAMTQSETOT *q* | $ | *Procured Capacity for Reg-Down Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for Reg-Down, for the hour. |
| PCRDAMT *q* | $ | *Procured Capacity for Reg-Down Amount per QSE for DAM*—The DAM Reg-Down payment for QSE *q*, 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. |
| RDINFQAMTTOT | $ | *Reg-Down Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Reg-Down, for the hour. |
| RDINFQAMT *q* | $ | *Reg-Down Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of its Ancillary Service Supply Responsibilities for Reg-Down, for the hour. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR841: Replace paragraph (a) above with the following upon system implementation:]  (a) The net total costs for Reg-Down for a given Operating Hour is calculated as follows:  **RDCOSTTOT = (-1) \* ((RTPCRDAMTTOT *m*) + PCRDAMTTOT + RDFQAMTTOT +**  **RDINFQAMTTOT** + **RDMWINFATOT)**  Where:  Total payment of SASM- and RSASM-procured capacity for Reg-Down by market  RTPCRDAMTTOT *m* = RTPCRDAMT *q, m*  Total payment of DAM-procured capacity for Reg-Down  PCRDAMTTOT= PCRDAMT *q*  Total charge of failure on Ancillary Service Supply Responsibility for Reg-Down  RDFQAMTTOT = RDFQAMTQSETOT *q*  Total payment of SASM- and RSASM-procured capacity for Reg-Down by QSE  RTPCRDAMTQSETOT *q* = RTPCRDAMT *q, m*  Total charge of infeasible Ancillary Service Supply Responsibility for Reg-Down  RDINFQAMTTOT =  RDINFQAMT *q*  Total Real-Time Day-Ahead Make-Whole Payment for Reg-Down  RDMWINFATOT =  RDMWINFA *q, h*  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | RDCOSTTOT | $ | *Reg-Down Cost Total*—The net total costs for Reg-Down, for the hour. | | RTPCRDAMTTOT *m* | $ | *Procured Capacity for Reg-Down Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for Reg-Down, for the hour. | | RTPCRDAMT *q, m* | $ | *Procured Capacity for Reg-Down Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for Reg-Down, for the hour. | | RDFQAMTTOT | $ | *Reg-Down Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures on their Ancillary Service Supply Responsibilities for Reg-Down, for the hour. | | RDMWINFATOT | $ | *Reg-Down Make-Whole Infeasible Amount total*¾ The total Real-Time calculated payment to all QSEs*,* for their contribution of Reg-Down, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour. | | RDMWINFA *q, h* | $ | *Reg-Down Make-Whole Infeasible Amount per QSE per hour*¾ The total Real-Time calculated payment to QSE *q,* for its contribution of Reg-Down, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour *h*. | | RDFQAMTQSETOT *q* | $ | *Reg-Down Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. | | RTPCRDAMTQSETOT *q* | $ | *Procured Capacity for Reg-Down Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for Reg-Down, for the hour. | | PCRDAMT *q* | $ | *Procured Capacity for Reg-Down Amount per QSE for DAM*—The DAM Reg-Down payment for QSE *q*, 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. | | RDINFQAMTTOT | $ | *Reg-Down Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Reg-Down, for the hour. | | RDINFQAMT *q* | $ | *Reg-Down Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of its Ancillary Service Supply Responsibilities for Reg-Down, for the hour. | | *q* | none | A QSE. | | *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. | |

(b) Each QSE’s share of the net total costs for Reg-Down for the Operating Hour is calculated as follows:

**RDCOST *q* = RDPR \* RDQ *q***

Where:

RDPR = RDCOSTTOT / RDQTOT

RDQTOT = RDQ *q*

RDQ *q* = RDO *q* – SARDQ *q*

RDO *q* = (SARDQ *q* + (RTPCRD *q, m*) + PCRD *q* –

RDFQ *q* – RRDFQ *q*) \* HLRS *q*

SARDQ *q* = DASARDQ *q* + RTSARDQ *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RDCOST *q* | $ | *Reg-Down Cost per QSE*—QSE *q*’s share of the net total costs for Reg-Down, for the hour. |
| RDPR | $/MW per hour | *Reg-Down Price—*The price for Reg-Down calculated based on the net total costs for Reg-Down, for the hour. |
| RDCOSTTOT | $ | *Reg-Down Cost Total*—The net total costs for Reg-Down, for the hour. See item (3)(a) above. |
| RDQTOT | MW | *Reg-Down Quantity Total*—The sum of every QSE’s Ancillary Service Obligation minus its self-arranged Reg-Down quantity in the DAM and any and all SASMs for the hour. |
| RDQ *q* | MW | *Reg-Down Quantity per QSE*—The QSE *q*’s Ancillary Service Obligation minus its self-arranged Reg-Down quantity in the DAM and any and all SASMs, for the hour. |
| RDO *q* | MW | *Reg-Down Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| DASARDQ *q* | MW | *Self-Arranged Reg-Down Quantity per QSE for DAM*—The self-arranged Reg-Down quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| RTSARDQ *q* | MW | *Self-Arranged Reg-Down Quantity per QSE for all SASMs*—The sum of all self-arranged Reg-Down quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1. |
| RTPCRD *q, m* | MW | *Procured Capacity for Reg-Down per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide Reg-Down, for the hour. |
| RDFQ *q* | MW | *Reg-Down Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| RRDFQ *q* | MW | *Reconfiguration Reg-Down Failure Quantity per QSE*—QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| HLRS *q* |  | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.4. |
| PCRD *q* | MW | *Procured Capacity for Reg-Down per QSE in DAM*—The total Reg-Down capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. |
| SARDQ *q* | MW | *Total Self-Arranged Reg-Down Quantity per QSE for all markets*—The sum of all self-arranged Reg-Down quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

(c) The adjustment to each QSE’s DAM charge for the Reg-Down for the Operating Hour, due to changes during the Adjustment Period or Real-Time operations, is calculated as follows:

**RTRDAMT *q* = RDCOST *q* – DARDAMT *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RTRDAMT *q* | $ | *Real-Time Reg-Down Amount per QSE*—The adjustment to QSE *q*’s share of the costs for Reg-Down, for the hour. |
| RDCOST *q* | $ | *Reg-Down Cost per QSE*—QSE *q*’s share of the net total costs for Reg-Down, for the hour. |
| DARDAMT *q* | $ | *Day-Ahead Reg-Down Amount per QSE*—QSE *q*’s share of the DAM cost for Reg-Down, for the hour. |
| *q* | none | A QSE. |

(4) For RRS, if applicable:

(a) The net total costs for RRS for a given Operating Hour is calculated as follows:

**RRCOSTTOT = (-1) \* ((RTPCRRAMTTOT *m*) + PCRRAMTTOT + RRFQAMTTOT +**

**RRINFQAMTTOT)**

Where:

Total payment of SASM- and RSASM-procured capacity for RRS by market

RTPCRRAMTTOT *m* = RTPCRRAMT *q, m*

Total payment of DAM-procured capacity for RRS

PCRRAMTTOT= PCRRAMT *q*

Total charge of failure on Ancillary Service Supply Responsibility for RRS

RRFQAMTTOT = RRFQAMTQSETOT *q*

Total payment of SASM- and RSASM-procured capacity RRS Service by QSE

RTPCRRAMTQSETOT *q* = RTPCRRAMT *q, m*

Total charge of infeasible Ancillary Service Supply Responsibility for RRS

RRINFQAMTTOT =  RRINFQAMT *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RRCOSTTOT | $ | *Responsive Reserve Cost Total*—The net total costs for RRS, for the hour. |
| RTPCRRAMTTOT *m* | $ | *Procured Capacity for Responsive Reserve Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for RRS, for the hour. |
| RTPCRRAMT *q, m* | $ | *Procured Capacity for Responsive Reserve Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for RRS, for the hour. |
| RRFQAMTTOT | $ | *Responsive Reserve Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for RRS, for the hour. |
| RRFQAMTQSETOT *q* | $ | *Responsive Reserve Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| RTPCRRAMTQSETOT *q* | $ | *Procured Capacity for Responsive Reserve Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for RRS, 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. |
| PCRRAMTTOT | $ | *Procured Capacity for Responsive Reserve Amount Total in DAM*—The total of the DAM RRS payments for all QSEs, for the hour. |
| RRINFQAMTTOT | $ | *Responsive Reserve Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for RRS, for the hour. |
| RRINFQAMT *q* | $ | *Responsive Reserve Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for RRS, for the hour. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR841: Replace paragraph (a) above with the following upon system implementation:]  (a) The net total costs for RRS for a given Operating Hour is calculated as follows:  **RRCOSTTOT = (-1) \* ((RTPCRRAMTTOT *m*) + PCRRAMTTOT + RRFQAMTTOT +**  **RRINFQAMTTOT + RRMWINFATOT)**  Where:  Total payment of SASM- and RSASM-procured capacity for RRS by market  RTPCRRAMTTOT *m* = RTPCRRAMT *q, m*  Total payment of DAM-procured capacity for RRS  PCRRAMTTOT= PCRRAMT *q*  Total charge of failure on Ancillary Service Supply Responsibility for RRS  RRFQAMTTOT = RRFQAMTQSETOT *q*  Total payment of SASM- and RSASM-procured capacity for RRS by QSE  RTPCRRAMTQSETOT *q* = RTPCRRAMT *q, m*  Total charge of infeasible Ancillary Service Supply Responsibility for RRS  RRINFQAMTTOT =  RRINFQAMT *q*  Total Real-Time Day-Ahead Make-Whole Payment for RRS  RRMWINFATOT =  RRMWINFA *q, h*  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | RRCOSTTOT | $ | *Responsive Reserve Cost Total*—The net total costs for RRS, for the hour. | | RTPCRRAMTTOT *m* | $ | *Procured Capacity for Responsive Reserve Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for RRS, for the hour. | | RTPCRRAMT *q, m* | $ | *Procured Capacity for Responsive Reserve Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for RRS, for the hour. | | RRFQAMTTOT | $ | *Responsive Reserve Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for RRS, for the hour. | | RRMWINFATOT | $ | *Responsive Reserve Make-Whole Infeasible Amount total*¾ The total Real-Time calculated payment to all QSEs*,* for their contribution of RRS, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour. | | RRMWINFA *q, h* | $ | *Responsive Reserve Make-Whole Infeasible Amount per QSE per hour*¾ The total Real-Time calculated payment to QSE *q,* for its contribution of RRS, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour *h*. | | RRFQAMTQSETOT *q* | $ | *Responsive Reserve Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for RRS, for the hour. | | RTPCRRAMTQSETOT *q* | $ | *Procured Capacity for Responsive Reserve Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for RRS, for the hour. | | PCRRAMT *q* | $ | *Procured Capacity for Responsive Reserve Amount per QSE in DAM*—The DAM RRS payment for QSE *q*, 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. | | RRINFQAMTTOT | $ | *Responsive Reserve Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for RRS, for the hour. | | RRINFQAMT *q* | $ | *Responsive Reserve Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for RRS, for the hour. | | *q* | none | A QSE. | | *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. | |

(b) Each QSE’s share of the net total costs for RRS for the Operating Hour is calculated as follows:

**RRCOST *q* = RRPR \* RRQ *q***

Where:

RRPR = RRCOSTTOT / RRQTOT

RRQTOT = RRQ *q*

RRQ *q* = RRO *q* – SARRQ *q*

RRO *q* = (SARRQ*q* + (RTPCRR *q, m*) + PCRR *q* –

RRFQ *q* – RRRFQ *q*) \* HLRS *q*

SARRQ *q* = DASARRQ *q* + RTSARRQ *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RRCOST *q* | $ | *Responsive Reserve Cost per QSE*—QSE *q*’s share of the net total costs for RRS, for the hour. |
| RRPR | $/MW per hour | *Responsive Reserve Price—*The price for RRS calculated based on the net total costs for RRS, for the hour. |
| RRCOSTTOT | $ | *Responsive Reserve Cost Total*—The net total costs for RRS, for the hour. See item (4)(a) above. |
| RRQTOT | MW | *Responsive Reserve Quantity Total*—The sum of every QSE’s Ancillary Service Obligation minus its self-arranged RRS quantity in the DAM and any and all SASMs for the hour. |
| RRQ *q* | MW | *Responsive Reserve Quantity per QSE*—The QSE *q*’s Ancillary Service Obligation minus its self-arranged RRS quantity in the DAM and any and all SASMs, for the hour. |
| RRO *q* | MW | *Responsive Reserve Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, 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. |
| RTSARRQ *q* | MW | *Self-Arranged Responsive Reserve Quantity per QSE for all SASMs*—The sum of all self-arranged RRS quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1. |
| RTPCRR *q, m* | MW | *Procured Capacity for Responsive Reserve per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide RRS, for the hour. |
| RRFQ *q* | MW | *Responsive Reserve Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| RRRFQ *q* | MW | *Reconfiguration Responsive Reserve Failure Quantity per QSE—*QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.4. |
| 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 the QSE, for the hour. |
| SARRQ *q* | MW | *Total Self-Arranged Responsive Reserve Quantity per QSE for all markets*—The sum of all self-arranged RRS quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

(c) The adjustment to each QSE’s DAM charge for the RRS for the Operating Hour, due to changes during the Adjustment Period or Real-Time operations, is calculated as follows:

**RTRRAMT *q* = RRCOST *q* – DARRAMT *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RTRRAMT *q* | $ | *Real-Time Responsive Reserve Amount per QSE*—The adjustment to QSE *q*’s share of the costs for RRS, for the hour. |
| RRCOST *q* | $ | *Responsive Reserve Cost per QSE*—QSE *q*’s share of the net total costs for RRS, for the hour. |
| DARRAMT *q* | $ | *Day-Ahead Responsive Reserve Amount per QSE*—QSE *q*’s share of the DAM cost for RRS, for the hour. |
| *q* | none | A QSE. |

(5) For Non-Spin, if applicable:

(a) The net total costs for Non-Spin for a given Operating Hour is calculated as follows:

**NSCOSTTOT = (-1) \* ((RTPCNSAMTTOT *m***) **+ PCNSAMTTOT + NSFQAMTTOT +**

**NSINFQAMTTOT)**

Where:

Total payment of SASM- and RSASM-procured capacity for Non-Spin by market

RTPCNSAMTTOT *m* = RTPCNSAMT *q, m*

Total payment of DAM-procured capacity for Non-Spin

PCNSAMTTOT = PCNSAMT *q*

Total charge of failure on Ancillary Service Supply Responsibility for Non-Spin

NSFQAMTTOT = NSFQAMTQSETOT *q*

Total payment of SASM- and RSASM-procured capacity for Non-Spin by QSE

RTPCNSAMTQSETOT *q* = RTPCNSAMT *q, m*

Total charge of infeasible Ancillary Service Supply Responsibility for Non-Spin

NSINFQAMTTOT =  NSINFQAMT *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| NSCOSTTOT | $ | *Non-Spin Cost Total*—The net total costs for Non-Spin, for the hour. |
| RTPCNSAMTTOT *m* | $ | *Procured Capacity for Non-Spin Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for Non-Spin, for the hour. |
| RTPCNSAMT *q, m* | $ | *Procured Capacity for Non-Spin Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for Non-Spin, for the hour. |
| NSFQAMTTOT | $ | *Non-Spin Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for Non-Spin, for the hour. |
| NSFQAMTQSETOT *q* | $ | *Non-Spin Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| RTPCNSAMTQSETOT *q* | $ | *Procured Capacity for Non-Spin Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for Non-Spin, 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. |
| PCNSAMTTOT | $ | *Procured Capacity for Non-Spin Amount Total in DAM*—The total of the DAM Non-Spin payments for all QSEs, for the hour. |
| NSINFQAMTTOT | $ | *Non-Spin Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Non-Spin, for the hour. |
| NSINFQAMT *q* | $ | *Non-Spin Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Non-Spin, for the hour. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR841: Replace paragraph (a) above with the following upon system implementation:]  (a) The net total costs for Non-Spin for a given Operating Hour is calculated as follows:  **NSCOSTTOT = (-1) \* ((RTPCNSAMTTOT *m***) **+ PCNSAMTTOT + NSFQAMTTOT +**  **NSINFQAMTTOT + NSMWINFATOT)**  Where:  Total payment of SASM- and RSASM-procured capacity for Non-Spin by market  RTPCNSAMTTOT *m* = RTPCNSAMT *q, m*  Total payment of DAM-procured capacity for Non-Spin  PCNSAMTTOT = PCNSAMT *q*  Total charge of failure on Ancillary Service Supply Responsibility for Non-Spin  NSFQAMTTOT = NSFQAMTQSETOT *q*  Total payment of SASM- and RSASM-procured capacity for Non-Spin by QSE  RTPCNSAMTQSETOT *q* = RTPCNSAMT *q, m*  Total charge of infeasible Ancillary Service Supply Responsibility for Non-Spin  NSINFQAMTTOT =  NSINFQAMT *q*  Total Real-Time Day-Ahead Make-Whole Payment for Non-Spin  NSMWINFATOT =  NSMWINFA *q, h*  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | NSCOSTTOT | $ | *Non-Spin Cost Total*—The net total costs for Non-Spin, for the hour. | | RTPCNSAMTTOT *m* | $ | *Procured Capacity for Non-Spin Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for Non-Spin, for the hour. | | RTPCNSAMT *q, m* | $ | *Procured Capacity for Non-Spin Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for Non-Spin, for the hour. | | NSFQAMTTOT | $ | *Non-Spin Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for Non-Spin, for the hour. | | NSMWINFATOT | $ | *Non Spin Make-Whole Infeasible Amount total*¾ The total Real-Time calculated payment to all QSEs*,* for their contribution of Non-Spin, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour. | | NSMWINFA *q, h* | $ | *Non Spin Make-Whole Infeasible Amount per QSE per hour*¾ The total Real-Time calculated payment to QSE *q,* for its contribution of Non-Spin, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour *h*. | | NSFQAMTQSETOT *q* | $ | *Non-Spin Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. | | RTPCNSAMTQSETOT *q* | $ | *Procured Capacity for Non-Spin Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for Non-Spin, 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. | | PCNSAMTTOT | $ | *Procured Capacity for Non-Spin Amount Total in DAM*—The total of the DAM Non-Spin payments for all QSEs, for the hour. | | NSINFQAMTTOT | $ | *Non-Spin Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Non-Spin, for the hour. | | NSINFQAMT *q* | $ | *Non-Spin Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Non-Spin, for the hour. | | *q* | none | A QSE. | | *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. | |

(b) Each QSE’s share of the net total costs for Non-Spin for the Operating Hour is calculated as follows:

**NSCOST *q* = NSPR \* NSQ *q***

Where:

NSPR = NSCOSTTOT / NSQTOT

NSQTOT = NSQ *q*

NSQ *q* = NSO *q* – SANSQ *q*

NSO *q* = (SANSQ *q* + (RTPCNS *q, m*) + PCNS *q* –

NSFQ *q* – RNSFQ *q*) \* HLRS *q*

SANSQ *q* = DASANSQ *q* + RTSANSQ *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| NSCOST *q* | $ | *Non-Spin Cost per QSE*—QSE *q*’s share of the net total costs for Non-Spin, for the hour. |
| NSPR | $/MW per hour | *Non-Spin Price—*The price for Non-Spin calculated based on the net total costs for Non-Spin, for the hour. |
| NSCOSTTOT | $ | *Non-Spin Cost Total*—The net total costs for Non-Spin for the hour. See item (5)(a) above. |
| NSQTOT | MW | *Non-Spin Quantity Total*—The sum of every QSE’s Ancillary Service Obligation minus its self-arranged Non-Spin quantity in the DAM and any and all SASMs, for the hour. |
| NSQ *q* | MW | *Non-Spin Quantity per QSE*—The difference in QSE *q*’s Ancillary Service Obligation minus its self-arranged Non-Spin quantity in the DAM and any and all SASMs, for the hour. |
| NSO *q* | MW | *Non-Spin Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| DASANSQ *q* | MW | *Day-Ahead Self-Arranged Non-Spin Quantity per QSE for DAM*—The self-arranged Non-Spin quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| RTSANSQ *q* | MW | *Self-Arranged Non-Spin Quantity per QSE for all SASMs*—The sum of all self-arranged Non-Spin quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1. |
| RTPCNS *q, m* | MW | *Procured Capacity for Non-Spin per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide Non-Spin, for the hour. |
| NSFQ *q* | MW | *Non-Spin Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| RNSFQ *q* | MW | *Reconfiguration Non-Spin Failure Quantity per QSE—*QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.4. |
| PCNS *q* | MW | *Procured Capacity for Non-Spin Service per QSE in DAM*—The total Non-Spin capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. |
| SANSQ *q* | MW | *Total Self-Arranged Non-Spin Supplied Quantity per QSE for all markets*—The sum of all self-arranged Non-Spin quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

(c) The adjustment to each QSE’s DAM charge for the Non-Spin for the Operating Hour, due to changes during the Adjustment Period or Real-Time operations, is calculated as follows:

**RTNSAMT *q* = NSCOST *q* – DANSAMT *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RTNSAMT *q* | $ | *Real-Time Non-Spin Amount per QSE*—The adjustment to QSE *q*’s share of the costs for Non-Spin, for the hour. |
| NSCOST *q* | $ | *Non-Spin Cost per QSE*—QSE *q*’s share of the net total costs for Non-Spin, for the hour. |
| DANSAMT *q* | $ | *Day-Ahead Non-Spin Amount per QSE*—QSE *q*’s share of the DAM cost for Non-Spin, for the hour. |
| *q* | none | A QSE. |

(6) For ECRS, if applicable:

(a) The net total costs for ECRS for a given Operating Hour is calculated as follows:

**ECRCOSTTOT = (-1) \* ((RTPCECRAMTTOT *m*) + PCECRAMTTOT + ECRFQAMTTOT +**

**ECRINFQAMTTOT)**

Where:

Total payment of SASM- and RSASM-procured capacity for ECRS by market

RTPCECRAMTTOT *m* = RTPCECRAMT *q, m*

Total payment of DAM-procured capacity for ECRS

PCECRAMTTOT= PCECRAMT *q*

Total charge of failure on Ancillary Service Supply Responsibility for ECRS

ECRFQAMTTOT = ECRFQAMTQSETOT *q*

Total payment of SASM- and RSASM-procured capacity ECRS Service by QSE

RTPCECRAMTQSETOT *q* = RTPCECRAMT *q, m*

Total charge of infeasible Ancillary Service Supply Responsibility for ECRS

ECRINFQAMTTOT =  ECRINFQAMT *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| ECRCOSTTOT | $ | *ERCOT Contingency Reserve Service Cost Total*—The net total costs for ECRS, for the hour. |
| RTPCECRAMTTOT *m* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for ECRS, for the hour. |
| RTPCECRAMT *q, m* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for ECRS, for the hour. |
| ECRFQAMTTOT | $ | *ERCOT Contingency Reserve Service Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for ECRS, for the hour. |
| ECRFQAMTQSETOT *q* | $ | *ERCOT Contingency Reserve Service Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for ECRS, for the hour. |
| RTPCECRAMTQSETOT *q* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for ECRS, for the hour. |
| PCECRAMT *q* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount per QSE for DAM*—The DAM ECRS payment for QSE *q*, for the hour. |
| PCECRAMTTOT | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount Total in DAM*—The total of the DAM ECRS payments for all QSEs, for the hour. |
| ECRINFQAMTTOT | $ | *ERCOT Contingency Reserve Service Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for ECRS, for the hour. |
| ECRINFQAMT *q* | $ | *ERCOT Contingency Reserve Service Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for ECRS, for the hour. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

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| [NPRR841: Replace paragraph (a) above with the following upon system implementation:]  (a) The net total costs for ECRS for a given Operating Hour is calculated as follows:  **ECRCOSTTOT = (-1) \* ((RTPCECRAMTTOT *m*) + PCECRAMTTOT + ECRFQAMTTOT +**  **ECRINFQAMTTOT + ECRMWINFATOT)**  Where:  Total payment of SASM- and RSASM-procured capacity for ECRS by market  RTPCECRAMTTOT *m* = RTPCECRAMT *q, m*  Total payment of DAM-procured capacity for ECRS  PCECRAMTTOT= PCECRAMT *q*  Total charge of failure on Ancillary Service Supply Responsibility for ECRS  ECRFQAMTTOT = ECRFQAMTQSETOT *q*  Total payment of SASM- and RSASM-procured capacity ECRS Service by QSE  RTPCECRAMTQSETOT *q* = RTPCECRAMT *q, m*  Total charge of infeasible Ancillary Service Supply Responsibility for ECRS  ECRINFQAMTTOT =  ECRINFQAMT *q*  Total Real-Time Day-Ahead Make-Whole Payment for ECRS  ECRMWINFATOT =  ECRMWINFA *q, h*  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | ECRCOSTTOT | $ | *ERCOT Contingency Reserve Service Cost Total*—The net total costs for ECRS, for the hour. | | RTPCECRAMTTOT *m* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for ECRS, for the hour. | | RTPCECRAMT *q, m* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for ECRS, for the hour. | | ECRFQAMTTOT | $ | *ERCOT Contingency Reserve Service Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for ECRS, for the hour. | | ECRMWINFATOT | $ | *ERCOT Contingency Reserve Service Make-Whole Infeasible Amount total*¾ The total Real-Time calculated payment to all QSEs*,* for their contribution of ECRS, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour. | | ECRMWINFA *q, h* | $ | *ERCOT Contingency Reserve Service Make-Whole Infeasible Amount per QSE per hour*¾ The total Real-Time calculated payment to QSE *q,* for its contribution of ECRS, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour *h*. | | ECRFQAMTQSETOT *q* | $ | *ERCOT Contingency Reserve Service Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for ECRS, for the hour. | | RTPCECRAMTQSETOT *q* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for ECRS, for the hour. | | PCECRAMT *q* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount per QSE for DAM*—The DAM ECRS payment for QSE *q*, for the hour. | | PCECRAMTTOT | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount Total in DAM*—The total of the DAM ECRS payments for all QSEs, for the hour. | | ECRINFQAMTTOT | $ | *ERCOT Contingency Reserve Service Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for ECRS, for the hour. | | ECRINFQAMT *q* | $ | *ERCOT Contingency Reserve Service Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for ECRS, for the hour. | | *q* | none | A QSE. | | *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. | |

(b) Each QSE’s share of the net total costs for ECRS for the Operating Hour is calculated as follows:

**ECRCOST *q* = ECRPR \* ECRQ *q***

Where:

ECRPR = ECRCOSTTOT / ECRQTOT

ECRQTOT = ECRQ *q*

ECRQ *q* = ECRO *q* – SAECRQ *q*

ECRO *q* = (SAECRQ*q* + (RTPCECR *q, m*) + PCECR *q* –

ECRFQ *q* – RECRFQ *q*) \* HLRS *q*

SAECRQ *q* = DASAECRQ *q* + RTSAECRQ *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| ECRCOST *q* | $ | *ERCOT Contingency Reserve Service Cost per QSE*—QSE *q*’s share of the net total costs for ECRS, for the hour. |
| ECRPR | $/MW per hour | *ERCOT Contingency Reserve Service Price—*The price for ECRS calculated based on the net total costs for ECRS, for the hour. |
| ECRCOSTTOT | $ | *ERCOT Contingency Reserve Service Cost Total*—The net total costs for ECRS, for the hour. See item (6)(a) above. |
| ECRQTOT | MW | *ERCOT Contingency Reserve Service Quantity Total*—The sum of every QSE’s Ancillary Service Obligation minus its self-arranged ECRS quantity in the DAM and any and all SASMs for the hour. |
| ECRQ *q* | MW | *ERCOT Contingency Reserve Service Quantity per QSE*—The QSE *q*’s Ancillary Service Obligation minus its self-arranged ECRS quantity in the DAM and any and all SASMs, for the hour. |
| ECRO *q* | MW | *ERCOT Contingency Reserve Service Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| DASAECRQ *q* | MW | *Day-Ahead Self-Arranged ERCOT Contingency Reserve Service Quantity per QSE*—The self-arranged ECRS quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| RTSAECRQ *q* | MW | *Self-Arranged ERCOT Contingency Reserve Service Quantity per QSE for all SASMs*—The sum of all self-arranged ECRS quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1. |
| RTPCECR *q, m* | MW | *Procured Capacity for ERCOT Contingency Reserve Service per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide ECRS, for the hour. |
| ECRFQ *q* | MW | *ERCOT Contingency Reserve Service Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for ECRS, for the hour. |
| RECRFQ *q* | MW | *Reconfiguration ERCOT Contingency Reserve Service Failure Quantity per QSE—*QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for ECRS, for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.4. |
| 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 the QSE, for the hour. |
| SAECRQ *q* | MW | *Total Self-Arranged ERCOT Contingency Reserve Service Quantity per QSE for all markets*—The sum of all self-arranged ECRS quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

(c) The adjustment to each QSE’s DAM charge for the ECRS for the Operating Hour, due to changes during the Adjustment Period or Real-Time operations, is calculated as follows:

**RTECRAMT *q* = ECRCOST *q* – DAECRAMT *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RTECRAMT *q* | $ | *Real-Time ERCOT Contingency Reserve Service Amount per QSE*—The adjustment to QSE *q*’s share of the costs for ECRS, for the hour. |
| ECRCOST *q* | $ | *ERCOT Contingency Reserve Service Cost per QSE*—QSE *q*’s share of the net total costs for ECRS, for the hour. |
| DAECRAMT *q* | $ | *Day-Ahead ERCOT Contingency Reserve Service Amount per QSE*—QSE *q*’s share of the DAM cost for ECRS, for the hour. |
| *q* | none | A QSE. |

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| ***[NPRR1010 and NPRR1245: Replace Section 6.7.4 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  6.7.4 Real-Time Settlement for Updated Day-Ahead Market Ancillary Service Obligations  (1) Each QSE is charged or paid for net obligations for each Ancillary Service procured in the DAM. DAM costs are calculated for each QSE in accordance with Section 4.6.4, Settlement of Ancillary Services Procured in the DAM. DAM net total costs for Ancillary Service procured in the DAM are re-calculated for each QSE under this Section based on Real-Time Load Ratio Share (LRS). Payments and/or charges for Ancillary Service obligations are calculated by Operating Hour as follows:  (a) For Regulation Up Service (Reg-Up), if applicable:  DARTPCRUAMT *q*= (DARUNOBL*q* -DASARUQ *q*) \* DARUPR - DARUAMT *q*  Where:  DARUNOBL *q* = DAPCRUQTOT \* HLRS *q*  DAPCRUQTOT = (PCRUR *r, q, DAM* *+* DARUOAWD *q* +DASARUQ *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | DARTPCRUAMT *q* | $ | *Day-Ahead Updated Real-Time Procured Capacity for Reg-Up Amount by QSE -* The payment or charge to QSE *q* for Reg-Up, for the re-calculated Real-Time obligation, for the Operating Hour. | | DARUPR | $/MW | *Day-Ahead Reg-Up Price*—The DAM Reg-Up price for the Operating Hour. | | DARUNOBL*q* | MW | *Day-Ahead Reg-Up New Obligation per QSE—*The updated Reg-Up Ancillary Service Obligation in Real-Time for QSE *q* for the Operating Hour. | | DARUAMT *q* | $ | *Day-Ahead Reg-Up Amount per QSE*—QSE *q*’s share of the DAM costs for Reg-Up for the Operating Hour. | | PCRUR *r, q, DAM* | MW | *Procured Capacity for Reg-Up per Resource per QSE in DAM*—The Reg-Up capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DARUOAWD *q* | MW | *Day-Ahead Reg-Up Award for the QSE* —The Reg-Up Only capacity awarded in the DAM to QSE *q* for the Operating Hour. | | HLRS *q* | none | *Hourly Load Ratio Share per QSE*—The Real-Time LRS as defined in Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour, for QSE *q*, for the Operating Hour. | | DAPCRUQTOT | MW | *Day-Ahead Procured Capacity for Reg-Up Total*—The total Reg-Up capacity for all QSEs for all Reg-Up awarded and self-arranged in the DAM for the Operating Hour. | | DASARUQ *q* | MW | *Day-Ahead Self-Arranged Reg-Up Quantity per QSE*—The self-arranged Reg-Up capacity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | *q* | none | A QSE. | | *r* | none | A Resource. |   (b) For Regulation Down Service (Reg-Down), if applicable:  DARTPCRDAMT *q*= (DARDNOBL*q*- DASARDQ *q*) \* DARDPR - DARDAMT *q*  Where:  DARDNOBL *q* = DAPCRDQTOT \* HLRS *q*  DAPCRDQTOT =  (PCRDR *r, q, DAM* + DARDOAWD *q* + DASARDQ *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | DARTPCRDAMT *q* | $ | *Day-Ahead Updated Real-Time Procured Capacity for Reg-Down Amount by QSE -* The payment or charge to QSE *q* for Reg-Down, for the re-calculated Real-Time obligation, for the Operating Hour. | | DARDPR | $/MW | *Day-Ahead Reg-Down Price*—The DAM Reg-Down price for the Operating Hour. | | DARDNOBL*q* | MW | *Day-Ahead Reg-Down New Obligation per QSE—*The updated Reg-Down Ancillary Service Obligation in Real-Time, for QSE *q*, for the Operating Hour. | | DARDAMT *q* | $ | *Day-Ahead Reg-Down Amount per QSE*—QSE *q*’s share of the DAM cost for Reg-Down, for the Operating Hour. | | PCRDR *r, q, DAM* | MW | *Procured Capacity for Reg-Down per Resource per QSE in DAM*—The Reg-Down capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DARDOAWD *q* | MW | *Day-Ahead Reg-Down Only Award for the QSE* —The Reg-Down Only capacity awarded in the DAM to QSE *q* for the Operating Hour. | | HLRS *q* | none | *Hourly Load Ratio Share per QSE*—The Real-Time as defined in Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour for QSE *q*, for the Operating Hour. | | DAPCRDQTOT | MW | *Day-Ahead Procured Capacity for Reg-Down Total*—The total Reg-Down capacity for all QSEs for all Reg-Down awarded and self-arranged, in the DAM for the Operating Hour. | | DASARDQ *q* | MW | *Day-Ahead Self-Arranged Reg-Down Quantity per QSE*—The self-arranged Reg-Down capacity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | *q* | none | A QSE. | | *r* | none | A Resource. |   (c) For Responsive Reserve (RRS), if applicable:  DARTPCRRAMT *q* = (DARRNOBL *q* – DASARRQ *q*) \* DARRPR - DARRAMT *q*  Where:  DARRNOBL *q* = DAPCRRQTOT \* HLRS *q*  DAPCRRQTOT = (PCRRR *r, q, DAM* + DARROAWD *q* + DASARRQ *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | DARTPCRRAMT *q* | $ | *Day-Ahead Updated Real-Time Procured Capacity for Responsive Reserve Amount by QSE -* The payment or charge to QSE *q* for RRS, for the re-calculated Real-Time obligation, for the Operating Hour. | | DARRPR | $/MW | *Day-Ahead Responsive Reserve Price*—The DAM RRS price for the Operating Hour. | | DARRNOBL*q* | MW | *Day-Ahead Responsive Reserve New Obligation per QSE—*The updated RRS Ancillary Service Obligation in Real-Time for QSE *q* for the Operating Hour. | | DARRAMT *q* | $ | *Day-Ahead Responsive Reserve Amount per QSE*—QSE *q*’s share of the DAM cost for RRS for the Operating Hour. | | PCRRR *r, q, DAM* | MW | *Procured Capacity for Responsive Reserve per Resource per QSE in DAM*—The RRS capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DARROAWD *q* | MW | *Day-Ahead Responsive Reserve Only Award for the QSE* —The RRS Only capacity awarded in the DAM to QSE *q* for the Operating Hour. | | HLRS *q* | none | Hourly Load Ratio Share per QSE—The Real-Time LRS as defined in Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour for QSE *q* for the Operating Hour. | | DAPCRRQTOT | MW | *Day-Ahead Procured Capacity for Responsive Reserve Total* —The total RRS capacity for all QSEs for all RRS awarded and self-arranged in the DAM for the Operating Hour. | | DASARRQ *q* | MW | *Day-Ahead Self-Arranged Responsive Reserve Quantity per QSE*—The self-arranged RRS capacity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | *q* | none | A QSE. | | *r* | none | A Resource. |   (d) For Non-Spinning Reserve (Non-Spin), if applicable:  DARTPCNSAMT *q* = (DANSNOBL *q* – DASANSQ *q*) \* DANSPR - DANSAMT *q*  Where:  DANSNOBL *q*  = DAPCNSQTOT \* HLRS *q*  DAPCNSQTOT =  (PCNSR *r, q, DAM* + DANSOAWD *q* + DASANSQ *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | DARTPCNSAMT *q* | $ | *Day-Ahead Updated Real-Time Procured Capacity for Non-Spin Amount by QSE -* The payment or charge to QSE *q* for Non-Spin for the re-calculated Real-Time obligation for the Operating Hour. | | DANSPR | $/MW | *Day-Ahead Non-Spin Price*—The DAM Non-Spin price for the Operating Hour. | | DANSNOBL*q* | MW | *Day-Ahead Non-Spin New Obligation per QSE—*The updated Non-Spin Ancillary Service Obligation in Real-Time for QSE *q* for the Operating Hour. | | PCNSR *r, q, DAM* | MW | *Procured Capacity for Non-Spin per Resource per QSE in DAM*—The Non-Spin capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DANSOAWD *q* | MW | *Day-Ahead Non-Spin Only Award for the QSE* — The Non-Spin Only capacity awarded in the DAM to QSE *q* for the Operating Hour. | | DANSAMT *q* | $ | *Day-Ahead Non-Spin Amount per QSE*—QSE *q*’s share of the DAM cost for Non-Spin for the Operating Hour. | | HLRS *q* | none | *Hourly Load Ratio Share per QSE*—The Real-Time LRS as defined in Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour for QSE *q* for the Operating Hour. | | DAPCNSQTOT | MW | *Day-Ahead Procured Capacity for Non-Spin Total* —The total Non-Spin capacity for all QSEs for all Non-Spin awarded and self-arranged in the DAM for the Operating Hour. | | DASANSQ *q* | MW | *Day-Ahead Self-Arranged Non-Spin Quantity per QSE*—The self-arranged Non-Spin capacity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | *q* | none | A QSE. | | *r* | none | A Resource. |   (e) For ERCOT Contingency Reserve Service(ECRS), if applicable:  DARTPCECRAMT *q* = (DAECRNOBL *q* – DASAECRQ *q*) \* DAECRPR –  DAECRAMT *q*  Where:  DAECRNOBL *q* = DAPCECRQTOT \* HLRS *q*  DAPCECRQTOT = (PCECRR *r, q, DAM* + DAECROAWD *q* + DASAECRQ *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | DARTPCECRAMT *q* | $ | *Day-Ahead Updated Real-Time Procured Capacity for ERCOT Contingency Reserve Service Amount by QSE -* The payment or charge to QSE *q* for ECRS for the re-calculated Real-Time obligation for the Operating Hour. | | DAECRPR | $/MW | *Day-Ahead ERCOT Contingency Reserve Price*—The DAM ECRS price for the Operating Hour. | | DAECRNOBL*q* | MW | *Day-Ahead ERCOT Contingency Reserve Service New Obligation per QSE*—The updated ECRS Ancillary Service Obligation in Real-Time for QSE *q* for the Operating Hour. | | PCECRR *r, q, DAM* | MW | *Procured Capacity for ERCOT Contingency Reserve Service per Resource per QSE in DAM*—The ECRS capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DAECROAWD *q* | MW | *Day-Ahead ERCOT Contingency Reserve Service Only Award for the QSE —* The ECRS Only capacity awarded in the DAM to QSE *q* for the Operating Hour. | | DAECRAMT *q* | $ | *Day-Ahead ERCOT Contingency Reserve Amount per QSE*—QSE *q*’s share of the DAM cost for ECRS for the Operating Hour. | | HLRS *q* | none | *Hourly Load Ratio Share per QSE*—The Real-Time LRS as defined in Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour for QSE *q* for the Operating Hour. | | DAPCECRQTOT | MW | *Day-Ahead Procured Capacity for ERCOT Contingency Reserve Total*—The total ECRS capacity for all QSEs for all ECRS awarded and self-arranged in the DAM for the Operating Hour. | | DASAECRQ *q* | MW | *Day-Ahead Self-Arranged ERCOT Contingency Reserve Quantity per QSE*—The self-arranged ECRS capacity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | *q* | none | A QSE. | | *r* | none | A Resource. |   (f) For Dispatchable Reliability Reserve Service (DRRS), if applicable:  DARTPCDRRAMT *q* = (DADRRNOBL *q* – DASADRRQ *q*) \* DADRRPR – DADRRAMT *q*  Where:  DADRRNOBL *q* = DAPCDRRQTOT \* HLRS *q*  DAPCDRRQTOT = (PCDRRR *r, q, DAM* + DAECROAWD *q* + DASADRRQ *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | DARTPCDRRAMT *q* | $ | *Day-Ahead Updated Real-Time Procured Capacity for Dispatchable Reliability Reserve Service Amount by QSE*—The payment or charge to QSE *q* for DRRS for the re-calculated Real-Time obligation for the Operating Hour. | | DADRRPR | $/MW | *Day-Ahead Dispatchable Reliability Reserve Service Price*—The DAM DRRS price for the Operating Hour. | | DADRRNOBL*q* | MW | *Day-Ahead Dispatchable Reliability Reserve Service New Obligation per QSE*—The updated DRRS Ancillary Service Obligation in Real-Time for QSE *q* for the Operating Hour. | | PCDRRR *r, q, DAM* | MW | *Procured Capacity for Dispatchable Reliability Reserve Service per Resource per QSE in DAM*—The DRRS capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DADRROAWD *q* | MW | *Day-Ahead Dispatchable Reliability Reserve Service-Only Award for the QSE —* The DRRS-only capacity awarded in the DAM to QSE *q* for the Operating Hour. | | DADRRAMT *q* | $ | *Day-Ahead Dispatchable Reliability Reserve Service Amount per QSE*—QSE *q*’s share of the DAM cost for DRRS for the Operating Hour. | | HLRS *q* | none | *Hourly Load Ratio Share per QSE*—The Real-Time LRS as defined in Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour for QSE *q* for the Operating Hour. | | DAPCDRRQTOT | MW | *Day-Ahead Procured Capacity for Dispatchable Reliability Reserve Service Total*—The total DRRS capacity for all QSEs for all DRRS awarded and self-arranged in the DAM for the Operating Hour. | | DASADRRQ *q* | MW | *Day-Ahead Self-Arranged Dispatchable Reliability Reserve Service Quantity per QSE*—The self-arranged DRRS capacity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | *q* | none | A QSE. | | *r* | none | A Resource. | |

**6.7.5.7 Dispatchable Reliability Reserve Service Payments and Charges**

(1) Dispatchable Reliability Reserve Service (DRRS) Imbalance Payment or Charge:

**RTDRRIMBAMT *q* = (-1) \* [****[RTDRRREV *q, r* – (1/4) \* (PCDRRR *r, q, DAM* \***

**RTMCPCDRR)] – (1/4) \* (DASADRRQ *q* \* RTMCPCDRR) + (1/4) \* (DRRTP *q* – DRRTS *q*) \* RTMCPCDRR]**

**Where:**

**RTDRRREV *q, r  =* (1/4) \* RTDRRAWD *q, r* \* RTMCPCDRRR *q, r***

**RTMCPCDRRR *q, r =*** **(DRRRWF *q, r, y* \* (RTMCPCDRRS *y* + RTRDPADRRS *y))***

**RTDRRAWD *q, r*  =**  **(RNWF *y*\* RTDRRAWDS *q, r, y*)**

Where:

DRRRWF *q, r, y* = [max(0.001, RTDRRAWDS *q, r, y*) \* TLMP *y*] / [max(0.001,

RTDRRAWDS *q, r, y*) \* TLMP *y*]

And:

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

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RTDRRIMBAMT *q* | $ | *Real-Time Dispatchable Reliability Reserve Service Imbalance Amount for the QSE—*The total payment or charge to QSE *q* for the Real-Time DRRS imbalance for each 15-minute Settlement Interval. |
| RTDRRAWD q, r | MW | *Real-Time Dispatchable Reliability Reserve Service Award per Resource per QSE*¾The DRRS amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RTDRRREV *q, r* | $ | *Real-Time Dispatchable Reliability Reserve Service Revenue*—The Real-Time DRRS revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTDRRAWDS *q, r, y* | MW | *Real-Time Dispatchable Reliability Reserve Service Award per Resource per QSE per SCED interval*—The DRRS amount awarded to QSE *q* for Resource *r* in Real-Time for the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMCPCDRRR *q, r* | $/MW | *Real-Time Market Clearing Price for Capacity for Dispatchable Reliability Reserve Service per Resource per QSE*¾The Real-Time MCPC for DRRS for Resource *r*, represented by QSE *q* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMCPCDRRS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for Dispatchable Reliability Reserve Service per SCED Interval*—The Real-Time MCPC for DRRS for the SCED interval *y.* |
| PCDRRR *r, q, DAM* | MW | *Procured Capacity for Dispatchable Reliability Reserve Service per Resource per QSE in DAM*—The DRRS capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RTMCPCDRR | $/MW | *Real-Time Market Clearing Price for Capacity for Dispatchable Reliability Reserve Service*—The Real-Time MCPC for DRRS for the 15-minute Settlement Interval. |
| RTRDPADRRS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Dispatchable Reliability Reserve Service per SCED interval*—The Real-Time price adder for DRRS that captures the impact of reliability deployments on DRRS prices for the SCED interval *y*. |
| DASADRRQ *q* | MW | *Day-Ahead Self-Arranged Dispatchable Reliability Reserve Service Quantity per QSE*—The self-arranged DRRS quantity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. |
| DRRTP *q* | MW | *Trade Purchases for Dispatchable Reliability Reserve Service for the QSE—*The trade purchases for QSE *q* for DRRS for the Operating Hour. |
| DRRTS *q* | MW | *Trade Sales for Dispatchable Reliability Reserve Service for the QSE—*The trade sales for QSE *q* for DRRS for the Operating Hour. |
| TLMP *y* | second | *Duration of SCED interval per interval*—The duration of the SCED interval *y*. |
| RNWF *y* | none | *Resource Node Weighting Factor per interval*—The weight used in the Ancillary Service award calculation for the portion of the SCED interval *y* within the Settlement Interval. |
| DRRRWF *q, r, y* | none | *Dispatchable Reliability Reserve Service Resource Node Weighting Factor per interval*—The DRRS Resource weight, based on DRRS awards, used in the Real-Time MCPC calculation for the portion of the SCED interval *y* within the Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *r* | none | A Resource. |
| *q* | none | A QSE. |
| *y* | none | A SCED interval in the 15-minute Settlement Interval. |

(2) DRRS Only Charge:

**RTDRROAMT *q* = (1/4) \* DADRROAWD *q* \* RTMCPCDRR**

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RTDRROAMT *q* | $ | *Real-Time Dispatchable Reliability Reserve Service Only Amount for the QSE—*The total charge to QSE *q* in Real-Time for DRRS only awards for each 15-minute Settlement Interval. |
| DADRROAWD *q* | MW | *Day-Ahead Dispatchable Reliability Reserve Service-Only Award for the QSE*¾The DRRS-only capacity awarded in the DAM to the QSE *q* for the Operating Hour. |
| RTMCPCDRR | $/MW | *Real-Time Market Clearing Price for Capacity for Dispatchable Reliability Reserve Service*—The Real-Time MCPC for DRRS for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |

(3) DRRS Trade Overage Charge:

**RTDRRTOAMT *q* = (1/4) \* RTDRRTO *q* \* RTMCPCDRR**

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RTDRRTOAMT *q* | $ | *Real-Time Dispatchable Reliability Reserve Service Trade Overage Amount for the QSE*—The total charge to QSE *q* in Real-Time for DRRS trade overages for each 15-minute Settlement Interval. |
| RTDRRTO *q* | MW | *Real-Time Dispatchable Reliability Reserve Service Trade Overage for the QSE*¾The quantity of submitted DRRS trades in excess of their DAM self-arrangement quantity for the QSE *q* for the Operating Hour. |
| RTMCPCDRR | $/MW | *Real-Time Market Clearing Price for Capacity for Dispatchable Reliability Reserve Service*—The Real-Time MCPC for ECRS for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1010 and NPRR1245: Insert Section 6.7.5.8 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  **6.7.5.8 Real-Time Derated Ancillary Service Capability Payment**  (1) If ERCOT manually reduces the amount of an Ancillary Service that may be awarded to a Resource in Real-Time under paragraph (6) of Section 6.4.9.1.1, Ancillary Service Awards, and the reduction reduces the payment the QSE would have received under Section 6.7.5.1, Real-Time Ancillary Service Imbalance Payment or Charge, the QSE may be eligible for a Real-Time derated Ancillary Service capability payment under this Section.  (2) In order to be eligible for a Real-Time derated Ancillary Service capability payment, the QSE must:  (a) File a timely Settlement and billing dispute, identifying the following items, by Settlement Interval:  (i) Dollar amount and calculation of the estimated Real-Time derated Ancillary Service capability payment;  (ii) The quantity of Ancillary Service awards, by Ancillary Service product, that were not awarded due to ERCOT’s manual reduction of the Resource’s Ancillary Service capability;  (iii) Any additional revenues earned by the QSE under Section 6.6.3.1, Real-Time Energy Imbalance Payment or Charge at a Resource Node; and  (iv) Any additional revenues earned by the QSE under Section 6.7.5.1, Real-Time Ancillary Service Imbalance Payment or Charge.  (b) Have submitted an Ancillary Service Offer for the disputed Settlement Interval(s). The Ancillary Service Offer used to calculate the Real-Time derated Ancillary Service capability payment shall be the most recent offer received by ERCOT effective for the disputed Settlement Interval(s) before ERCOT manually reduced the amount of Ancillary Service to be awarded.  (3) ERCOT shall attempt to validate the calculations provided by the QSE, and may request additional supporting documentation or explanation with respect to the submitted materials within 15 Business Days of receipt. Additional information requested by ERCOT must be provided by the QSE within 15 Business Days of ERCOT’s request. Upon determination by ERCOT that no additional supporting documentation or explanation is needed from the disputing QSE, ERCOT shall notify the QSE of its acceptance or rejection of the claim for the Real-Time derated Ancillary Service capability payment within 15 Business Days.  (4) The price used to determine the derated MWs that were not awarded due to the manual reduction shall be the Real-Time MCPC for the Ancillary Service that was reduced.  (5) The amount recoverable under this section shall be capped by the Real-Time MCPC for the Ancillary Service that was reduced, multiplied by the reduced quantity.  (6) The amount recoverable under this Section shall be reduced by any additional revenue received by the QSE, as determined in paragraphs (2)(a)(iii) and (2)(a)(iv) above.  (7) The Real-Time derated Ancillary Service capability payment for a given 15-minute Settlement Interval is calculated as follows:  **RTDASAMT *q* = (-1) \* Max [0,** **Min[(RTRUILD *q* + RTRDILD *q* + RTRRILD *q* + RTNSILD *q* + RTECRILD *q* + RTDRRILD *q* – RTEIRD** *q* **– RTASIRD *q*),** **RTDASCAP *q, r*]]**  Where:  RTDASCAP *q. r* = (1/4) \* (RTMCPCRU \* RTRUDQ *q, r***+** RTMCPCRD \* RTRDDQ *q, r* **+** RTMCPCRR \* RTRRDQ *q, r* **+** RTMCPCNS \* RTNSDQ *q, r* **+**  RTMCPCECR \* RTECRDQ *q, r* **+** RTMCPCDRR \* RTDRRDQ *q, r*)  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | RTDASAMT *q* | $ | *Real-Time Derated Ancillary Service Amount*—The payment to QSE *q* for amounts recoverable resulting from a manual reduction of Ancillary Services by ERCOT for the 15-minute Settlement Interval. | | RTRUILD*q* | $ | *Real-Time Derated Regulation Up Imbalance Losses for Deration*—The payments not made to QSE *q* under paragraph (1) of Section 6.7.5.2, Regulation Up Service Payments and Charges, for the 15-minute Settlement Interval. | | RTRDILD *q* | $ | *Real-Time Derated Regulation Down Imbalance Losses for Deration*—The payments not made to QSE *q* under paragraph (1) of Section 6.7.5.3, Regulation Down Service Payments and Charges, for the 15-minute Settlement Interval. | | RTRRILD *q* | $ | *Real-Time Derated Responsive Reserve Imbalance Losses for Deration*—The payments not made to QSE *q* under paragraph (1) of Section 6.7.5.4, Responsive Reserve Payments and Charges, for the 15-minute Settlement Interval. | | RTNSILD *q* | $ | *Real-Time Derated Non-Spin Imbalance Losses for Deration*—The payments not made to QSE *q* under paragraph (1) of Section 6.7.5.5, Non-Spinning Reserve Service Payments and Charges, for the 15-minute Settlement Interval. | | RTECRILD q | $ | *Real-Time Derated ERCOT Contingency Reserve Service Imbalance Losses for Deration*—The payments not made to QSE *q* under paragraph (1) of Section 6.7.5.6, ERCOT Contingency Reserve Service Payments and Charges, for the 15-minute Settlement Interval. | | RTDRRILD q | $ | *Real-Time Derated Dispatchable Reliability Reserve Service Imbalance Losses for Deration*—The payments not made to QSE *q* under paragraph (1) of Section 6.7.5.7, Dispatchable Reliability Reserve Service Payments and Charges, for the 15-minute Settlement Interval. | | RTEIRD*q* | $ | *Real-Time Energy Imbalance Revenues for Deration*—The additional payments to QSE *q* under Section 6.6.3.1. | | RTASIRD*q* | $ | *Real-Time Ancillary Service Imbalance Revenues for Deration*—The additional Ancillary Service imbalance payments to QSE *q* for all Ancillary Service products for the 15-minute Settlement Interval. | | RTDASCAP *q, r* | $ | *Real-Time Derated Ancillary Service Payment Cap—*The amount recoverable for Resource *r* represented by QSE *q,* capped by the Real-Time MCPC for the Ancillary Service product that was derated, multiplied by the quantity by which the Resource’s capability to provide the Ancillary Service was reduced for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTMCPCRU | $/MW | *Real-Time Market Clearing Price for Capacity for Regulation Up*—The Real-Time MCPC for Reg-Up for the 15-minute Settlement Interval. | | RTMCPCRD | $/MW | *Real-Time Market Clearing Price for Capacity for Regulation Down*—The Real-Time MCPC for Reg-Down for the 15-minute Settlement Interval. | | RTMCPCRR | $/MW | *Real-Time Market Clearing Price for Capacity for Responsive Reserve*—The Real-Time MCPC for RRS for the 15-minute Settlement Interval. | | RTMCPCNS | $/MW | *Real-Time Market Clearing Price for Capacity for Non-Spin*—The Real-Time MCPC for Non-Spin for the 15-minute Settlement Interval. | | RTMCPCECR | $/MW | *Real-Time Market Clearing Price for Capacity for ERCOT Contingency Reserve Service*—The Real-Time MCPC for ECRS for the 15-minute Settlement Interval. | | RTMCPCDRR | $/MW | *Real-Time Market Clearing Price for Capacity for Dispatchable Reliability Reserve Service*—The Real-Time MCPC for DRRS for the 15-minute Settlement Interval. | | RTRUDQ *q, r* | MW | *Real-Time Regulation Up Derated Quantity*—The Reg-Up quantity manually reduced by ERCOT for the Resource *r* represented by QSE *q* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDDQ *q, r* | MW | *Real-Time Regulation Down Derated* *Quantity*—The Reg-Down quantity manually reduced by ERCOT for the Resource *r* represented by QSE *q* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRDQ *q, r* | MW | *Real-Time Responsive Reserve Derated Quantity*—The RRS quantity manually reduced by ERCOT for the Resource *r* represented by QSE *q* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRDQ *q, r* | MW | *Real-Time ERCOT Contingency Reserve Service Derated Quantity*—The ECRS quantity manually reduced by ERCOT for the Resource *r* represented by QSE *q* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSDQ *q, r* | MW | *Real-Time Non-Spin Derated Quantity*—The Non-Spin quantity manually reduced by ERCOT for the Resource *r* represented by QSE *q* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTDRRDQ *q, r* | MW | *Real-Time Dispatchable Reliability Reserve Service Derated Quantity*—The DRRS quantity manually reduced by ERCOT for the Resource *r* represented by QSE *q* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *q* | none | A QSE. | | *r* | none | A Resource. | |

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| [NPRR1010 and NPRR1245: Insert Section 6.7.5.9 below upon system implementation of the Real-Time Co-Optimization (RTC) project:] 6.7.5.9 Real-Time Derated Ancillary Service Capability Charge (1) The total cost for Real-Time derated Ancillary Service payments is allocated to QSEs representing Load based on Load Ratio Share (LRS). The Real-Time derated Ancillary Service Payment allocations to each QSE for a given 15-minute Settlement Interval are calculated as follows:  LARTDASAMT *q* = (-1) \* RTDASAMTTOT \* LRS *q*  Where:  RTDASAMTTOT =  RTDASAMT *q*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | LARTDASAMT *q* | $ | *Load Allocated Real-Time Derated Ancillary Service Amount per QSE*—The charge to QSE *q* due to a manual reduction of Ancillary Services to be awarded for the 15-minute Settlement Interval. | | RTDASAMTTOT | $ | *Real-Time Derated Ancillary Service Amount Total*—The total of all payments to all QSEs for amounts recoverable due to an ERCOT issued manual reduction of Ancillary Services to be awarded for the 15-minute Settlement Interval. | | RTDASAMT *q* | $ | *Real-Time Derated Ancillary Service Amount*—The payment to QSE *q* for amounts recoverable due to an ERCOT issued manual reduction of Ancillary Services to be awarded for the 15-minute Settlement Interval. | | LRS*q* | none | *Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval, for QSE *q* for the 15-minute Settlement Interval. | | *q* | none | A QSE. | |

***6.7.6 Real-Time Ancillary Service Imbalance Revenue Neutrality Allocation***

(1) The total cost for Ancillary Service Imbalance payments and charges associated with ORDC and reliability deployments is allocated to the QSEs representing Load based on Load Ratio Share (LRS). The Real-Time Ancillary Service imbalance revenue neutrality allocations to each QSE for a given 15-minute Settlement Interval are calculated as follows:

**LAASIRNAMT *q*= (-1) \* [(RTASIAMTTOT + RTRUCRSVAMTTOT) \* LRS *q*]**

**LARDASIRNAMT *q*= (-1) \* [(RTRDASIAMTTOT + RTRDRUCRSVAMTTOT) \* LRS *q*]**

Where:

RTASIAMTTOT = RTASIAMT *q*

RTRUCRSVAMTTOT =  RTRUCRSVAMT *q*

RTRDASIAMTTOT = RTRDASIAMT *q*

RTRDRUCRSVAMTTOT=  RTRDRUCRSVAMT *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| LAASIRNAMT *q* | $ | *Load-Allocated Ancillary Service Imbalance Revenue Neutrality Amount per QSE*—The QSE *q*’s share of the total Real-Time Ancillary Service imbalance revenue neutrality amount associated with ORDC for the 15-minute Settlement Interval. |
| LARDASIRNAMT *q* | $ | *Load-Allocated Reliability Deployment Ancillary Service Imbalance Revenue Neutrality Amount per QSE*—The QSE *q*’s share of the total Real-Time Ancillary Service imbalance revenue neutrality amount associated with Reliability Deployments for the 15-minute Settlement Interval. |
| RTASIAMTTOT | $ | *Real-Time Ancillary Service Imbalance Market Total Amount*—The total payment or charge to all QSEs for the Real-Time Ancillary Service imbalance associated with ORDC for each 15-minute Settlement Interval. |
| RTASIAMT *q* | $ | *Real-Time Ancillary Service Imbalance Amount*—The total payment or charge to QSE *q* for the Real-Time Ancillary Service imbalance associated with ORDC for each 15-minute Settlement Interval. |
| RTRDASIAMTTOT | $ | *Real-Time Reliability Deployment Ancillary Service Imbalance Market Total Amount*—The total payment or charge to all QSEs for the Real-Time Ancillary Service imbalance associated with Reliability Deployments for each 15-minute Settlement Interval. |
| RTRDASIAMT *q* | $ | *Real-Time Reliability Deployment Ancillary Service Imbalance Amount*—The total payment or charge to QSE *q* for the Real-Time Ancillary Service imbalance associated with Reliability Deployments for each 15-minute Settlement Interval. |
| RTRUCRSVAMTTOT | $ | *Real-Time RUC Ancillary Service Reserve Market Total Amount*—The total payment to all QSEs for the Real-Time RUC Ancillary Service reserve payments associated with ORDC for each 15-minute Settlement Interval. |
| RTRUCRSVAMT *q* | $ | *Real-Time RUC Ancillary Service Reserve Amount*—The total payment to QSE *q* for the Real-Time RUC Ancillary Service reserve payment associated with ORDC for each 15-minute Settlement Interval. |
| RTRDRUCRSVAMTTOT | $ | *Real-Time Reliability Deployment RUC Ancillary Service Reserve Market Total Amount*—The total payment |to all QSEs for the Real-Time RUC Ancillary Service Reserve payment as a result of Reliability Deployments for each 15-minute Settlement Interval. |
| RTRDRUCRSVAMT *q* | $ | *Real-Time Reliability Deployment RUC Ancillary Service Reserve Amount*—The total payment |to QSE *q* for the Real-Time RUC Ancillary Service Reserve payment as a result of Reliability Deployments for each 15-minute Settlement Interval. |
| LRS *q* | none | The LRS calculated for QSE *q* for the 15-minute Settlement Interval. See Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval. |
| *q* | none | A QSE. |

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| [NPRR1010: Replace Section 6.7.6 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  ***6.7.6 Real-Time Ancillary Service Revenue Neutrality Allocation***  (1) The total cost for Real-Time Ancillary Service payments and charges is allocated to the QSEs representing Load based on Load Ratio Share (LRS). The Real-Time Ancillary Service allocations to each QSE for a given 15-minute Settlement Interval are calculated as follows:  (a) For Reg-Up:  LARTRUAMT *q* = (-1) \* (RTRUIMBAMTTOT + RTRUOAMTTOT +  RTRUTOAMTTOT) \* LRS *q*  Where:  RTRUIMBAMTTOT =  (RTRUIMBAMT *q*)  RTRUOAMTTOT =  (RTRUOAMT *q*)  RTRUTOAMTTOT =  (RTRUTOAMT *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | LARTRUAMT *q* | $ | *Load-Allocated Real-Time Reg-Up Amount for the QSE*— The QSE *q*­’s share of the total Real-Time Reg-Up amount for the 15-minute Settlement Interval. | | RTRUIMBAMT *q* | $ | *Real-Time Reg-Up Imbalance Amount for the QSE -* The total payment or charge to QSE *q* for the Real-Time Reg-Up imbalance for each 15-minute Settlement Interval. | | RTRUOAMT *q* | $ | *Real-Time Reg-Up Only Amount for the QSE*— The total charge to QSE *q* in Real-Time for Reg-Up only awards for each 15-minute Settlement Interval. | | RTRUIMBAMTTOT | $ | *Real-Time Reg-Up Imbalance Market Total Amount -* The total payment or charge to all QSEs for the Real-Time Reg-Up imbalance for each 15-minute Settlement Interval. | | RTRUOAMTTOT | $ | *Real-Time Reg-Up Only Market Total Amount -* The total charge to all QSEs in Real-Time for Reg-Up only awards for each 15-minute Settlement Interval. | | RTRUTOAMT *q* | $ | *Real-Time Reg-Up Trade Overage Amount for the QSE*— The total charge to QSE *q* in Real-Time for Reg-Up trade overages for each 15-minute Settlement Interval. | | RTRUTOAMTTOT | $ | *Real-Time Reg-Up Trade Overage Total Amount* — The total charge to all QSEs for Real-Time Reg-Up trade overages for each 15-minute Settlement Interval. | | LRS*q* | none | *Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval, for QSE *q* for the 15-minute Settlement Interval. | | *q* | none | A QSE. |   (b) For Reg-Down:  LARTRDAMT *q* = (-1) **\* (**RTRDIMBAMTTOT + RTRDOAMTTOT +  RTRDTOAMTTOT) \* LRS *q*  Where:  RTRDIMBAMTTOT = (RTRDIMBAMT *q*)  RTRDOAMTTOT = (RTRDOAMT *q*)  RTRDTOAMTTOT = (RTRDTOAMT *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | LARTRDAMT *q* | $ | *Load-Allocated Real-Time Reg-Down Amount for the QSE* ¾ The QSE *q*’s share of the total Real-Time Reg-Down amount for the 15-minute Settlement Interval. | | RTRDIMBAMT *q* | $ | *Real-Time Reg-Down Imbalance Amount for the QSE -* The total payment or charge to QSE *q* for the Real-Time Reg-Down imbalance for each 15-minute Settlement Interval. | | RTRDOAMT *q* | $ | *Real-Time Reg-Down Only Amount for the QSE*— The total charge to QSE *q* in Real-Time for Reg-Down only awards for each 15-minute Settlement Interval. | | RTRDIMBAMTTOT | $ | *Real-Time Reg-Down Imbalance Market Total Amount -* The total payment or charge to all QSEs for the Real-Time Reg-Down imbalance for each 15-minute Settlement Interval. | | RTRDOAMTTOT | $ | *Real-Time Reg-Down Only Market Total Amount -* The total charge to all QSEs in Real-Time for Reg-Down only awards for each 15-minute Settlement Interval. | | RTRDTOAMT *q* | $ | *Real-Time Reg-Down Trade Overage Amount for the QSE*— The total charge to QSE *q* in Real-Time for Reg-Down trade overages for each 15-minute Settlement Interval. | | RTRDOAMTTOT | $ | *Real-Time Reg-Down Trade Overage Total Amount* — The total charge to all QSEs for Real-Time Reg-Down trade overages for each 15-minute Settlement Interval. | | LRS*q* | none | *Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2 for QSE *q* for the 15-minute Settlement Interval. | | *q* | none | A QSE. |   (c) For Responsive Reserve (RRS):  LARTRRAMT *q* = (-1) **\* (**RTRRIMBAMTTOT + RTRROAMTTOT +  RTRRTOAMTTOT) \* LRS *q*  Where:  RTRRIMBAMTTOT =  (RTRRIMBAMT *q*)  RTRROAMTTOT =  (RTRROAMT *q*)  RTRRTOAMTTOT =  (RTRRTOAMT *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | LARTRRAMT *q* | $ | *Load-Allocated Real-Time Responsive Reserve Amount for the QSE* ¾ The QSE’s share of the total Real-Time RRS amount for the 15-minute Settlement Interval. | | RTRRIMBAMT *q* | $ | *Real-Time Responsive Reserve Imbalance Amount for the QSE -* The total payment or charge to QSE *q* for the Real-Time RRS imbalance for each 15-minute Settlement Interval. | | RTRROAMT *q* | $ | *Real-Time Responsive Reserve Only Amount for the QSE*— The total charge to QSE *q* in Real-Time for RRS only awards for each 15-minute Settlement Interval. | | RTRRIMBAMTTOT | $ | *Real-Time Responsive Reserve Imbalance Market Total Amount -* The total payment or charge to all QSEs for the Real-Time RRS imbalance for each 15-minute Settlement Interval. | | RTRROAMTTOT | $ | *Real-Time Responsive Reserve Only Market Total Amount -* The total charge to all QSEs in Real-Time for RRS only awards for each 15-minute Settlement Interval. | | RTRRTOAMT *q* | $ | *Real-Time Responsive Reserve Trade Overage Amount for the QSE*— The total charge to QSE *q* in Real-Time for RRS trade overages for each 15-minute Settlement Interval. | | RTRROAMTTOT | $ | *Real-Time Responsive Reserve Trade Overage Total Amount* — The total charge to all QSEs for Real-Time RRS trade overages for each 15-minute Settlement Interval. | | LRS*q* | none | *Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2 for QSE *q* for the 15-minute Settlement Interval. | | *q* | none | A QSE. |   (d) For Non-Spin:  LARTNSAMT *q* = (-1) \* (RTNSIMBAMTTOT + RTNSOAMTTOT +  RTNSTOAMTTOT) \* LRS *q*  Where:  RTNSIMBAMTTOT =  (RTNSIMBAMT *q*)  RTNSOAMTTOT =  (RTNSOAMT *q*)  RTNSTOAMTTOT =  (RTNSTOAMT *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | LARTNSAMT *q* | $ | *Load-Allocated Real-Time Non-Spin Amount for the QSE* ¾ The QSE’s share of the total Real-Time Non-Spin amount for the 15-minute Settlement Interval. | | RTNSIMBAMT *q* | $ | *Real-Time Non-Spin Imbalance Amount for the QSE -* The total payment or charge to QSE *q* for the Real-Time Non-Spin imbalance for each 15-minute Settlement Interval. | | RTNSOAMT *q* | $ | *Real-Time Non-Spin Only Amount for the QSE*— The total charge to QSE *q* in Real-Time for Non-Spin only awards for each 15-minute Settlement Interval. | | RTNSIMBAMTTOT | $ | *Real-Time Non-Spin Imbalance Market Total Amount -* The total payment or charge to all QSEs for the Real-Time Non-Spin imbalance for each 15-minute Settlement Interval. | | RTNSOAMTTOT | $ | *Real-Time Non-Spin Only Market Total Amount -* The total charge to all QSEs in Real-Time for Non-Spin only awards for each 15-minute Settlement Interval. | | RTNSTOAMT *q* | $ | *Real-Time Non-Spin Trade Overage Amount for the QSE*— The total charge to QSE *q* in Real-Time for Non-Spin trade overages for each 15-minute Settlement Interval. | | RTNSOAMTTOT | $ | *Real-Time Non-Spin Trade Overage Total Amount* — The total charge to all QSEs for Real-Time Non-Spin trade overages for each 15-minute Settlement Interval. | | LRS*q* | none | *Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2 for QSE *q* for the 15-minute Settlement Interval. | | *q* | none | A QSE. |   (e) For ERCOT Contingency Reserve Service (ECRS):  LARTECRAMT *q* = (-1) \* (RTECRIMBAMTTOT + RTECROAMTTOT +  RTECRTOAMTTOT) \* LRS *q*  Where:  RTECRIMBAMTTOT =  (RTECRIMBAMT *q*)  RTECROAMTTOT = (RTECROAMT *q*)  RTECRTOAMTTOT = (RTECRTOAMT *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | LARTECRAMT *q* | $ | *Load-Allocated Real-Time ERCOT Contingency Reserve Service Amount for the QSE -* The QSE *q*’s share of the total Real-Time ECRS amount for the 15-minute Settlement Interval. | | RTECRIMBAMT *q* | $ | *Real-Time ERCOT Contingency Reserve Service Imbalance Amount for the QSE -* The total payment or charge to QSE *q* for the Real-Time ECRS imbalance for each 15-minute Settlement Interval. | | RTECROAMT *q* | $ | *Real-Time ERCOT Contingency Reserve Service Only Amount for the QSE—* The total charge to QSE *q* in Real-Time for ECRS only awards for each 15-minute Settlement Interval. | | RTECRIMBAMTTOT | $ | *Real-Time ERCOT Contingency Reserve Service Imbalance Market Total Amount -* The total payment or charge to all QSEs for the Real-Time ECRS imbalance for each 15-minute Settlement Interval. | | RTECROAMTTOT | $ | *Real-Time ERCOT Contingency Reserve Service Only Market Total Amount -* The total charge to all QSEs in Real-Time for ECRS only awards for each 15-minute Settlement Interval. | | RTECRTOAMT *q* | $ | *Real-Time ERCOT Contingency Reserve Service Trade Overage Amount for the QSE*— The total charge to QSE *q* in Real-Time for ECRS trade overages for each 15-minute Settlement Interval. | | RTECROAMTTOT | $ | *Real-Time ERCOT Contingency Reserve Service Trade Overage Total Amount* — The total charge to all QSEs for Real-Time ECRS trade overages for each 15-minute Settlement Interval. | | LRS*q* | none | *Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2 for QSE *q* for the 15-minute Settlement Interval. | | *q* | none | A QSE. |   (f) For Dispatchable Reliability Reserve Service (DRRS):  LARTDRRAMT *q* = (-1) \* (RTDRRIMBAMTTOT + RTDRROAMTTOT +  RTDRRTOAMTTOT) \* LRS *q*  Where:  RTDRRIMBAMTTOT =  (RTDRRIMBAMT *q*)  RTDRROAMTTOT = (RTDRROAMT *q*)  RTDRRTOAMTTOT = (RTDRRTOAMT *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | LARTDRRAMT *q* | $ | *Load-Allocated Real-Time Dispatchable Reliability Reserve Service Amount for the QSE -* The QSE *q*’s share of the total Real-Time DRRS amount for the 15-minute Settlement Interval. | | RTDRRIMBAMT *q* | $ | *Real-Time Dispatchable Reliability Reserve Service Imbalance Amount for the QSE -* The total payment or charge to QSE *q* for the Real-Time DRRS imbalance for each 15-minute Settlement Interval. | | RTDRROAMT *q* | $ | *Real-Time Dispatchable Reliability Reserve Service Only Amount for the QSE—* The total charge to QSE *q* in Real-Time for DRRS only awards for each 15-minute Settlement Interval. | | RTDRRIMBAMTTOT | $ | *Real-Time Dispatchable Reliability Reserve Service Imbalance Market Total Amount -* The total payment or charge to all QSEs for the Real-Time DRRS imbalance for each 15-minute Settlement Interval. | | RTDRROAMTTOT | $ | *Real-Time Dispatchable Reliability Reserve Service Only Market Total Amount -* The total charge to all QSEs in Real-Time for DRRS only awards for each 15-minute Settlement Interval. | | RTDRRTOAMT *q* | $ | *Real-Time Dispatchable Reliability Reserve Service Trade Overage Amount for the QSE*— The total charge to QSE *q* in Real-Time for DRRS trade overages for each 15-minute Settlement Interval. | | RTDRROAMTTOT | $ | *Real-Time Dispatchable Reliability Reserve Service Trade Overage Total Amount* — The total charge to all QSEs for Real-Time DRRS trade overages for each 15-minute Settlement Interval. | | LRS*q* | none | *Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2 for QSE *q* for the 15-minute Settlement Interval. | | *q* | none | A QSE. | |

**8.1.1.2.1.8** **Dispatchable Reliability Reserve Service Qualification**

(1) Each Resource being offered to provide Dispatchable Reliability Reserve Service (DRRS) must be capable of ramping to its Ancillary Service award for DRRS within two hours. Subject to DRRS Release Factor (DRRSRF) constraints, DRRS may only be provided from capability that is not fulfilling any other energy or capacity commitment.

(2) Subject to DRRSRF constraints, each QSE shall ensure that each Resource is able to meet the Resource’s obligations to provide the Ancillary Service award.

(3) Resources are required to undergo a qualification test to provide DRRS when the Resource is On-Line, which shall at least include the ability to provide applicable telemetry and market submissions.

(4) For any Resource requesting qualification for providing Off-Line DRRS, a qualification test for each Resource to provide DRRS is conducted during a continuous eight-hour period agreed to by the QSE and ERCOT. ERCOT shall confirm the date and time of the test with the QSE. ERCOT shall administer the following test requirements:

(a) At any time during the window (selected by ERCOT when market and reliability conditions allow and not previously disclosed to the QSE), ERCOT shall notify the QSE by using the messaging system and requesting that the QSE provide an amount of DRRS from each Resource equal to the amount for which the QSE is requesting qualification. The QSE shall acknowledge the start of the test; and

(b) For the Resources being tested during the test window, ERCOT shall send a message to the QSE representing a Resource to deploy DRRS. ERCOT shall measure the test Resource’s response as described under Section 8.1.1.4.5, Dispatchable Reliability Reserve Service Energy Deployment Criteria. ERCOT shall evaluate the response of the Resource given the current operating conditions of the ERCOT System and determine the Resource’s qualification to provide DRRS.

(5) For Resources seeking to qualify to provide DRRS, the Resource must be capable of operating at its High Sustained Limit (HSL) for at least four consecutive hours. The amount of DRRS for which the Resource is qualified is limited to the amount of capacity that can be ramped within two hours. Additionally, the maximum quantity of DRRS that an individual Resource is qualified to provide is limited to the amount of DRRS that can be sustained by the Resource for at least four hours.

***8.1.1.3.5 Dispatchable Reliability Reserve Service Capacity Monitoring Criteria***(1) ERCOT shall continuously monitor the capacity of each Resource to provide DRRS. ERCOT shall consider for each Resource the Resource Status, the actual generation or Load, the Ancillary Service award for DRRS, the HSL, the LSL, ramp rates, and the Resource’s qualification to provide DRRS. ERCOT shall also monitor DRRS available from and awarded to qualified Resources with an OFF status***.***

(2) For the DRRS capability provided for a Resource to ERCOT by the Resource’s QSE, the amount of DRRS reflected in that capability must be limited to the amount of DRRS that can be sustained by the Resource for at least four consecutive hours.

***8.1.1.4.5 Dispatchable Reliability Reserve Service Energy Deployment Criteria***

(1) ERCOT shall, as part of its Ancillary Service deployment procedure under Section 6.5.7.6.2.5, Deployment of Dispatchable Reliability Reserve Service (DRRS), include all performance metrics for a Resource receiving a DRRS deployment and recall instruction from ERCOT.

(2) A DRRS Dispatch Instruction from ERCOT must respect the minimum runtime of the Resource.

(3) Control performance during periods in which ERCOT has manually deployed DRRS shall be based on the requirements below and failure to meet any one of these requirements for the greater of one or 5% of DRRS deployments during a month shall be reported to the Reliability Monitor as non-compliance:

(a) Off-Line Generation Resources providing DRRS must be On-Line with an Energy Offer Curve following a DRRS deployment instruction and the telemetered net generation must be greater than or equal to the Resource’s telemetered LSL multiplied by P1, where P1 is defined in the “ERCOT and QSE Operations Business Practices During the Operating Hour.” This process must occur within a time frame that would allow the Resource to achieve its Ancillary Service award for DRRS within two hours of receiving a DRRS deployment. Once the Resource is On-Line, the Resource Status that must be telemetered indicating that the Resource has come On-Line with an Energy Offer Curve is ON, as described in paragraph (5)(b)(i) of Section 3.9.1.

(b) If a Generation Resource experiences a Startup Loading Failure (excluding those caused by operator error), the Resource may be considered for exclusion from performance non-compliance if the QSE provides to ERCOT the following documentation regarding the incident:

(i) Its generation log documenting the Startup Loading Failure; and

(ii) Equipment failure documentation such as, but not limited to, Generation Availability Data System (GADS) reports, plant operator logs, work orders, or other applicable information.

(4) Off-Line Resources that have been made available through a deployment of DRRS will be economically dispatched by SCED.

(5) Once DRRS capacity has been manually deployed by ERCOT, the Resource’s DRRS capacity shall remain available for dispatch by SCED until ERCOT issues a recall instruction or the Resource has exhausted its ability to maintain the deployed capacity after meeting the requirements of paragraph (2) of Section 8.1.1.3.5, Dispatchable Reliability Reserve Service Capacity Monitoring Criteria, whichever occurs first.

***9.2.3 DAM Settlement Charge Types***

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

(a) Section 4.6.2.1, Day-Ahead Energy Payment;

(b) Section 4.6.2.2, Day-Ahead Energy Charge;

(c) Section 4.6.2.3.1, Day-Ahead Make-Whole Payment;

(d) Section 4.6.2.3.2, Day-Ahead Make-Whole Charge;

(e) Section 4.6.3, Settlement for PTP Obligations Bought in DAM;

(f) Section 4.6.4.1.1, Regulation Up Service Payment;

(g) Section 4.6.4.1.2, Regulation Down Service Payment;

(h) Section 4.6.4.1.3, Responsive Reserve Payment;

(i) Section 4.6.4.1.4, Non-Spinning Reserve Service Payment;

(j) Section 4.6.4.1.5, ERCOT Contingency Reserve Service Payment;

(k) Section 4.6.4.1.6, Dispatchable Reliability Reserve Service Payment;(l) Section 4.6.4.2.1, Regulation Up Service Charge;

(m) Section 4.6.4.2.2, [Regulation Down Service Charge](#_Toc109527549);

(n) Section 4.6.4.2.3, Responsive Reserve Charge;

(o) Section 4.6.4.2.4, Non-Spinning Reserve Service Charge;

(p) Section 4.6.4.2.5, ERCOT Contingency Reserve Service Charge;

(q) Section 4.6.4.2.6, Dispatchable Reliability Reserve Service Charge;(r) Section 7.9.1.1, Payments and Charges for PTP Obligations Settled in DAM;

(s) Section 7.9.1.2, Payments for PTP Options Settled in DAM;

(t) Section 7.9.1.4, Payments for FGRs Settled in DAM;

(u) Section 7.9.1.5, Payments and Charges for PTP Obligations with Refund Settled in DAM;

(v) Section 7.9.1.6, Payments for PTP Options with Refund Settled in DAM; and

(w) Paragraph (2) of Section 7.9.3.3, Shortfall Charges to CRR Owners.

9.14.10 Settlement for Market Participants Impacted by Omitted Procedures or Manual Actions to Resolve the DAM

(1) A Market Participant that has been directly impacted by an action or omission by ERCOT to resolve the DAM, as described in paragraph (4) of Section 4.1.2, Day-Ahead Process and Timing Deviations, may seek recovery by filing a Settlement and billing dispute as defined in Section 9.14. Where ERCOT determines that the Market Participant seeking recovery has been directly impacted by such ERCOT action or omission, the following provisions apply:

(a) No resettlement of the DAM will occur as a result of a Market Participant’s recovery under this Section;

(b) Where a Market Participant’s submissions were not cleared in the DAM, ERCOT will establish a set of DAM Energy Bids, DAM Energy Offers, Ancillary Service Offers, and Point-to-Point (PTP) bids that would have cleared given the settled prices of the DAM;

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| ***[NPRR1245: Replace paragraph (b) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (b) Where a Market Participant’s submissions were not cleared in the DAM, ERCOT will establish a set of DAM Energy Bids, DAM Energy Offers, Resource-Specific Ancillary Service Offers, Ancillary Service Only Offers, and Point-to-Point (PTP) bids that would have cleared given the settled prices of the DAM; |

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| ***[NPRR1188: Replace paragraph (b) above with the following upon system implementation:]***  (b) Where a Market Participant’s submissions were not cleared in the DAM, ERCOT will establish a set of DAM Energy Bids, DAM Energy Offers, Ancillary Service Offers, Energy Bid Curves, and Point-to-Point (PTP) bids that would have cleared given the settled prices of the DAM; |

(c) Startup Costs and minimum energy costs will not be considered for recovery;

(d) For linked offers of energy and Ancillary Services, the available capacity will be allocated to the offers that would have created the greatest value for the Market Participant seeking recovery;

(e) All impacted positions will be summed based on their positive or negative value with respect to Real-Time prices;

Day-Ahead Energy Sales Impact

DAMSQSEAMT *q* = (-1) \*  ((DASPP *p* – RTSPP *p*) \* (1/4)\* DAES *q,**p*)

Day-Ahead Energy Purchase Impact

DAMPQSEAMT *q* = (-1) \*  ((RTSPP *p* – DASPP *p*) \* (1/4)\* DAEP *q,**p*)

Day-Ahead Ancillary Services Sales Impact

DAMASQSEAMT *q* = (-1) \*  (((MCPCRU *DAM* – RUOPR *q, r, DAM*) \* PCRUR *q, r, DAM*)

+ ((MCPCRD *DAM* – RDOPR *q, r, DAM*) \* PCRDR *q, r, DAM*)

+ ((MCPCRR *DAM* – RROPR *q, r, DAM*) \* PCRRR *q, r, DAM*)

+ ((MCPCECR *DAM* – ECRSOPR *q, r, DAM*) \* PCECRR *q, r, DAM*)

+ ((MCPCNS *DAM* – NSOPR *q, r, DAM*) \* PCNSR *q, r, DAM*))

Day-Ahead Point-to-Point Obligation Impact

DAMRTPTPQSEAMT *q* = (-1) \*  ((RTOBLPR *(j, k)* – DAOBLPR *(j, k)*) \* RTOBL *q, (j, k)*)

Where:

RTOBLPR *(j, k)* = (RTSPP (*k,i*) – RTSPP (*j,i* )) / 4

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

|  |
| --- |
| ***[NPRR1245: Replace paragraph (e) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (e) All impacted positions will be summed based on their positive or negative value with respect to Real-Time prices;  Day-Ahead Energy Sales Impact  DAMSQSEAMT *q* = (-1) \*  ((DASPP *p* – RTSPP *p*) \* (1/4)\* DAES *q,**p*)  Day-Ahead Energy Purchase Impact  DAMPQSEAMT *q* = (-1) \*  ((RTSPP *p* – DASPP *p*) \* (1/4)\* DAEP *q,**p*)  Day-Ahead Ancillary Services Sales Impact  DAMASQSEAMT *q* = (-1) \*  (((MCPCRU *DAM* – RTMCPCRU) \* (1/4) \* PCRUR *q, r, DAM*)  + ((MCPCRD *DAM* – RTMCPCRD) \* (1/4) \* PCRDR *q, r, DAM*)  + ((MCPCRR *DAM* – RTMCPCRR) \* (1/4) \* PCRRR *q, r, DAM*)  + ((MCPCECR *DAM* – RTMCPCECR) \* (1/4) \* PCECRR *q, r, DAM*)  + ((MCPCNS *DAM* – RTMCPCNS) \* (1/4) \* PCNSR *q, r, DAM*)  + ((MCPCDRR *DAM* – RTMCPCDRR) \* (1/4) \* PCDRRR *q, r, DAM*)  + ((MCPCRU *DAM* – RTMCPCRU) \* (1/4) \* DARUOAWD *q*)  + ((MCPCRD *DAM* – RTMCPCRD) \*(1/4) \* DARDOAWD *q*)  + ((MCPCRR *DAM* – RTMCPCRR) \* (1/4) \* DARROAWD *q*)  + ((MCPCECR *DAM* – RTMCPCECR) \* (1/4) \* DAECROAWD *q*)  + ((MCPCNS *DAM* – RTMCPCNS) \* (1/4) \* DANSOAWD *q*)  + ((MCPCDRR *DAM* – RTMCPCDRR) \* (1/4) \* DADRROAWD *q*))  Day-Ahead Point-to-Point Obligation Impact  DAMRTPTPQSEAMT *q* = (-1) \*  ((RTOBLPR *(j, k)* – DAOBLPR *(j, k)*) \* RTOBL *q, (j, k)*)  Where:  RTOBLPR *(j, k)* = (RTSPP (*k,i*) – RTSPP (*j,i* )) / 4  DAOBLPR *(j, k)* = DASPP *k* – DASPP *j* |

(f) If any RUC short charges occur for any Operating Hour involved in a Market Participant’s recovery under this Section, ERCOT will evaluate the Market Participant’s revised position to determine if the Market Participant is entitled to a refund, or should be charged for RUC short charge;

(g) Any resulting charge or payment to the Market Participant will be invoiced using a miscellaneous Invoice, but allocated with the method outlined in paragraphs (2) through (4) of Section 9.19.1, Default Uplift Invoices.

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Definition** |
| DAMSQSEAMT *q* | $ | *Day-Ahead Market Energy Sales Amount by QSE*—The sum of the DAM Energy Sales positions compared to Real-Time results, for the QSE *q*, for the 15-minute Settlement Interval. |
| DAMPQSEAMT *q* | $ | *Day-Ahead Market Energy Purchases Amount by QSE*—The sum of the DAM Energy purchases compared to Real-Time results, for the QSE *q*, for the 15-minute Settlement Interval. |
| DAMASQSEAMT *q* | $ | *Day-Ahead Market Ancillary Service Amount by QSE—*The sum of the DAM Ancillary Service awarded amounts compared to Real-Time results, for the QSE q, for the hour.   |  | | --- | | ***[NPRR1245: Replace the definition above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  *Day-Ahead Market Ancillary Service Amount by QSE—*The sum of the DAM Ancillary Service awarded amounts compared to Real-Time results, for the QSE q, for the 15-minute Settlement Interval. | |
| DAMRTPTPQSEAMT *q* | $ | *Day-Ahead Market Real-Time Point-to-Point Obligation Amount by QSE*—The sum of the PTP Obligation bids cleared in the DAM compared to Real-Time results, for the QSE *q*, for the hour. |
| DASPP*p* | $/MWh | *Day-Ahead Settlement Point Price per Settlement Point*—The DAM Settlement Point Price at Settlement Point *p*, 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 that would have cleared in the DAM and settled in Real-Time for the source *j,* and the sink *k*, for the hour. |
| RTSPP*p* | $/MWh | *Real-Time Settlement Point Price—*The Real-Time Settlement Point Price at the Settlement Point for the 15-minute Settlement Interval within the hour. |
| DAES*q, p* | MW | *Day-Ahead Energy Sale per QSE per Settlement Point*¾The total amount of energy represented by QSE *q*’s Three-Part Supply Offers that would have cleared in the DAM and DAM Energy-Only Offer Curves that would have cleared in the DAM at Settlement Point *p*, for the hour. |
| DAEP*q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point¾The total amount of energy represented by QSE q’s DAM Energy Bids that would have cleared at Settlement Point p, for the hour.*   |  | | --- | | ***[NPRR1188: Replace the definition above with the following upon system implementation:]***  *Day-Ahead Energy Purchase per QSE per Settlement Point¾*The total amount of energy represented by QSE q’s DAM Energy Bids and Energy Bid Curves that would have cleared in the DAM at Settlement Point p, for the hour. | |
| PCRUR *q, r, DAM* | MW | *Procured Capacity for Regulation Up from Resource per QSE per Resource in DAM*—The Regulation Up Service (Reg-Up) capacity quantity that would have been 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. |
| PCRDR *q, r, DAM* | MW | *Procured Capacity for Regulation Down from Resource per QSE per Resource in DAM*—The Regulation Down Service (Reg-Down) capacity quantity that would have been 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. |
| PCRRR *q, r, DAM* | MW | *Procured Capacity for Responsive Reserve from Resource per QSE per Resource in DAM*—The Responsive Reserve (RRS) capacity quantity that would have been 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. |
| PCNSR *q, r, DAM* | MW | *Procured Capacity for Non-Spinning Reserve from Resource per QSE per Resource in DAM*—The Non-Spinning Reserve (Non-Spin) capacity quantity that would have been 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. |
| PCECRR *q, r, DAM* | MW | *Procured Capacity for ERCOT Contingency Reserve Service from Resource per QSE per Resource in DAM*—The ERCOT Contingency Reserve Service (ECRS) capacity quantity that would have been 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. |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | ***[NPRR1245: Insert the following variables upon system implementation of the Real-Time Co-Optimization (RTC) project:]***   |  |  |  | | --- | --- | --- | | PCDRRR *r, q, DAM* | MW | *Procured Capacity for Dispatchable Reliability Reserve Service from Resource per QSE per Resource in DAM*—The Dispatchable Reliability ReserveService (DRRS) 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. | | DARUOAWD *q* | MW | *Day-Ahead Reg-Up Only Award per QSE—*The Reg-Up Only capacity quantity that would have been awarded to QSE *q* in the DAM for the hour. | | DARDOAWD *q* | MW | *Day-Ahead Reg-Down Only Award per QSE—*The Reg-Down Only capacity quantity that would have been awarded to QSE *q* in the DAM for the hour. | | DARROAWD *q* | MW | *Day-Ahead Responsive Reserve Only Award per QSE*—The RRS Only capacity quantity that would have been awarded to QSE *q* in the DAM for the hour. | | DANSOAWD *q* | MW | *Day-Ahead Non-Spin Only Award per QSE—*The Non-Spin Only capacity quantity that would have been awarded to QSE *q* in the DAM for the hour. | | DAECROAWD *q* | MW | *Day-Ahead ERCOT Contingency Reserve Service Only Award per QSE—*The ECRS Only capacity quantity that would have been awarded to QSE *q* in the DAM for the hour. | | DADRROAWD *q* | MW | *Day-Ahead Dispatchable Reliability Reserve Service-Only Award per QSE—*The DRRS-only capacity quantity that would have been awarded to QSE *q* in the DAM for the hour. | | | | |
| RUOPR *q, r, DAM* | $/MW per hour | *Regulation Up Offer Price*—The offer price for Resource *r* represented by QSE *q,* for the impacted Reg-Up Ancillary Service Offers. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RDOPR*q, r, DAM* | $/MW per hour | *Regulation Down Offer Price*—The offer price for Resource *r* represented by QSE *q,* for the impacted Reg-Down Ancillary Service Offers. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RROPR*q, r, DAM* | $/MW per hour | *Responsive Reserve Offer Price*—The offer price for Resource *r* represented by QSE *q,* for the impacted RRS Ancillary Service Offers. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| ECRSOPR *q, r,**DAM* | $/MW per hour | *ERCOT Contingency Reserve Service Offer Price*—The offer price for Resource *r* represented by QSE *q,* for the impacted ECRS Ancillary Service Offers. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| NSOPR*q, r, DAM* | $/MW per hour | *Non-Spinning Reserve Offer Price*—The offer price for Resource *r* represented by QSE *q,* for the impacted Non-Spin Ancillary Service Offers. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| |  | | --- | | ***[NPRR1245: Delete the variables “RUOPR q, r, DAM”, “RDOPR q, r, DAM”, “RROPR q, r, DAM”, “ECRSOPR q, r, DAM”, and “NSOPR q, r, DAM” above upon system implementation of the Real-Time Co-Optimization (RTC) project:]*** | | | |
| MCPCRU *DAM* | $/MW per hour | *Market Clearing Price for Capacity for Regulation Up in DAM*—The DAM Market Clearing Price for Capacity (MCPC) for Reg-Up, for the hour. |
| MCPCRD *DAM* | $/MW per hour | *Market Clearing Price for Capacity for Regulation Down in DAM*—The DAM MCPC for Reg-Down, for the hour. |
| MCPCRR *DAM* | $/MW per hour | *Market Clearing Price for Capacity for Responsive Reserve in DAM*—The DAM MCPC for RRS, for the hour. |
| MCPCNS *DAM* | $/MW per hour | *Market Clearing Price for Capacity for Non-Spinning Reserve in DAM*—The DAM MCPC for Non-Spin, for the hour. |
| MCPCECR *DAM* | $/MW per hour | *Market Clearing Price for Capacity for ERCOT Contingency Reserve Service in DAM*—The DAM MCPC for ECRS, for the hour. |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | ***[NPRR1245: Insert the following variables upon system implementation of the Real-Time Co-Optimization (RTC) project:]***   |  |  |  | | --- | --- | --- | | MCPCDRR *DAM, h* | $/MW per hour | *Market Clearing Price for Capacity for Dispatchable Reliability Reserve Service per hour in DAM*—The DAM MCPC for DRRS for the hour *h*. | | RTMCPCRU | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Up—*The Real-Time MCPC for Reg-Up for the 15-minute Settlement Interval. | | RTMCPCRD | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Down—*The Real-Time MCPC for Reg-Down for the 15-minute Settlement Interval. | | RTMCPCRR | $/MW | *Real-Time Market Clearing Price for Capacity for Responsive Reserve—*The Real-Time MCPC for RRS for the 15-minute Settlement Interval. | | RTMCPCNS | $/MW | *Real-Time Market Clearing Price for Capacity for Non-Spin—*The Real-Time MCPC for Non-Spin for the 15-minute Settlement Interval. | | RTMCPCECR | $/MW | *Real-Time Market Clearing Price for Capacity for ERCOT Contingency Reserve Service—*The Real-Time MCPC for ECRS for the 15-minute Settlement Interval. | | RTMCPCDRR | $/MW | *Real-Time Market Clearing Price for Capacity for Dispatchable Reliability Reserve Service—*The Real-Time MCPC for DRRS for the 15-minute Settlement Interval. | | | | |

|  |  |  |
| --- | --- | --- |
| DAOBLPR (*j, k)* | $/MWh | *Day-Ahead Obligation Price per pair of source and sink*¾The DAM clearing price of a PTP Obligation bid with the source *j,* and the sink *k*, for the hour. |
| RTOBLPR *(j, k)* | $/MWh | *Real-Time Obligation Price per pair of source and sink*¾The Real-Time calculated price of a PTP Obligation bid with the source *j,* and the sink *k*, for the 15 minute period.   |  | | --- | | ***[NPRR1245: Replace the definition above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  *Real-Time Obligation Price per pair of source and sink*¾The Real-Time calculated price of a PTP Obligation bid, with the source *j* and the sink *k*, for the hour. | |
| *q* | none | A QSE. |
| *r* | none | A Resource. |
| *i* | none | A 15-minute Settlement Interval. |
| *k* | none | A sink Settlement Point. |
| *p* | none | A Settlement Point. |
| *j* | none | A source Settlement Point. |

9.19.1 Default Uplift Invoices

(1) ERCOT shall collect the total short-pay amount for all Settlement Invoices for a month, less the total payments expected from a payment plan, from Qualified Scheduling Entities (QSEs) and CRR Account Holders. ERCOT must pay the funds it collects from payments on Default Uplift Invoices to the Entities previously short-paid. ERCOT shall notify those Entities of the details of the payment.

(2) Each Counter-Party’s share of the uplift is calculated using the best available Settlement data for each Operating Day in the month prior to the month in which the default occurred (the “reference month”), and is calculated as follows:

**DURSCP*cp* = TSPA \* MMARS*cp***

Where:

MMARS *cp* = MMA *cp* / MMATOT

MMA *cp* = Max { ∑*mp* (URTMG *mp*+ URTDCIMP *mp* + USOGTOT *mp*),

∑*mp* (URTAML *mp* + UWSLTOT *mp*),

∑*mp*URTQQES *mp*,

∑*mp* URTQQEP *mp*,

∑*mp* UDAES *mp*,

∑*mp* UDAEP *mp*,

∑*mp* (URTOBL *mp +* URTOBLLO *mp*),

∑*mp* (UDAOPT *mp*+ UDAOBL *mp*+UOPTS *mp*+UOBLS *mp*),

∑*mp* (UOPTP *mp*+ UOBLP *mp*)}

|  |
| --- |
| ***[NPRR995, NPRR1012, and NPRR1201: Replace applicable portions of the formula “MMA cp” above with the following upon system implementation for NPRR995 or NPRR1201; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1012:]***  MMA *cp* = Max { ∑*mp* (URTMG *mp*+ URTDCIMP *mp* + USOGTOT *mp*),  ∑*mp* (URTAML *mp* + UWSLTOT *mp* + USOCLTOT *mp*),  ∑*mp*URTQQES *mp*,  ∑*mp* URTQQEP *mp*,  ∑*mp* UDAES *mp*,  ∑*mp* UDAEP *mp*,  ∑*mp* (URTOBL *mp +* URTOBLLO *mp*),  ∑*mp* (UDAOPT *mp*+ UDAOBL *mp*),  ∑*mp* UDAASOAWD *mp*} |

MMATOT = ∑*cp* (MMA*cp*)

Where:

URTMG *mp* = ∑*p, r, i* (RTMG *mp, p, r, i*), excluding RTMG for RMR Resources and RTMG in Reliability Unit Commitment (RUC)-Committed Intervals for RUC-committed Resources

URTDCIMP *mp* = ∑*p, i* (RTDCIMP *mp, p, i*) / 4

URTAML *mp* = max(0,∑*p, i* (RTAML *mp, p, i*))

URTQQES *mp* = ∑*p, i* (RTQQES *mp, p, i*) / 4

URTQQEP *mp* = ∑*p, i* (RTQQEP *mp, p, i*) / 4

UDAES *mp* = ∑*p, h* (DAES *mp, p, h*)

UDAEP *mp* = ∑*p, h* (DAEP *mp, p, h*)

URTOBL mp = ∑(j, k), h (RTOBL mp, (j, k), h)

URTOBLLO *mp* = ∑*(j, k), h* (RTOBLLO*mp, (j, k), h*)

UDAOPT mp = ∑(j, k), h (DAOPT mp, (j, k), h)

UDAOBL mp = ∑(j, k), h (DAOBL mp, (j, k), h)

UOPTS mp = ∑(j, k), h (OPTS mp, (j, k), h)

UOBLS mp = ∑(j, k), h (OBLS mp, (j, k), h)

UOPTP mp = ∑(j, k), h (OPTP mp, j, h)

UOBLP mp = ∑(j, k), h (OBLP mp, (j, k), h)

|  |
| --- |
| ***[NPRR1201: Delete the formulas “UOPTS mp”, “UOBLS mp”, “UOPTP mp”, and “UOBLP mp” above upon system implementation.]*** |

UWSLTOT *mp* = (-1) \* ∑*r, b* (MEBL *mp, r, b*)

|  |
| --- |
| ***[NPRR1012: Insert the formula “UDAASOAWD mp” below upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  UDAASOAWD *mp*  = ∑*h* (DARUOAWD *mp, h* + DARDOAWD *mp, h* + DARROAWD *mp, h* + DANSOAWD *mp, h* + DAECROAWD *mp, h* + DADRROAWD *mp, h*) |

USOGTOT *mp* = ∑*gsc* (MEBSOGNET *mp, gsc*) + ∑ *p, i* (RTMGSOGZ *mp, p, i*)

|  |
| --- |
| ***[NPRR995: Insert the formula “USOCLTOT mp” below upon system implementation:]***  USOCLTOT *mp* = (-1) \* ∑*gsc, b* (WSOL *mp, gsc, b*) |

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| DURSCP *cp* | $ | *Default Uplift Ratio Share per Counter-Party*—The Counter-Party’s pro rata portion of the total short-pay amount for all Day-Ahead Market (DAM) and Real-Time Market (RTM) Invoices for a month. |
| TSPA | $ | *Total Short Pay Amount*—The total short-pay amount calculated by ERCOT to be collected through the Default Uplift Invoice process. |
| MMARS *cp* | None | *Maximum MWh Activity Ratio Share*—The Counter-Party’s pro rata share of Maximum MWh Activity in the reference month. |
| MMA *cp* | MWh | *Maximum MWh Activity*—The maximum MWh activity of all Market Participants represented by the Counter-Party in the DAM, RTM and CRR Auction in the reference month. |
| MMATOT | MWh | *Maximum MWh Activity Total*—The sum of all Counter-Party’s Maximum MWh Activity in the reference month. |
| RTMG *mp, p, r, i* | MWh | *Real-Time Metered Generation per Market Participant per Settlement Point per Resource*—The Real-Time energy produced by the Generation Resource *r* represented by Market Participant *mp*, at Resource Node *p*, for the 15-minute Settlement Interval *i*, where the Market Participant is a QSE.   |  | | --- | | ***[NPRR1246: Replace the definition above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  *Real-Time Metered Generation per Market Participant per Settlement Point per Resource*—The Real-Time energy produced by the Resource *r* represented by Market Participant *mp*, at Resource Node *p*, for the 15-minute Settlement Interval *i*, where the Market Participant is a QSE. | |
| URTMG *mp* | MWh | *Uplift Real-Time Metered Generation per Market Participant*—The monthly sum of Real-Time energy produced by Generation Resources represented by Market Participant *mp*, excluding generation for RMR Resources and generation in RUC-Committed Intervals, where the Market Participant is a QSE assigned to the registered Counter-Party.   |  | | --- | | ***[NPRR1246: Replace the definition above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  *Uplift Real-Time Metered Generation per Market Participant*—The monthly sum of Real-Time energy produced by Resources represented by Market Participant *mp*, excluding generation for RMR Resources and generation in RUC-Committed Intervals, where the Market Participant is a QSE assigned to the registered Counter-Party. | |
| RTDCIMP *mp, p, i* | MW | *Real-Time DC Import per QSE per Settlement Point*—The aggregated Direct Current Tie (DC Tie) Schedule submitted by Market Participant *mp,* as an importer into the ERCOT System through DC Tie *p*, for the 15-minute Settlement Interval *i*, where the Market Participant is a QSE. |
| URTDCIMP *mp* | MW | *Uplift Real-Time DC Import per Market Participant*—The monthly sum of the aggregated DC Tie Schedule submitted by Market Participant *mp*, as an importer into the ERCOT System where the Market Participant is a QSE assigned to a registered Counter-Party. |
| RTAML *mp, p, i* | MWh | *Real-Time Adjusted Metered Load per Market Participant per Settlement Point*—The sum of the Adjusted Metered Load (AML) at the Electrical Buses that are included in Settlement Point *p* represented by Market Participant *mp* for the 15-minute Settlement Interval *i*, where the Market Participant is a QSE. |
| URTAML *mp* | MWh | *Uplift Real-Time Adjusted Metered Load per Market Participant*—The monthly sum of the AML represented by Market Participant *mp*, where the Market Participant is a QSE assigned to the registered Counter-Party. |
| RTQQES *mp, p, i* | MW | *QSE-to-QSE Energy Sale per Market Participant per Settlement Point*—The amount of MW sold by Market Participant *mp* through Energy Trades at Settlement Point *p* for the 15-minute Settlement Interval *i*, where the Market Participant is a QSE. |
| URTQQES *mp* | MWh | *Uplift QSE-to-QSE Energy Sale per Market Participant*—The monthly sum of MW sold by Market Participant *mp* through Energy Trades, where the Market Participant is a QSE assigned to the registered Counter-Party. |
| RTQQEP *mp, p, i* | MW | *QSE-to-QSE Energy Purchase per Market Participant per Settlement Point*—The amount of MW bought by Market Participant *mp* through Energy Trades at Settlement Point *p* for the 15-minute Settlement Interval *i*, where the Market Participant is a QSE. |
| URTQQEP *mp* | MWh | *Uplift QSE-to-QSE Energy Purchase per Market Participant*—The monthly sum of MW bought by Market Participant *mp* through Energy Trades, where the Market Participant is a QSE assigned to the registered Counter-Party. |
| DAES *mp, p, h* | MW | *Day-Ahead Energy Sale per Market Participant per Settlement Point per hour*—The total amount of energy represented by Market Participant *mp*’s cleared Three-Part Supply Offers in the DAM and cleared DAM Energy-Only Offers at Settlement Point *p*, for the hour *h*, where the Market Participant is a QSE. |
| UDAES *mp* | MWh | *Uplift Day-Ahead Energy Sale per Market Participant*—The monthly total of energy represented by Market Participant *mp*’s cleared Three-Part Supply Offers in the DAM and cleared DAM Energy-Only Offer Curves, where the Market Participant is a QSE assigned to the registered Counter-Party. |
| DAEP *mp, p, h* | MW | *Day-Ahead Energy Purchase per Market Participant per Settlement Point per hour*—The total amount of energy represented by Market Participant *mp*’s cleared DAM Energy Bids at Settlement Point *p* for the hour *h*, where the Market Participant is a QSE.   |  | | --- | | ***[NPRR1188: Replace the definition above with the following upon system implementation:]***  *Day-Ahead Energy Purchase per Market Participant per Settlement Point per hour*—The total amount of energy represented by Market Participant *mp*’s DAM Energy Bids and Energy Bid Curves, cleared in the DAM, at Settlement Point *p* for the hour *h*, where the Market Participant is a QSE. | |
| UDAEP *mp* | MWh | *Uplift Day-Ahead Energy Purchase per Market Participant*—The monthly total of energy represented by Market Participant *mp*’s cleared DAM Energy Bids, where the Market Participant is a QSE assigned to the registered Counter-Party.   |  | | --- | | ***[NPRR1188: Replace the definition above with the following upon system implementation:]***  *Uplift Day-Ahead Energy Purchase per Market Participant*—The monthly total of energy represented by Market Participant *mp*’s DAM Energy Bids and Energy Bid Curves, cleared in the DAM, where the Market Participant is a QSE assigned to the registered Counter-Party. | |
| RTOBL *mp, (j, k), h* | MW | *Real-Time Obligation per Market Participant per source and sink pair per hour*—The number of Market Participant *mp*’s Point-to-Point (PTP) Obligations with the source *j* and the sink *k* settled in Real-Time for the hour *h*, and where the Market Participant is a QSE. |
| URTOBL *mp* | MWh | *Uplift Real-Time Obligation per Market Participant*—The monthly total of Market Participant *mp*’s PTP Obligations settled in Real-Time, counting the quantity only once per source and sink pair, and where the Market Participant is a QSE assigned to the registered Counter-Party. |
| RTOBLLO *q, (j, k)* | MW | *Real-Time Obligation with Links to an Option per QSE per pair of source and sink*¾The total MW of the QSE’s PTP Obligation with Links to an Option Bids cleared in the DAM and settled in Real-Time for the source *j* and the sink *k* for the hour. |
| URTOBLLO *q, (j, k)* | MW | *Uplift Real-Time Obligation with Links to an Option per QSE per pair of source and sink*¾The monthly total of Market Participant *mp*’s MW of PTP Obligation with Links to Options Bids cleared in the DAM and settled in Real-Time for the source *j* and the sink *k* for the hour, where the Market Participant is a QSE assigned to the registered Counter-Party. |
| DAOPT *mp, (j, k), h* | MW | *Day-Ahead Option per Market Participant per source and sink pair per hour*¾The number of Market Participant *mp*’s PTP Options with the source *j* and the sink *k* owned in the DAM for the hour *h*, and where the Market Participant is a CRR Account Holder. |
| UDAOPT *mp* | MWh | *Uplift Day-Ahead Option per Market Participant*¾The monthly total of Market Participant *mp*’s PTP Options owned in the DAM, counting the ownership quantity only once per source and sink pair, and where the Market Participant is a CRR Account Holder assigned to the registered Counter-Party. |
| DAOBL *mp, (j, k), h* | MW | *Day-Ahead Obligation per Market Participant per source and sink pair per hour*—The number of Market Participant *mp*’s PTP Obligations with the source *j* and the sink *k* owned in the DAM for the hour *h*, and where the Market Participant is a CRR Account Holder. |
| UDAOBL *mp* | MWh | *Uplift Day-Ahead Obligation per Market Participant*¾The monthly total of Market Participant *mp*’s PTP Obligations owned in the DAM, counting the ownership quantity only once per source and sink pair, where the Market Participant is a CRR Account Holder assigned to the registered Counter-Party. |
| OPTS *mp, (j, k), a, h* | MW | *PTP Option Sale per Market Participant per source and sink pair per CRR Auction per hour*—The MW quantity that represents the total of Market Participant *mp*’s PTP Option offers with the source *j* and the sink *k* awarded in CRR Auction *a*, for the hour *h*, where the Market Participant is a CRR Account Holder. |
| UOPTS *mp* | MWh | *Uplift PTP Option Sale per Market Participant*—The MW quantity that represents the monthly total of Market Participant *mp*’s PTP Option offers awarded in CRR Auctions, counting the awarded quantity only once per source and sink pair, where the Market Participant is a CRR Account Holder assigned to the registered Counter-Party. |
| OBLS *mp, (j, k), a, h* | MW | *PTP Obligation Sale per Market Participant per source and sink pair per CRR Auction per hour*—The MW quantity that represents the total of Market Participant *mp*’s PTP Obligation offers with the source *j* and the sink *k* awarded in CRR Auction *a*, for the hour *h*, where the Market Participant is a CRR Account Holder. |
| UOBLS *mp* | MWh | *Uplift PTP Obligation Sale per Market Participant*—The MW quantity that represents the monthly total of Market Participant *mp*’s PTP Obligation offers awarded in CRR Auctions, counting the quantity only once per source and sink pair, where the Market Participant is a CRR Account Holder assigned to the registered Counter-Party. |
| OPTP *mp, (j, k), a, h* | MW | *PTP Option Purchase per Market Participant per source and sink pair per CRR Auction per hour*—The MW quantity that represents the total of Market Participant *mp*’s PTP Option bids with the source *j* and the sink *k* awarded in CRR Auction *a*, for the hour *h*, where the Market Participant is a CRR Account Holder. |
| UOPTP *mp* | MWh | *Uplift PTP Option Purchase per Market Participant*—The MW quantity that represents the monthly total of Market Participant *mp*’s PTP Option bids awarded in CRR Auctions, counting the quantity only once per source and sink pair, where the Market Participant is a CRR Account Holder assigned to the registered Counter-Party. |
| OBLP *mp, (j, k), a, h* | MW | *PTP Obligation Purchase per Market Participant per source and sink pair per CRR Auction per hour*—The MW quantity that represents the total of Market Participant *mp*’s PTP Obligation bids with the source *j* and the sink *k* awarded in CRR Auction *a*, for the hour *h*, where the Market Participant is a CRR Account Holder. |
| UOBLP *mp* | MWh | *Uplift PTP Obligation Purchase per Market Participant*—The MW quantity that represents the monthly total of Market Participant *mp*’s PTP Obligation bids awarded in CRR Auctions, counting the quantity only once per source and sink pair, where the Market Participant is a CRR Account Holder assigned to the registered Counter-Party. |
| |  | | --- | | [NPRR1201: Delete the variables “OPTS mp, (j, k), a, h”, “UOPTS mp”, “OBLS mp, (j, k), a, h”, “UOBLS mp”, “OPTP mp, (j, k), a, h”, “UOPTP mp”, “OBLP mp, (j, k), a, h”, “UOBLP mp” above upon system implementation.] | | | |
| UWSLTOT *mp* | MWh | *Uplift Metered Energy for Wholesale Storage Load at bus per Market Participant*¾The monthly sum of Market Participant *mp*’s Wholesale Storage Load (WSL) energy metered by the Settlement Meter which measures WSL. |
| MEBL *mp, r, b* | MWh | *Metered Energy for Wholesale Storage Load at bus*¾The WSL energy metered by the Settlement Meter which measures WSL for the 15-minute Settlement Interval represented as a negative value, for the Market Participant *mp*, Resource *r*, at bus *b*. |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | [NPRR1012: Insert the variables below upon system implementation of the Real-Time Co-Optimization (RTC) project:]   |  |  |  | | --- | --- | --- | | UDAASOAWD *mp* | MWh | *Uplift Day-Ahead Ancillary Service Only Award per Market Participant—*The monthly total of Market Participant *mp’s* Ancillary Service Only Offers awarded in DAM, where the Market Participant is a QSE assigned to the registered Counter-Party. | | DARUOAWD *mp, h* | MW | *Day-Ahead Reg-Up Only Award per Market Participant*¾The Reg-Up Only capacity quantity awarded in the DAM to the Market Participant *mp* for the hour *h*. | | DARDOAWD *mp, h* | MW | *Day-Ahead Reg-Down Only Award per Market Participant*¾The Reg-Down Only capacity quantity awarded in the DAM to the Market Participant *mp* for the hour *h*. | | DARROAWD *mp, h* | MW | *Day-Ahead Responsive Reserve Only Award per Market Participant*¾ The Responsive Reserve (RRS) Only capacity quantity awarded in the DAM to the Market Participant *mp* for the hour *h*. | | DANSOAWD *mp, h* | MW | *Day-Ahead Non-Spin Only Award per Market Participant*¾The Non-Spin Only capacity quantity awarded in the DAM to the Market Participant *mp* for the hour *h*. | | DAECROAWD *mp, h* | MW | *Day-Ahead ERCOT Contingency Reserve Service Only Award per Market Participant*¾The ERCOT Contingency Reserve Service (ECRS) Only capacity quantity awarded in the DAM to the Market Participant *mp* for the hour *h*. | | DADRROAWD *mp, h* | MW | *Day-Ahead Dispatchable Reliability Reserve Service-Only Award per Market Participant*¾ The Dispatchable Reliability Reserve Service (DRRS)-only capacity quantity awarded in the DAM to the Market Participant *mp* for the hour *h*. | | | | |
| USOGTOT *mp* | MWh | *Uplift Real-Time Settlement Only Generator Site per Market Participant*—The monthly sum of Real-Time energy produced by Settlement Only Generators (SOGs) represented by Market Participant *mp*, where the Market Participant is a QSE assigned to the registered Counter-Party.   |  | | --- | | [NPRR995: Replace the definition above with the following upon system implementation:]  *Uplift Real-Time Settlement Only Generator Site per Market Participant*—The monthly sum of Real-Time energy produced by Settlement Only Generators (SOGs), Settlement Only Distribution Generators (SODGs), Settlement Only Transmission Generators (SOTGs), Settlement Only Distribution Energy Storage Systems (SODESSs), or Settlement Only Transmission Energy Storage Systems (SOTESSs) represented by Market Participant *mp*, where the Market Participant is a QSE assigned to the registered Counter-Party. | |
| |  |  |  |  | | --- | --- | --- | --- | | [NPRRR995: Insert the variable “USOCLTOT mp” below upon system implementation:]   |  |  |  | | --- | --- | --- | | USOCLTOT *mp* | MWh | *Uplift Real-Time Settlement Only Charging Load per Market Participant*—The monthly sum of Real-Time charging Load that is WSL by SODESSs and SOTESSs represented by Market Participant *mp*, where the Market Participant is a QSE assigned to the registered Counter-Party. | | | | |
| RTMGSOGZ *mp. p, i* | MWh | *Real-Time Metered Generation from Settlement Only Generators Zonal per QSE per Settlement Point*—The total Real-Time energy produced by Settlement Only Transmission Self-Generators (SOTSGs) for the Market Participant *mp* in Load Zone Settlement Point *p*, for the 15-minute Settlement Interval. MWh quantities for Energy Storage System (ESS), Settlement Only Distribution Generators (SODGs), and Settlement Only Transmission Generators (SOTGs) at sites where the ESS capacity constitutes more than 50% of the total SOG nameplate capacity will be included in this value. MWh quantities for SODGs and SOTGs that opted out of nodal pricing pursuant to Section 6.6.3.8, Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG) or a Settlement Only Transmission Generator (SOTG), will also be included in this value.   |  | | --- | | [NPRR995: Replace the definition above with the following upon system implementation:]  *Real-Time Metered Generation from Settlement Only Generators Zonal per QSE per Settlement Point*—The total Real-Time energy produced by Settlement Only Transmission Self-Generators (SOTSGs) for the Market Participant *mp* in Load Zone Settlement Point *p*, for the 15-minute Settlement Interval. MWh quantities for Energy Storage System (ESS), SODGs, and SOTGs at sites where the ESS capacity constitutes more than 50% of the total SOG nameplate capacity will be included in this value. MWh quantities for SODGs and SOTGs that opted out of nodal pricing pursuant to Section 6.6.3.8, Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG), Settlement Only Transmission Generator (SOTG), Settlement Only Distribution Energy Storage System (SODESS), or Settlement Only Transmission Energy Storage System (SOTESS), will also be included in this value. | |
| MEBSOGNET *q, gsc* | MWh | *Net Metered energy at gsc for an SODG or SOTG Site*¾The net sum for all Settlement Meters for SODG or SOTG site *gsc* represented by QSE *q*. A positive value indicates an injection of power to the ERCOT System.   |  | | --- | | [NPRR995: Replace the definition above with the following upon system implementation:]  *Net Metered energy at gsc for an SODG, SOTG, SODESS, or SOTESS Site*¾The net sum for all Settlement Meters for SODG, SOTG, SODESS, or SOTESS site *gsc* represented by QSE *q* for the 15-minute Settlement Interval. A positive value indicates an injection of power to the ERCOT System. | |
| |  |  |  |  | | --- | --- | --- | --- | | [NPRRR995: Insert the variable “WSOL mp, gsc, b” below upon system implementation:]   |  |  |  | | --- | --- | --- | | WSOL *mp, gsc, b* | MWh | *WSL for an SODESS or SOTESS Site*¾The WSL as measured for an for SODESS or SOTESS site *gsc* at Electrical Bus *b*, represented by the Market Participant *mp,* represented as a negative value, for the 15-minute Settlement Interval. | | | | |
| *cp* | none | A registered Counter-Party. |
| *mp* | none | A Market Participant with MWh activity in the reference month that is a currently-registered QSE or CRR Account Holder or that voluntarily terminated its QSE or CRR Account Holder registration. |
| *j* | none | A source Settlement Point. |
| *k* | none | A sink Settlement Point. |
| *a* | none | A CRR Auction. |
| *p* | none | A Settlement Point. |
| *i* | none | A 15-minute Settlement Interval. |
| *h* | none | The hour that includes the Settlement Interval i. |
| *r* | none | A Resource. |
| *gsc* | none | A generation site code. |
| *b* | none | An Electrical Bus. |

(3) The uplifted short-paid amount will be allocated to the Market Participants (QSEs or CRR Account Holders) assigned to a registered Counter-Party based on the pro-rata share of MWhs that the QSE or CRR Account Holder contributed to its Counter-Party’s maximum MWh activity ratio share.

(4) Any uplifted short-paid amount greater than $2,500,000 must be scheduled so that no amount greater than $2,500,000 is charged on each set of Default Uplift Invoices until ERCOT uplifts the total short-paid amount. ERCOT must issue Default Uplift Invoices at least 30 days apart from each other.

(5) ERCOT shall issue Default Uplift Invoices no earlier than 90 days following a short-pay of a Settlement Invoice on the date specified in the Settlement Calendar. The Invoice Recipient is responsible for accessing the Invoice on the MIS Certified Area once posted by ERCOT.

(6) Each Default Uplift Invoice must contain:

(a) The Invoice Recipient’s name;

(b) The ERCOT identifier (Settlement identification number issued by ERCOT);

(c) Net Amount Due or Payable – the aggregate summary of all charges owed by a Default Uplift Invoice Recipient;

(d) Run Date – the date on which ERCOT created and published the Default Uplift Invoice;

(e) Invoice Reference Number – a unique number generated by the ERCOT applications for payment tracking purposes;

(f) Default Uplift Invoice Reference – an identification code used to reference the amount uplifted;

(g) Payment Date and Time – the date and time that Default Uplift Invoice amounts must be paid;

(h) Remittance Information Details – details including the account number, bank name, and electronic transfer instructions of the ERCOT account to which any amounts owed by the Invoice Recipient are to be paid or of the Invoice Recipient’s account from which ERCOT may draw payments due; and

(i) Overdue Terms – the terms that would apply if the Market Participant makes a late payment.

(7) Each Invoice Recipient shall pay any net debit shown on the Default Uplift Invoice on the payment due date whether or not there is any Settlement and billing dispute regarding the amount of the debit.

***16.11.4.3.1*** ***Day-Ahead Liability Estimate***

(1) ERCOT shall estimate Day-Ahead Liability (DAL) for an Operating Day as the sum of estimates for the following DAM Settlement charges and payments:

(a) Section 4.6.2.1, Day-Ahead Energy Payment;

(b) Section 4.6.2.2, Day-Ahead Energy Charge;

(c) Section 4.6.3, Settlement for PTP Obligations Bought in DAM;

(d) Section 4.6.4.1.1, Regulation Up Service Payment;

(e) Section 4.6.4.1.2, Regulation Down Service Payment;

(f) Section 4.6.4.1.3, Responsive Reserve Payment;

(g) Section 4.6.4.1.4, Non-Spinning Reserve Service Payment;

(h) Section 4.6.4.1.5, ERCOT Contingency Reserve Service Payment;

(i) Section 4.6.4.1.6, Dispatchable Reliability Reserve Service Payment;

(j) Section 4.6.4.2.1, Regulation Up Service Charge;

(k) Section 4.6.4.2.2, Regulation Down Service Charge;

(l) Section 4.6.4.2.3, Responsive Reserve Charge;

(m) Section 4.6.4.2.4, Non-Spinning Reserve Service Charge;

(n) Section 4.6.4.2.5, ERCOT Contingency Reserve Service Charge;

(o) Section 4.6.4.2.6, Dispatchable Reliability Reserve Service Charge;

(p) Section 7.9.1.1, Payments and Charges for PTP Obligations Settled in DAM;

(q) Section 7.9.1.2, Payments for PTP Options Settled in DAM;

(r) Section 7.9.1.5, Payments and Charges for PTP Obligations with Refund Settled in DAM; and

(s) Section 7.9.1.6, Payments for PTP Options with Refund Settled in DAM.

***16.11.4.3.2*** ***Real-Time Liability Estimate***

(1) ERCOT shall estimate RTL for an Operating Day as the sum of estimates for the following RTM Settlement charges and payments:

(a) Section 6.6.3.1, Real-Time Energy Imbalance Payment or Charge at a Resource Node, using Real-Time Metered Generation (RTMG) as generation estimate;

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| ***[NPRR1188: Replace item (a) above with the following upon system implementation:]***  (a) Section 6.6.3.1, Real-Time Energy Imbalance Payment or Charge at a Resource Node, using Real-Time Net Metered Generation (RTMG) including CLRs that are not ALRsas generation estimate; |

(b) Section 6.6.3.2, Real-Time Energy Imbalance Payment or Charge at a Load Zone, using 14-day or seven-day-old LRS for Load estimate;

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| --- |
| ***[NPRR829: Replace item (b) above with the following upon system implementation:]***  (b) Section 6.6.3.2, Real-Time Energy Imbalance Payment or Charge at a Load Zone, using 14-day or seven-day-old LRS for Load estimate and Real-Time telemetry of net generation as the generation estimate; |

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

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

(e) Section 6.6.3.8, Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG) or a Settlement Only Transmission Generator (SOTG), using the Real-Time telemetry, if provided, of net generation as the outflow estimate and the Real-Time Price for each SODG or SOTG site;

|  |
| --- |
| ***[NPRR995 and NPRR1077: Replace applicable portions of item (e) above with the following upon system implementation:]***  (e) Section 6.6.3.8, Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG), Settlement Only Transmission Generator (SOTG), Settlement Only Distribution Energy Storage System (SODESS), or Settlement Only Transmission Energy Storage System (SOTESS), using the Real-Time telemetry of net generation as the outflow estimate and the Real-Time Price for each SODG, SOTG, SODESS, or SOTESS site; |

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

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| --- |
| ***[NPRR1013: Insert items (g)-(k) below upon system implementation of the Real-Time Co-Optimization (RTC) project and renumber accordingly:]***  (g) Section 6.7.5.2, Regulation Up Payments and Charges;  (h) Section 6.7.5.3, Regulation Down Payments and Charges;  (i) Section 6.7.5.4, Responsive Reserve Payments and Charges;  (j) Section 6.7.5.5, Non-Spinning Reserve Payments and Charges;  (k) Section 6.7.5.6, ERCOT Contingency Reserve Service Payments and Charges;  (l) Section 6.7.5.7, Dispatchable Reliability Reserve Service Payments and Charges; and |

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