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| NPRR Number | [1235](https://www.ercot.com/mktrules/issues/NPRR1235) | NPRR Title | Dispatchable Reliability Reserve Service as a Stand-Alone Ancillary Service |
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| Date | | September 23, 2024 | |
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| Market Segment | | Independent Generator | |

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| Comments |

Luminant Generation Company LLC (Luminant) appreciates the ability to comment on Nodal Protocol Revision Request (NPRR) 1235 regarding the establishment of Dispatchable Reliability Reserve Service (DRRS) as a stand-alone Ancillary Service. DRRS is an Ancillary Service required by Texas law regarding reliability of the ERCOT power region.[[1]](#footnote-1) PURA § 39.159(d) specifically requires DRRS from dispatchable generation facilities[[2]](#footnote-2) that can come online and be dispatchable within 2 hours after being deployed,[[3]](#footnote-3) have dispatchable flexibility to address inter-hour operational challenges,[[4]](#footnote-4) and be capable of running at the generator’s High Sustained Limit (HSL) at a number of consecutive hours, as determined by ERCOT,[[5]](#footnote-5) but no less than four hours.[[6]](#footnote-6) This is part of the broader reliability standard for the ERCOT region established under PURA § 39.159(b)[[7]](#footnote-7) and required under PURA § 39.159(c) to ensure that the reliability standard is met by dispatchable resources with seasonally appropriate attributes, including the ability “to ensure winter performance *for several days*.”[[8]](#footnote-8) Many of these requirements are already represented in NPRR1235; Luminant’s comments are intended to ensure that DRRS, as implemented by NPRR1235, appropriately allows for alignment with all of the statutory requirements, specifically including DRRS’ anticipated contribution to meeting the reliability standard for the ERCOT power region. Therefore, these comments simply incorporate those statutory requirements into the definition of DRRS in ERCOT Protocols. Luminant provides these comments on top of the June 13, 2024 PRS Report (which was endorsed by ROS on August 1, 2024), and respectfully asks that stakeholders support the inclusion of these alignment clarifications in any version of NPRR1235 that advances to the ERCOT Board and Public Utility Commission of Texas for consideration.

As currently drafted in NPRR1235, the definition of DRRS only respects the operational half of DRRS’ objectives. However, because DRRS is required by law to support the ERCOT reliability standard (and has been consistently advocated as a resource adequacy solution, typically as an alternative to the Performance Credit Mechanism, or PCM), it is critical that the definition of DRRS reflect the dual nature of DRRS as *both* an operational tool “to address inter-hour operational challenges” and uncertainty, *and* support the “requirements to meet the reliability needs of the [ERCOT] power region”[[9]](#footnote-9) by helping “to ensure appropriate reliability during extreme heat and extreme cold weather conditions and during times of low non-dispatchable power production in the power region.”[[10]](#footnote-10) Luminant proposes to reconcile this divergence through targeted edits to the following Protocol sections, as revised by NPRR1235:

* Section 2.1 (Definitions): targeted edits to the definition of DRRS
* Section 3.17.5: targeted edits to the description of DRRS
* Section 6.5.7.6.2.5(1): targeted edits to description of the “intended” function of DRRS
* Section 6.5.7.6.2.5(3): correcting typos (non-substantive)
* Section 8.1.1.2.1.8(4): correcting a typo (non-substantive) and conforming edits regarding determination of the number of consecutive hours

Aside from the non-substantive typo corrections, each of these incorporates the same language into definitions and descriptions of DRRS to integrate statutory language and requirements. Specifically, it (1) recognizes that ERCOT may require a minimum runtime of more than four hours;[[11]](#footnote-11) and (2) recognizes the role of DRRS in supporting compliance with the Commission-adopted reliability standard that implements PURA § 39.159(b).[[12]](#footnote-12)

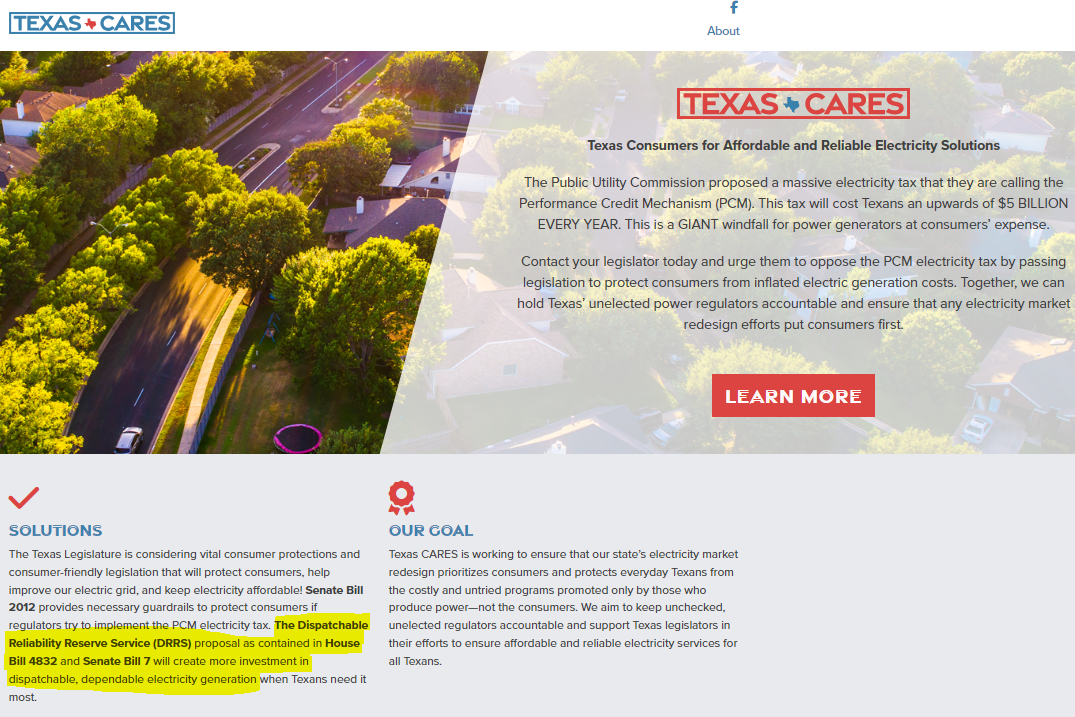
Contextually it is important to recognize that not only does statute establish a dual nature of DRRS (as both an operational tool and a tool to support compliance with the reliability standard), but that dual purpose has deep roots in the original advocacy for DRRS. Supporting the ERCOT reliability standard and supporting investment in dispatchable generation has been central to discussions about DRRS since the very inception of the term ‘Dispatchable Reliability Reserve Service.’ The term originated with comments filed by The Dispatchable Reliability Reserve Service Coalition (DRRS Coalition) in PUCT Project No. 52373 on December 14, 2022[[13]](#footnote-13) – a timing that coincided with the December 15, 2022 deadline that PUCT Staff had established for stakeholder comments regarding the *Assessment of Market Reform Options to Enhance Reliability of the ERCOT System* prepared for the PUCT by Energy and Environmental Economics, Inc. (E3), which first introduced the Performance Credit Mechanism (PCM).[[14]](#footnote-14) The DRRS Coalition explicitly presented DRRS as a “Market Design Alternative” to the PCM and other market design proposals to meet the requirements of PURA § 39.159(b) considered in the E3 Report, both in title and in substance:



The DRRS Coalition asserted that “development of [DRRS] will best *resolve ERCOT's* *reliability concern* by both guaranteeing real-time availability and *sending market signals to attract new investment in flexible dispatchable resources* that best meet system needs,”[[15]](#footnote-15) and that, “together with *a policy commitment to the approach*, *this process would provide* market certainty, a revenue stream, and *new investment incentive* for the types of flexible dispatchable resources capable of efficiently resolving system reliability issues, as the investment in more variable resources and new sources of demand grow and change.”[[16]](#footnote-16) (*emphasis added*). The DRRS Coalition further asserted that, while PCM “will not effectively value and incentivize new steel in the ground,”[[17]](#footnote-17) a “targeted Ancillary Service product [DRRS] and potential modification of existing Ancillary Services is better suited for resolving the current reliability concerns and *would provide pricing signals for additional flexible, dispatchable resource investment*.”[[18]](#footnote-18) **The consistent theme throughout was that DRRS would provide market signals for sufficient dispatchable generation investment to meet the resource adequacy needs of the state better than the PCM** (or other proposals intended to incorporate the reliability standard into the ERCOT market design).

The pro-DRRS/anti-PCM sentiment was furthered in early 2023, when a coalition of stakeholders issued a press release proclaiming “newly published assessment finds [PCM] would cost consumers $5.7 billion annually; *Dispatchable Reliability Reserve Service would be more effective* at a fraction of the cost.”[[19]](#footnote-19) (emphasis added). The press release was based on a preliminary report from Bates White Economic Consulting,[[20]](#footnote-20) which was later finalized in May 2023[[21]](#footnote-21) (Bates White Report) and publicized via another press release that asserted “by enhancing the revenues available to dispatchable resources, *DRRS will further incentivize the continued investment in dispatchable generation* to meet ERCOT’s reliability needs.”[[22]](#footnote-22) (*emphasis added*). Similar to the DRRS Coalition, the Bates White Report presented DRRS as a preferred alternative to the PCM,[[23]](#footnote-23) and developed a framework for determining the quantity of DRRS needed (~9,491 MW, “correspond[ing] to the 99th percentile of the 4-hour forecast uncertainty for [Intermittent Renewable Resources (IRRs)]” that was translated “to a 6-hour uncertainty value by applying a standard statistical adjustment based on volatility scaling used in commodity and financial markets” and grossed up “to capture the expected increase in forecast uncertainty from additional IRR capacity on the system… based on average [Effective Load Carrying Capability (ELCC)] for the identified categories of wind and solar generation”) that would *yield estimated DRRS revenue of $1,683 million*[[24]](#footnote-24) *and* *yield a net capacity increase in dispatchable generation resources of 9,872 MW to 18,460 MW*.[[25]](#footnote-25) **Once again, the consistent theme throughout was that DRRS would provide market signals for sufficient dispatchable generation investment to meet the resource adequacy needs of the state better than the PCM.**

The advocacy in favor of DRRS as a vehicle to “create more investment in dispatchable, dependable electricity generation” was furthered by advocacy to the Texas Legislature from an advocacy coalition named Texas Consumers for Affordable and Reliable Electricity Solutions:[[26]](#footnote-26)



Taken together, this short history of the origin of DRRS should make abundantly clear that not only do the words and structure of Texas statute require DRRS to serve a dual purpose (as both an operational tool and a tool to support compliance with the reliability standard), but the advocacy that supported the establishment of DRRS in statute was bathed in promises of supporting investment in dispatchable generation sufficient to meet ERCOT’s reliability standard. While Luminant did not advocate for DRRS, Luminant respects that DRRS is a core component of the market design policy framework established by the Texas Legislature. Luminant also observes, based on the statutory framework and the history above, that DRRS’ inclusion in statute was informed by unambiguous claims about its ability to incentivize investment in dispatchable generation “steel in the ground” to help meet the reliability standard mandated by statute and recently implemented by the PUCT. Luminant submits, therefore, that it is incumbent upon stakeholders to support a DRRS implementation that is capable of meeting those expectations. DRRS need not meet those expectations alone, but with the recent decision to design the PCM with a gross annual cost cap of only $1 billion there is inevitably greater weight that will fall on DRRS to help “meet the reliability needs of the ERCOT power region.”[[27]](#footnote-27)

Luminant greatly appreciates stakeholders’ consideration of these comments and respectfully requests that these revisions be incorporated into NPRR1235. Luminant looks forward to discussion about these comments as well as anticipated discussion about other technical matters (e.g., evaluating whether the proposed Ancillary Service Demand Curve for DRRS in the Day-Ahead Market should be modified). Luminant may offer additional comments as it continues to review NPRR1235. There were a number of potential clarifications identified in the preparation of these comments, but these comments are intentionally focused solely on ensuring that DRRS is defined to incorporate all of DRRS’ statutory functions and provisions.

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| Revised Cover Page Language |

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| Justification of Reason for Revision and Market Impacts | This NPRR has been developed pursuant to Public Utility Regulatory Act (PURA) § 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.” More specifically, this program must support the objectives of PURA § 39.159(b)-(c) and adhere to the following requirements:   1. The quantity of DRRS “for dispatchable generation facilities” is “based on historical variations in generation availability for each season based on a targeted reliability standard or goal, including intermittency of non-dispatchable generation facilities and forced outage rates”;[[28]](#footnote-28) 2. A resource is required to “be capable of running at least four hours at the resource’s high sustainable limit”[[29]](#footnote-29) (though ERCOT “may require a resource to be capable of running for more than four hours as the organization determines is needed”[[30]](#footnote-30)), “be online and dispatchable not more than two hours after being called on for deployment”,[[31]](#footnote-31) and “have the dispatchable flexibility to address inter-hour operational challenges”;[[32]](#footnote-32) and 3. “Reduce the amount of reliability unit commitment by the amount of [DRRS] procured.”[[33]](#footnote-33) |

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| Revised Proposed Protocol Language |

**2.1 DEFINITIONS**

**Ancillary Service Resource Responsibility for Dispatchable Reliability Reserve Service (DRRS)**

The MW of Dispatchable Reliability Reserve Service (DRRS) that each Resource is obligated to provide in Real-Time rounded to the nearest MW.



**Ancillary Service Supply Responsibility for Dispatchable Reliability Reserve Service (DRRS)**

The net amount of Dispatchable Reliability Reserve Service (DRRS) that a Qualified Scheduling Entity (QSE) is obligated to provide to ERCOT, by hour and service type.

**Dispatchable Reliability Reserve Service (DRRS)** An Ancillary Service that is provided using capacity from a Generation Resource that can be On-Line within two hours and can operate at its High Sustained Limit (HSL) for a number of consecutive hours, as determined by ERCOT, but no less than four hours. It is a market mechanism designed to manage grid uncertainty while mitigating the need for Reliability Unit Commitment (RUC) instructions and to ensure appropriate reliability during extreme heat and extreme cold weather conditions and during times of low non-dispatchable power production in the power region through compliance with the reliability standard adopted by the Public Utility Commission of Texas (PUCT).

**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

***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.

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| ***[NPRR962, NPRR1007, and NPRR1029: Replace applicable portions of Section 3.2.3 above with the following upon system implementation for NPRR962 or 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. This capability excludes any capability being reserved for providing Dispatchable Reliability Reserve Service (DRRS). 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 or Non-Spin;  (vi) Capacity to provide Reg-Up, RRS, ECRS, or any combination, irrespective of whether it is capable of providing Non-Spin;  (vii) Capacity to provide Reg-Up, RRS, ECRS, Non-Spin, or any combination; and  (viii) Capacity to provide Reg-Down;  (e) Capability reserved on Resources for providing DRRS, using COPs submitted by QSEs;  (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  (j) 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.

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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 (SOC) for any two consecutive hours shall be feasible based on the ESR’s maximum rate of charge or discharge.  (4) The COP for Resources that are providing Dispatchable Reliability Reserve Service (DRRS) should reflect the Ancillary Service Resource Responsibility for DRRS. The total Ancillary Service Resource Responsibility for DRRS across all Resources in a QSE’s portfolio should be equal to the QSE’s Ancillary Service Supply Responsibility for DRRS for each Operating Hour. |

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

(6) 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 and Non-Spin, 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, and NPRR1029: 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 or NPRR1029:]***  (R) ONHOLD – Resource is On-Line but temporarily unavailable for Dispatch by SCED or Ancillary Service awards. 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, if qualified and capable;  (C) DRRS – Off-Line but reserved for DRRS with an Ancillary Service Resource Responsibility for DRRS; |

(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;

(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 by SCED with an RTM Energy Bid;

(E) ONRL – Available for Dispatch of RRS or Non-Spin, excluding Controllable Load Resources. A Load Resource, excluding Controllable Load Resources, 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.]*** |

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

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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;

(H) ONFFRRRSL – Available for Dispatch of RRS when providing FFR, excluding Controllable Load Resources. 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 Energy Storage Resource (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 Controllable Load Resources, 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 Controllable Load Resources, 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:]***  (h) Ancillary Service capability in MW for each product and sub-type, excluding DRRS; and  (i) Ancillary Service Resource Responsibility for DRRS in MW. |

(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.]*** |

(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:]***  (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. |

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

(1) Dispatchable Reliability Reserve service (DRRS) is a service that is provided using capacity from an Off-Line Generation Resource that can be On-Line within two hours and can operate at its High Sustained Limit (HSL) for a number of consecutive hours, as determined by ERCOT, but no less than four hours. It is a market mechanism designed to manage grid uncertainty while mitigating the need for Reliability Unit Commitment (RUC) instructions and to ensure appropriate reliability during extreme heat and extreme cold weather conditions and during times of low non-dispatchable power production in the power region through compliance with the reliability standard adopted by the Public Utility Commission of Texas (PUCT).

(2) DRRS may be provided from Off-Line Generation Resources, as further prescribed in the Operating Guides.

(3) DRRS may be deployed by ERCOT to increase available reserves in Real-Time Operations.

**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: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (1) For On-Line 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 and renumber accordingly:]***  (2) For DRRS, the amount of DRRS provided must be less than or equal to the HSL for Off-Line Generation Resources.  (3) For Non-Spin, the amount of Non-Spin awarded must be less than or equal to the HSL for Off-Line Generation Resources.  (4) A Resource shall not be awarded in DAM both Off-Line Non-Spin and DRRS for the same Operating Hour. |

(3) For RRS:

(a) The full amount of RRS awarded to or self-arranged from an On-Line Generation Resource is dependent upon the verified droop characteristics of the Resource. ERCOT shall calculate and update, using the methodology described in the Nodal Operating Guide, a maximum MW amount of RRS for each Generation Resource subject to verified droop performance. The default value for any newly qualified Generation Resource 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: Replace paragraph (3) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (3) For RRS:  (a) The full amount of RRS that can be provided by an On-Line Generation Resource is dependent upon the verified droop characteristics of the Resource. ERCOT shall calculate and update, using the methodology described in the Nodal Operating Guide, a maximum MW amount of RRS for each Generation Resource subject to verified droop performance. The default value for any newly qualified Generation Resource 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. |

(4) 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: Replace applicable portions of paragraph (4) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  (4) For ECRS:  (a) The full amount of ECRS that can be awarded to an On-Line Generation Resource 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.

(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.

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

(2) By 1000 in the Day-Ahead, a QSE may submit Load Resource-specific Ancillary Service Offers for Regulation Service, Non-Spin, 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 and NPRR1014: Insert applicable portions of paragraph (4) below upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; 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 will be treated as if it was an offer for ECRS from an On-Line Generation Resource. |

(4) Ancillary Service Offers remain active for the offered period 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 Ancillary Service Offer for Off-Line Non-Spin and/or DRRS was not also submitted for that hour. When the DAM considers a self-committed offer for clearing, the Resource constraints identified in paragraph (4)(c)(ii) of Section 4.5.1, DAM Clearing Process, other than HSL, are ignored. A Combined Cycle Generation Resource will be considered by the DAM to be self-committed based on an On-Line Ancillary Service Offer submittal if:

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

(b) No Ancillary Service Offer for Off-Line Non-Spin and/or DRRS 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 a Resource-Specific Ancillary Service Offer for Off-Line Non-Spin and/or DRRS was not also submitted for that hour. A QSE that submits an On-Line ESR-specific Ancillary Service Offer or Energy Bid/Offer Curve for the DAM will be considered to be On-Line. A QSE may not submit an Off-Line Ancillary Service Offer for an ESR. When the DAM considers a self-committed offer for clearing, the Resource constraints identified in paragraph (4)(c)(ii) of Section 4.5.1, DAM Clearing Process, other than HSL, are ignored; however, for an ESR, the DAM will consider LSL and HSL. A Combined Cycle Generation Resource will be considered by the DAM to be self-committed based on an On-Line Resource-Specific Ancillary Service Offer submittal if:  (a) Its QSE submits an On-Line Resource-Specific Ancillary Service Offer without also submitting a Three-Part Supply Offer for the DAM for any Combined Cycle Generation Resource within the Combined Cycle Train for that hour;  (b) No Resource-Specific Ancillary Service Offer for Off-Line Non-Spin and/or DRRS 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: 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 Generation Resource, may transfer that portion of its Ancillary Service Position via Ancillary Service Trade(s) to another QSE only if that QSE designates the ECRS will be provided by a Generation Resource. |

(5) A QSE with an Ancillary Service 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

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

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

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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 |

(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 |

(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 |

(9) A QSE with an Ancillary Service Supply Responsibility for Dispatchable Reliability Reserve Service (DRRS) may transfer that portion of its Ancillary Service Supply Responsibility for DRRS via Ancillary Service Trade(s) to another QSE.

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| ***[NPRR1008: Insert Section 4.4.12 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  ***4.4.12 Determination of Ancillary Service Demand Curves for the Day-Ahead Market and Real-Time Market***  (1) This Section describes the process for determining ASDCs for Regulation Up Service (Reg-Up), Regulation Down Service (Reg-Down), Responsive Reserve (RRS), ERCOT Contingency Reserve Service (ECRS), and Non-Spinning Reserve (Non-Spin) for the Day-Ahead Market (DAM) and Real-Time Market (RTM), as well as ASDC for Dispatchable Reliability Reserve Service (DRRS) for the DAM. This section does not apply to ASDCs used in the Reliability Unit Commitment (RUC) process.  (2) The DAM shall use the same ASDCs as the RTM, as an initial condition, excluding DRRS. Specific to the DAM, the ASDCs will be adjusted, as needed, to account for negative Self-Arranged Ancillary Service Quantities.  (3) For Reg-Down, the ASDC shall be a constant value equal to VOLL for the full range of the Ancillary Service Plan for Reg-Down.  (4) To determine the individual ASDCs for Reg-Up, RRS, ECRS, and Non-Spin, an Aggregate ORDC (AORDC) will be created and then disaggregated into individual curves for the different Ancillary Services.  (5) ERCOT shall develop the AORDC from historical data from the period of June 1, 2014 through December 31, 2023 as follows:  (a) For all SCED intervals where the sum of RTOLCAP and RTOFFCAP is less than 10,000 MW, use the RTOLCAP and RTOFFCAP values to calculate the AORDC as follows:  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | RTOLCAP | MWh | *Real-Time On-Line Reserve Capacity –* The Real-Time reserve capacity of On-Line Resources available for the SCED intervals beginning June 1, 2014 through December 31, 2023 | | RTOFFCAP | MWh | *Real-Time Off-Line Reserve Capacity –* The Real-Time reserve capacity of Off-Line Resources available for the SCED intervals beginning June 1, 2014 through December 31, 2023. | | *μ* | None | The mean value of the shifted LOLP distribution as published for Fall 2024 | | *σ* | None | The standard deviation of the shifted LOLP distribution as published for Fall 2024 |   (b) Using the results of step (a) above, use regression methods to fit a curve to the average reserve pricing outcomes for the various MW reserve levels.  (c) Calculate points on the regression curve in 1 MW increments for any observed reserve level >= 2,000 MW and price >$0.01/MWh. These points form the AORDC.  (6) ERCOT shall disaggregate the AORDC developed pursuant to paragraph (5) above into individual ASDCs for each Ancillary Service product as follows:  (a) The ASDC for all Reg-Up in the Ancillary Service Plan shall use the highest price portion of the AORDC;  (b) The ASDC for all RRS in the Ancillary Service Plan shall use the highest price portion of the remaining AORDC after removing the portion of the AORDC that was used for the Reg-Up ASDC;  (c) The ASDC for all ECRS in the Ancillary Service Plan shall use the highest price portion of the remaining AORDC after removing the portions of the AORDC that were used for the Reg-Up and RRS ASDCs;  (d) The ASDC for Non-Spin shall use the remaining portion of the remaining AORDC after removing the portions of the AORDC that were used for the Reg-Up, RRS, and ECRS ASDCs.  (7) Each ASDC will be represented by a 100-point linear approximation to the corresponding part of the AORDC. Fewer points may be used for cases where it would not result in decreased accuracy in representing the corresponding part of the AORDC.  (8) The ASDC for DRRS will only be used in the DAM and shall be a constant value equal to $150/MWh. (9) Should the PNM exceed the PNM threshold per MW-year, as described in Protocol Section 4.4.11.1, Scarcity Pricing Mechanism, the AORDC used in determining the individual ASDCs will be adjusted to reflect the updated value of VOLL for the remainder of the annual Resource adequacy cycle. The AORDC will be reset to use the HCAP for DAM at the start of the next calendar year. |

***4.5.1 DAM Clearing Process***

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(iii) Other constraints –

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

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

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

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

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

(d) Ancillary Service needs for each Ancillary Service include the needs specified in the Ancillary Service Plan that are not part of the Self-Arranged Ancillary Service Quantity and that must be met from available DAM Ancillary Service Offers while co-optimizing with DAM Energy Offers. ERCOT may not buy more of one Ancillary Service in place of the quantity of a different service. See Section 4.5.2, Ancillary Service Insufficiency, for what happens if insufficient Ancillary Service Offers are received in the DAM.

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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) The DAM uses a multi-hour mixed integer programming algorithm to maximize bid-based revenues, including revenues based on Ancillary Service Demand Curves (ASDCs), minus the offer-based costs over the Operating Day, subject to security and other constraints.  (a) The bid-based revenues include revenues from ASDCs, DAM Energy Bids, bid portions of Energy Bid/Offer Curves, and Point-to-Point (PTP) Obligation bids.  (b) The offer-based costs include costs from the Startup Offer, Minimum Energy Offer, and Energy Offer Curve of any Resource that submitted a Three-Part Supply Offer, DAM Energy-Only Offers, offer portions of Energy Bid/Offer Curves, Ancillary Service Only Offers, and Ancillary Service Offers.  (c) Security constraints specified to prevent DAM solutions that would overload the elements of the ERCOT Transmission Grid include the following:  (i) Transmission constraints – transfer limits on energy flows through the ERCOT Transmission Grid, e.g., thermal or stability limits. These limits must be satisfied by the intact network and for certain specified contingencies. These constraints may represent:  (A) Thermal constraints – protect Transmission Facilities against thermal overload.  (B) Generic constraints – protect the ERCOT Transmission Grid against transient instability, dynamic stability or voltage collapse.  (C) Power flow constraints – the energy balance at required Electrical Buses in the ERCOT Transmission Grid must be maintained.  (ii) Resource constraints – the physical and security limits on Resources that submit Three-Part Supply Offers or Energy Bid/Offer Curves:  (A) Resource output constraints – the Low Sustained Limit (LSL) and High Sustained Limit (HSL) of each Resource; and  (B) Resource operational constraints – includes minimum run time, minimum down time, and configuration constraints.  (iii) Other constraints –  (A) Linked offers – the DAM may not select any one part of that Resource capacity to provide more than one Ancillary Service or to provide both energy and an Ancillary Service in the same Operating Hour. The DAM may, however, select part of that Resource capacity to provide one Ancillary Service and another part of that capacity to provide a different Ancillary Service or energy in the same Operating Hour, provided that linked Energy and Off-Line Non-Spinning Reserve (Non-Spin) Resource-Specific Ancillary Service Offers are not awarded in the same Operating Hour.  (B) The sum of the awarded Resource-Specific Ancillary Service Offer capacities for each Resource must be within the Resource limits specified in the Current Operating Plan (COP) and Section 3.18, Resource Limits in Providing Ancillary Service, and the Resource Parameters as described in Section 3.7, Resource Parameters.  (C) Block Resource-Specific Ancillary Service Offers for a Load Resource – blocks will not be cleared unless the entire quantity block can be awarded. Because block Resource-Specific Ancillary Service Offers cannot set the Market Clearing Price for Capacity (MCPC), a block Ancillary Service Offer may clear below the Ancillary Service Offer price for that block.  (D) Block DAM Energy Bids, DAM Energy-Only Offers, and PTP Obligation bids – blocks will not be cleared unless the entire time and/or quantity block can be awarded. Because quantity block bids and offers cannot set the Settlement Point Price, a quantity block bid or offer may clear in a manner inconsistent with the bid or offer price for that block.  (E) Combined Cycle Generation Resources – The DAM may commit a Combined Cycle Generation Resource in a time period that includes the last hour of the Operating Day only if that Combined Cycle Generation Resource can transition to a shutdown condition in the DAM Operating Day.  (F) Energy Storage Resources (ESRs) – The energy cleared for an ESR may be negative, indicating purchase of energy, or positive, indicating sale of energy.  (d) Ancillary Service needs will be reflected in ASDCs for each Ancillary Service. Self-Arranged Ancillary Service Quantities will first be used to meet the ASDCs, and the remaining Ancillary Service needs are met from Ancillary Service Offers, as long as the costs do not exceed the ASDC value. ERCOT may not buy more of one Ancillary Service in place of the quantity of a different service.  (e) A DRRS Offer submitted with other Ancillary Service Offers or an Energy Offer Curve for a Resource may clear in a manner inconsistent with expected individual Resource revenue. |

(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.

(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: 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; and

(c) The breaker open-close sequence, as indicated by the On-Line/Off-Line sequence from the telemetered Resource status, for which the QSE is eligible for startup cost compensation in the DAM or Reliability Unit Commitment (RUC), 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.

(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** |
| --- | --- | --- |
| 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. |
| *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).

(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* = PCDRRR *r, q, DAM*



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. |
| 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. |
| *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) \* PCDRRAMTTOT / DADRRQTOT

PCDRRAMTTOT = PCDRRAMT *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. |
| PCDRRAMTTOT | $ | *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. |
| 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. |

**5.2.2.2 RUC Process Timeline After an Aborted Day-Ahead Market**

(1) If ERCOT aborts all or part of the Day-Ahead process in accordance with Section 4.1.2, Day-Ahead Process and Timing Deviations, for any reason not due to a Market Suspension, then ERCOT shall use the following Supplemental Ancillary Services Market (SASM) process to purchase Ancillary Services for the next Operating Day and the Hourly Reliability Unit Commitment (HRUC) process described in this Section in lieu of the DRUC process. If ERCOT aborts the Day-Ahead process due to a Market Suspension, it shall act in accordance with Section 25.3, Market Restart Processes.

(2) When the DAM is aborted, ERCOT shall include in the Watch notification required by paragraph (2) of Section 4.1.2 the time when it intends to conduct the SASM described in this Section 5.2.2.2 to procure the amounts of Ancillary Services necessary to meet the Ancillary Service Plan for the Operating Day affected by the aborted DAM. ERCOT shall allow at least one hour between the issuance of the Watch and the beginning of this SASM.

(3) After the issuance of the Watch described in paragraph (2) above and prior to the beginning of this SASM, a Qualified Scheduling Entity (QSE) may cancel unexpired Ancillary Service Offers that were submitted for the aborted DAM.

(4) A QSE may submit Ancillary Service Offers for this SASM after the issuance of the Watch described in paragraph (2) above and prior to the beginning of this SASM.

(5) For this SASM, the QSE must submit the Self-Arranged Ancillary Service Quantity for the next Operating Day in accordance with the timeline described in paragraph (3) of Section 6.4.9.2, Supplemental Ancillary Services Market. This amount may be different from the self-arrangement amounts previously submitted for the aborted DAM.

(6) The amount of each Ancillary Service to be procured by ERCOT in this SASM is the amount of each Ancillary Service specified in the ERCOT Ancillary Service Plan posted prior to the aborted DAM less the total amount of each Ancillary Service in the QSE submittals for self-arranged Ancillary Services for this SASM.

(7) This SASM will settle in accordance with Section 6.7, Real-Time Settlement Calculations for the Ancillary Services.

(8) The SASM process for acquiring Ancillary Services in the event of an aborted Day-Ahead process shall be conducted in accordance with Section 6.4.9.2.2, SASM Clearing Process, but shall use the following activities and timeline as specified in paragraph (3) of Section 6.4.9.2, with time “X” being the time specified by ERCOT for the beginning of the SASM process in the Watch notification described above.

(9) As soon as practicable, but no later than the time specified in paragraph (3) of Section 6.4.9.2, ERCOT shall notify each QSE of its awarded Ancillary Service Offer quantities, specifying Resource, Ancillary Service type, SASM Market Clearing Price for Capacity (MCPC), and the first and last hours of the awarded offer.

(10) As soon as practicable, but no later than the time specified in paragraph (3) of Section 6.4.9.2, ERCOT shall post on the ERCOT website the hourly:

(a) SASM MCPC for each type of Ancillary Service for each hour;

(b) Total Ancillary Service procured in MW by Ancillary Service type for each hour; and

(c) Aggregated Ancillary Service Offer Curve for each Ancillary Service for each hour.

(11) No sooner than 1800 in the Day-Ahead and after the completion of the SASM process described in this Section 5.2.2.2, ERCOT shall execute an HRUC process.

(a) The RUC Study Period for this HRUC process is the balance of the current Operating Day plus the next Operating Day. This HRUC process may be a post-1800 HRUC for the current Operating Day.

(b) The COP and Trades Snapshot taken just prior to the execution of the HRUC process described in this Section 5.2.2.2 will be used to settle RUC charges in the Operating Day affected by the aborted DAM.

(c) This HRUC process described in this Section 5.2.2.2 may commit Resources to supply Ancillary Services if the Ancillary Service Offers submitted in the SASM described in this Section 5.2.2.2 are insufficient to meet the requirements of the Ancillary Services Plan in the Operating Day affected by the aborted DAM.

(d) A QSE may request cancellation of a RUC instruction to supply Ancillary Services if the Resource requested is not capable of providing the Ancillary Services due to equipment issues that are the result of non-frequency responsive power augmentation or other Resource control issues. If ERCOT accepts the cancellation, ERCOT may require QSEs to submit supporting information describing the Resource control issues.

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| ***[NPRR1009: Replace Section 5.2.2.2 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  **5.2.2.2 RUC Process Timeline After an Aborted Day-Ahead Market**  (1) If ERCOT aborts all or part of the Day-Ahead process in accordance with Section 4.1.2, Day-Ahead Process and Timing Deviations, for any reason not due to a Market Suspension, then ERCOT shall use the Hourly Reliability Unit Commitment (HRUC) process described in this Section in lieu of the DRUC process, and ERCOT shall not procure Dispatchable Reliability Reserve Services (DRRS) for the corresponding Operating Day. If ERCOT aborts the Day-Ahead process due to a Market Suspension, it shall act in accordance with Section 25.3, Market Restart Processes. |

***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).

(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.

(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:

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| **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 approved by the ERCOT Board. ERCOT shall update parameter value(s) on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. | | |

(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 QSE 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.

(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, and NPRR1204: 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 and NPRR1204; or upon system implementation for NPRR1032:]***  ***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 with Ancillary Service Resource Responsibility for 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 SOC values from COP, while incorporating any adjustments under paragraph (18)(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 and the current interval’s Hour Beginning Planned SOC. The formulation of the RUC objective function must employ penalty factors on violations of security constraints and violations of ESR COP Hour Beginning Planned SOC. The objective of the RUC process is to minimize costs based on the Resource costs described in paragraphs (10) through (14) 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. ERCOT shall post the ASDCs to the ERCOT website as soon as practicable after any change to the ASDCs.  (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 Deployment 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 Resources, 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 Resources, 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) 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).  (8) 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.  (9) 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.  (10) 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 (16) 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.  (11) 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 (14) 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.  (12) 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.  (13) 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.  (14) 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.  (15) 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, except for DRRS. 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.  (16) 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 approved by the ERCOT Board. ERCOT shall update parameter value(s) on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. | | |   (17) The RUC process, including any Verbal Dispatch Instructions (VDIs), will be used to deploy DRRS from Resources with an Ancillary Service Resource Responsibility for DRRS. 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 an Ancillary Service Resource Responsibility for DRRS.  (18) To prioritize the utilization of 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 an Ancillary Service Resource Responsibility for 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 approved by the ERCOT Board. ERCOT shall update parameter value(s) on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. | | |   (19) 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 that is providing DRRS based on 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.  (20) 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 Hour Beginning Planned SOC will be performed. This check may adjust the Hour Beginning Planned SOC 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 Hour Beginning Planned SOC is achievable from the previous interval. If it is not feasible, then RUC will adjust the Hour Beginning Planned SOC to the closest achievable value.  (21) 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.  (22) 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.  (23) 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.  (24) 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. |

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

***5.7.2 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. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[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 RUC Make-Whole Charges***

(1) All QSEs that were DRRS short in each RUC will be charged for that shortage, as described in Section 5.7.4.1, RUC Dispatchable Reliability Reserve Service Short Charge.

(2) If the revenues from the DRRS short charges are not enough to cover all RUC Make-Whole Payments for a Settlement Interval, then the difference will be charged to the QSEs that were capacity-short in each RUC under Section 5.7.4.2, RUC Capacity-Short Charge.

(3) If the revenues from the charges under Section 5.7.4.1 and Section 5.7.4.2 are not enough to cover all RUC Make-Whole Payments for a Settlement Interval, then the remaining amount will be uplifted to all QSEs on a Load Ratio Share (LRS) basis, as described in Section 5.7.4.3, RUC Make-Whole Uplift Charge.

(4) On a monthly basis, within ten days after the Initial Settlement of the last day of the month has been completed, ERCOT shall post on the Market Information System (MIS) Secure Area the total RUC Make-Whole Charges and RUC Clawback Payment Amounts, by Settlement Interval, by QSE capacity-shortfall and by amount uplifted. **5.7.4.1 RUC DRRS-Short Charge**

(1) The dollar amount charged to each QSE, due to a DRRS shortfall for a particular RUC, for a 15-minute Settlement Interval, is the QSE’s DRRS shortfall ratio share multiplied by the total RUC Make-Whole Payments to all QSEs for that RUC, subject to a cap. The cap on the charge is two multiplied by the total RUC Make-Whole Payments for all QSEs multiplied by that QSE’s DRRS shortfall for that RUC process divided by the total capacity of all RUC-committed Resources during that Settlement Interval for the RUC process. The dollar amount charged to each QSE is calculated as follows:

RUCDRRSAMT ***ruc, i, q* =** (-1) \* Max [(RUCDRRSFRS *ruc, i, q* \* RUCMWAMTRUCTOT *ruc, h*), (2\* RUCDRRSF *ruc, i, q*  \* RUCMWAMTRUCTOT *ruc, h* / RUCCAPTOT *ruc, h* )] /4

Where:

RUCMWAMTRUCTOT *ruc, h*  = RUCMWAMT *ruc, q, r, h*



RUCCAPTOT *ruc, h* = (HSL *ruc, h, r* – HSL *ruc, h, beforeCCGR*)



|  |
| --- |
| ***[NPRR1139: Replace the formula “RUCCAPTOT ruc, h” above with the following upon system implementation:]***  RUCCAPTOT *ruc, h* = (RUCHSL *ruc, h, r* – RUCHSL *ruc, h, beforeCCGR*) |

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RUCDRRSAMT ***ruc, i, q*** | $ | *RUC DRRS Short Amount* —The charge to a QSE *q*, due to DRRS shortfall for a particular RUC process *ruc*, for the 15-minute Settlement Interval *i*. |
| RUCMWAMTRUCTOT *ruc, h* | $ | *RUC Make-Whole Amount Total per RUC*—The sum of RUC Make-Whole Payments for a particular RUC process *ruc*, including amounts for RMR Units, for the hour *h* that includes the 15-minute Settlement Interval. |
| RUCMWAMT *ruc, q, r, h* | $ | *RUC Make-Whole Payment*—The RUC Make-Whole Payment to the QSE *q* for Resource *r*, for a particular RUC process *ruc*, for the hour *h* that includes the 15-minute Settlement Interval. See Section 5.7.1, RUC Make-Whole Payment. 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. |
| RUCDRRSFRS *ruc, i, q* | none | *RUC DRRS Shortfall Ratio Share*—The ratio of the QSE *q*’s DRRS shortfall to the sum of all QSEs’ DRRS shortfalls for a particular RUC process *ruc*, for the 15-minute Settlement Interval *i*. See Section 5.7.4.1.1, DRRS Shortfall Ratio Share. |
| RUCDRRSF *ruc, i, q* | MW | *RUC DRRS Shortfall*—The QSE *q*’s DRRS shortfall for a particular RUC process *ruc* for the 15-minute Settlement Interval *i*. See formula in Section 5.7.4.1.1. |
| RUCCAPTOT *ruc, h* | MW | *RUC Capacity Total*—The sum of the High Sustained Limits (HSLs) of all RUC-committed Resources for a particular RUC process *ruc*, for the hour *h* that includes the 15-minute Settlement Interval. See formula in Section 5.7.4.1.1. |
| HSL *ruc, h, r* | MW | *High Sustained Limit*—The HSL of Generation Resource *r* for a particular RUC process *ruc*, for the hour *h* that includes the Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| |  |  |  |  | | --- | --- | --- | --- | | ***[NPRR1139: Replace the variable “HSL ruc, h, r” above with the following upon system implementation:]***   |  |  |  | | --- | --- | --- | | RUCHSL *ruc, h, r* | MW | *High Sustained Limit at RUC Snapshot*—The HSL of Generation Resource *r* represented by QSE *q* for the hour *h*, according to the COP and Trades Snapshot for the RUC process *ruc*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | | | |
| *ruc* | none | The RUC process for which the RUC DRRS Short Charge is calculated. |
| *i* | none | A 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *h* | none | The hour that includes the Settlement Interval *i*. |
| *r* | none | A Generation Resource that is RUC-committed for the hour that includes the Settlement Interval *i*, as a result of a particular RUC process. |
| *beforeCCGR* | none | The Combined Cycle Generation Resource that was QSE-committed or DRRS deployed in a RUCAC-Interval. |

***5.7.4.1.1 DRRS Shortfall Ratio Share***

(1) In calculating the RUC DRRS shortfall amount for each QSE, the Resource’s Ancillary Service Resource Responsibility for DRRS shall be the value reflected in the COP for the Generation Resource. The DRRCOPSNAP variable used below shall include the DRRS amounts for the Resource when the COP status is DRRS or ON.

(2) For Combined Cycle Generation Resources, if more than one Combined Cycle Generation Resource within the Combined Cycle Train has an eligible COP status per paragraph (1) above for the same Settlement hour, then the Combined Cycle Generation Resource with the greatest Ancillary Service Resource Responsibility for DRRS as reflected in their COP will be used in the RUC DRRS Short Charge calculation for that Settlement hour.

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

RUCDRRSFRS *ruc, q ,i*  = RUCDRRSF *ruc, i, q* / RUCDRRSFTOT *ruc, i*

Where:

RUCDRRSFTOT *ruc, i* =  RUCDRRSF *ruc, i, q*

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

RUCDRRSF *ruc, q ,i*  = Max (0, RUCDRRSFSNAP *ruc, q ,i*  – RUCDRRCREDIT*q, i, z*)



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

RUCDRRSFSNAP *ruc, q ,i* = Max (0, ( PCDRRR *r, q, DAM, h* + DASADRRQ *q, h*) – (DRRCOPSNAP *ruc, q, r, h +* DRRTRPQSNAP *ruc, q, h* – DRRTRSQSNAP *ruc, q, h*))



The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RUCDRRSFRS *ruc, i, q* | none | *RUC DRRS Shortfall Ratio Share*—The ratio of the QSE *q*’s DRRS shortfall to the sum of all QSEs’ DRRS shortfalls for a particular RUC process *ruc*, for the 15-minute Settlement Interval *i*. |
| RUCDRRSF *ruc, i, q* | MW | *RUC DRRS Shortfall*—The QSE *q*’s DRRS shortfall for a particular RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| RUCDRRSFTOT *ruc, i* | MW | *RUC DRRS Shortfall*—The sum of all QSEs’ DRRS shortfalls, for a particular RUC process *ruc,* for the 15-minute Settlement Interval *i*. |
| RUCDRRSFSNAP *ruc, q, i* | MW | *RUC DRRS Shortfall at Snapshot*—The QSE *q*’s DRRS shortfall according to the snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| RUCDRRCREDIT *q, i, z* | MW | *RUC DRRS Credit by QSE*—The QSE *q*’s DRRS credit resulting from DRRS paid through the RUC DRRS Short Amount for RUC process *z* for the 15-minute Settlement Interval *i*. |
| 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. |
| DASADRRQ *q, h* | 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. |
| DRRCOPSNAP *ruc, q, r, h* | MW | *DRRS COP at Snapshot –* The Ancillary Service Resource Responsibility for DRRS for Resource *r* represented by QSE *q* for the hour *h*, according to the COP and Trades Snapshot for the RUC process *ruc,* as described in paragraph (1) of this Section*.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| DRRTRPQSNAP*ruc, q, h* | MW | *DRRS Trade Purchases per QSE at Snapshot—*QSE *q’*s total time-weighted average capacity Trade Purchase for DRRS, according to the COP and Trades Snapshot for the RUC process *ruc* for the hour *h*. The time-weighted average value is rounded to 0.1 MW. |
| DRRTRSQSNAP*ruc, q, h* | MW | *DRRS Trade Sale per QSE at Snapshot—*QSE q’s total time-weighted average capacity Trade Sale for DRRS, according to the COP and Trades Snapshot for the RUC process *ruc* for the hour *h*. The time-weighted average value is rounded to 0.1 MW. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |
| *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 DRRS Shortfall Ratio Share is calculated. |

***5.7.4.1.2 RUC DRRS Credit***

(1) A QSE that is charged for a DRRS shortfall in one RUC process gets a credit equal to the minimum of the QSE’s DRRS shortfall (MW) or the total RUC capacity purchased multiplied by the QSE’s DRRS shortfall ratio share. The DRRS credit to be used in future RUC processes for the same 15-minute Settlement Interval is calculated as follows:

RUCDRRCREDIT *ruc, i, q* = Min [RUCDRRSF *ruc, i, q*, (RUCCAPTOT *ruc, h* \* RUCDRRSFRS *ruc, i, q*)]

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RUCDRRCREDIT *ruc, q, i* | MW | *RUC DRRS Credit by QSE*—The QSE *q*’s DRRS credit resulting from DRRS paid through the RUC DRRS Short Amount for RUC process *z* for the 15-minute Settlement Interval *i*. |
| RUCDRRSFRS *ruc, i, q* | none | *RUC DRRS Shortfall Ratio Share*—The ratio of the QSE *q*’s DRRS shortfall to the sum of all QSEs’ DRRS shortfalls for a particular RUC process *ruc*, for the 15-minute Settlement Interval *i*. |
| RUCDRRSF *ruc, i, q* | MW | *RUC DRRS Shortfall*—The QSE *q*’s DRRS shortfall for a particular RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| RUCCAPTOT *ruc, h* | MW | *RUC Capacity Total*—The total capacity of all RUC-committed Resources during the RUC process, for the hour that includes the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *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 DRRS Credit is calculated. |

**5.7.4.2 RUC Capacity-Short Charge**

(1) The dollar amount charged to each QSE, due to capacity shortfalls for a particular RUC, for a 15-minute Settlement Interval, is the QSE’s shortfall ratio share multiplied by the total RUC Make-Whole Payments, less the total amount charged through the RUC DRRS-Short Charge, to all QSEs for that RUC, subject to a cap. The cap on the charge to each QSE is two multiplied by the total RUC Make-Whole Payments, less the total amount charged through the RUC DRRS-Short Charge, for all QSEs multiplied by that QSE’s capacity shortfall for that RUC process divided by the remaining capacity of RUC-committed Resources that has not been recovered during that Settlement Interval for the RUC process. The dollar amount charged to each QSE is calculated as follows:

**RUCCSAMT *ruc, i, q*** **= (-1) \* Max [(RUCSFRS *ruc, i, q* \* RUCMWDELTA *ruc, h* ),  
(2 \* RUCSF *ruc, i, q* \* RUCMWDELTA *ruc, h*  / RUCCAPDELTA *ruc, h*)] / 4**

Where:

RUCMWDELTA *ruc, h*  = Min (0, RUCMWAMTRUCTOT *ruc, h* + RUCDRRSAMTRUCTOT *ruc, h* )

RUCDRRSAMTRUCTOT *ruc, h*  = RUCDRRSAMT*ruc, i, q*



RUCCAPDELTA *ruc, h*  = RUCMWDELTA *ruc, h*  / (RUCMWAMTRUCTOT *ruc, h* / RUCCAPTOT *ruc, h* )



The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RUCCSAMT *ruc, i, q* | $ | *RUC Capacity-Short Amount*—The charge to a QSE *q*, due to capacity shortfall for a particular RUC process *ruc*, for the 15-minute Settlement Interval *i*. |
| RUCMWAMTRUCTOT *ruc, h* | $ | *RUC Make-Whole Amount Total per RUC*—The sum of RUC Make-Whole Payments for a particular RUC process *ruc*, including amounts for RMR Units, for the hour *h* that includes the 15-minute Settlement Interval. |
| 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 a particular RUC process *ruc*, for the 15-minute Settlement Interval *i*. See Section 5.7.4.2.1, Capacity Shortfall Ratio Share. |
| RUCSF *ruc, i, q* | MW | *RUC Shortfall*—The QSE *q*’s capacity shortfall for a particular RUC process *ruc* for the 15-minute Settlement Interval *i*. See formula in Section 5.7.4.2.1. |
| RUCCAPTOT *ruc, h* | MW | *RUC Capacity Total*—The sum of the High Sustained Limits (HSLs) of all RUC-committed Resources for a particular RUC process *ruc*, for the hour *h* that includes the 15-minute Settlement Interval. See formula in Section 5.7.4.2.1. |
| RUCMWDELTA *ruc, h* | $ | *RUC Make-Whole Delta –* The remaining RUC Make-Whole amount that has not been covered by RUC DRRS Short Charges, for a particular RUC process *ruc*, for the hour *h* that includes the 15-minute Settlement Interval. |
| RUCDRRSAMT *ruc, i, q* | $ | *RUC DRRS Short Amount –* The charge to QSE *q,* due to a DRRS shortfall for a particular RUC process *ruc,* for the 15-minute Settlement Interval *i.* |
| RUCDRRSAMTRUCTOT *ruc, h* | $ | *RUC DRRS Short Amount Total per RUC –* The sum of shortfall for DRRS Charges for a particular RUC process *ruc*, for the hour *h* that includes the 15-minute Settlement Interval. |
| RUCCAPDELTA *ruc, h* | MW | *RUC Capacity Delta –* The remaining RUC Capacity that has not been covered by the DRRS Short Charges, for a particular RUC process *ruc,* for the hour *h* that includes the 15-minute Settlement Interval. |
| *ruc* | none | The RUC process for which the RUC Capacity-Short Charge is calculated. |
| *i* | none | A 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *h* | none | The hour that includes the Settlement Interval *i*. |

***5.7.4.2.2 RUC Capacity Credit***

(1) A QSE that is charged for a capacity shortfall in one RUC process gets a capacity credit equal to the minimum of the QSE’s RUC shortfall (MW) or the total RUC capacity purchased multiplied by the QSE’s shortfall ratio share. The capacity credit to be used in future RUC processes for the same 15-minute Settlement Interval is calculated as follows:

**RUCCAPCREDIT*ruc,i,q* = Min [RUCSF*ruc, i, q*, (RUCCAPDELTA *ruc, h* \* RUCSFRS*ruc, i, q*)]**

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RUCCAPCREDIT*ruc,i,q* | MW | *RUC Capacity Credit by QSE*—The capacity credit resulting from capacity paid through the RUC Capacity-Short Charge for the 15-minute Settlement Interval. |
| RUCSF*ruc,i,q* | MW | *RUC Shortfall*—The QSE’s capacity shortfall for the RUC process for the 15-minute Settlement Interval. |
| RUCSFRS*ruc,i,q* | none | *RUC Shortfall Ratio Share*—The ratio of the QSE’s capacity shortfall to the sum of all QSEs’ capacity shortfalls, for the RUC process, for the 15-minute Settlement Interval. |
| RUCCAPDELTA*ruc,h* | MW | *RUC Capacity Delta –* The remaining RUC Capacity that has not been covered by the DRRS Short Charges, for A particular RUC process *ruc,* for the hour *h* that includes the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *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 Capacity Credit is calculated. |

**5.7.4.3 RUC Make-Whole Uplift Charge**

(1) If the revenues from the charges under Section 5.7.4.1, RUC DRRS Short Charge and Section 5.7.4.2, RUC Capacity-Short Charge, are not enough to cover all RUC Make-Whole Payments for a 15-minute Settlement Interval, then the difference will be uplifted to all QSEs on a Load Ratio Share basis, as a RUC Make-Whole Uplift Charge, calculated as follows:

LARUCAMT*q,i* = (-1) \* Max (0, (RUCMWAMTTOT*h* / 4 + RUCDRRSAMTTOT *i* + RUCCSAMTTOT*i*)) \* LRS*q,i*

Where:

RUCMWAMTTOT*h*  = RUCMWAMTRUCTOT*ruc,h*



RUCDRRSAMTTOT *i*  = RUCDRRSAMT *ruc, i, q*



RUCCSAMTTOT*i* = RUCCSAMT*ruc,i,q*



The above variables are defined as follows:

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| **Variable** | **Unit** | **Definition** |
| LARUCAMT*q,i* | $ | *RUC Make-Whole Uplift Charge*—The amount owed from the QSE based on Load Ratio Share, for the 15-minute Settlement Interval. |
| RUCMWAMTTOT*h* | $ | *RUC Make-Whole Amount Total*—The sum of RUC Make-Whole Payments for all RUC processes, including amounts for RMR Units, for the hour that includes the 15-minute Settlement Interval. |
| RUCMWAMTRUCTOT*ruc,h* | $ | *RUC Make-Whole Amount Total per RUC*—The sum of RUC Make-Whole Payments for a particular RUC process, including payments for RMR Units, for the hour that includes the 15-minute Settlement Interval. |
| RUCDRRSAMT *ruc, i, q* | $ | *RUC DRRS Shortfall Amount –* The charge to QSE *q,* due to a DRRS shortfall for a particular RUC process *ruc,* for the 15-minute Settlement Interval *i.* |
| RUCDRRSAMTTOT *i* | $ | *RUC DRRS Shortfall Amount Total –* The sum of RUC DRRS Short Charges for all QSEs and RUC processes*,* for the 15-minute Settlement Interval *i.* |
| RUCCSAMTTOT*i* | $ | *RUC Capacity Amount Total*—The sum of RUC Capacity-Short Charges for all QSEs and RUC processes, including payments for RMR Units, for the 15-minute Settlement Interval. |
| RUCCSAMT*ruc,i,q* | $ | *RUC Capacity-Short Amount*—The charge to a QSE, due to capacity shortfall for a particular RUC process, for the 15-minute Settlement Interval. |
| LRS*q,i* | none | *Load Ratio Share*—The ratio of Adjusted Metered Load to the total ERCOT Adjusted Metered Load for the 15-minute Settlement Interval. See Section 6.6.2, Load Ratio Share, item (2). |
| *i* | none | A 15-minute Settlement Interval. |
| *h* | none | The hour that includes the Settlement Interval *i*. |
| *ruc* | none | A RUC Process. |
| *q* | none | A QSE. |

**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, except Dispatchable Reliability Reserve Service (DRRS), 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 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.

**6.5.5.2 Operational Data Requirements**

(1) ERCOT shall use Operating Period data to monitor and control the reliability of the ERCOT Transmission Grid and shall use it in network analysis software to predict the short-term reliability of the ERCOT Transmission Grid. Each TSP, at its own expense, may obtain that Operating Period data from ERCOT or directly from QSEs.

(2) A QSE representing a Generation Resource connected to Transmission Facilities or distribution facilities shall provide the following Real-Time telemetry data to ERCOT for each Generation Resource. ERCOT shall make that data available, in accordance with ERCOT Protocols, NERC Reliability Standards, and Governmental Authority requirements, to requesting TSPs and DSPs operating within ERCOT. Such data must be provided to the requesting TSP or DSP at the requesting TSP’s or DSP’s expense, including:

(a) Net real power (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered gross real power and conversion constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process. Net real power represents the actual generation of a Resource for all real power dispatch purposes, including use in Security-Constrained Economic Dispatch (SCED), determination of the High Ancillary Service Limit (HASL), High Dispatch Limit (HDL), Low Dispatch Limit (LDL) and Low Ancillary Service Limit (LASL), and is consistent with telemetered HSL, LSL and Non-Frequency Responsive Capacity (NFRC);

(b) Gross real power (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered real power, which may include Supervisory Control and Data Acquisition (SCADA) metering, and conversions constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process;

(c) Gross Reactive Power (in Megavolt-Amperes reactive (MVAr));

(d) Net Reactive Power (in MVAr);

(e) Power to standby transformers serving plant auxiliary Load;

(f) Status of switching devices in the plant switchyard not monitored by the TSP or DSP affecting flows on the ERCOT Transmission Grid;

(g) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;

(h) Generation Resource breaker and switch status;

(i) HSL (Combined Cycle Generation Resources) shall:

(i) Submit the HSL of the current operating configuration; and

(ii) When providing ECRS, update the HSL as needed, to be consistent with Resource performance limitations of ECRS provision;

(j) NFRC currently available (unloaded) and included in the HSL of the Combined Cycle Generation Resource’s current configuration;

(k) High Emergency Limit (HEL), under Section 6.5.9.2, Failure of the SCED Process;

(l) Low Emergency Limit (LEL), under Section 6.5.9.2;

(m) LSL;

(n) Configuration identification for Combined Cycle Generation Resources;

(o) Ancillary Service Schedule for each quantity of ECRS and Non-Spin which is equal to the Ancillary Service Resource Responsibility minus the amount of Ancillary Service deployment;

(i) For On-line Non-Spin, Ancillary Service Schedule shall be set to zero;

(ii) For Off-Line Non-Spin and for On-Line Non-Spin using Off-Line power augmentation technology the Ancillary Service Schedule shall equal the Non-Spin obligation and then shall be set to zero within 20 minutes following Non-Spin deployment;

(p) Ancillary Service Resource Responsibility for each quantity of Regulation Up Service (Reg-Up), Regulation Down Service (Reg-Down), RRS, ECRS, and Non-Spin. The sum of Ancillary Service Resource Responsibility for all Resources in a QSE is equal to the Ancillary Service Supply Responsibility for that QSE;

(q) Reg-Up and Reg-Down participation factors represent how a QSE is planning to deploy the Ancillary Service energy on a percentage basis to specific qualified Resource(s). The Reg-Up and Reg-Down participation factors for a Resource providing Fast Responding Regulation Up Service (FRRS-Up) or Fast Responding Regulation Down Service (FRRS-Down) shall be zero; and

(r) The designated Master QSE of a Generation Resource that has been split to function as two or more Split Generation Resources shall provide Real-Time telemetry for items (a), (b), (c), (d), (e), (g), and (h) above, PSS and AVR status for the total Generation Resource in addition to the Split Generation Resource the Master QSE represents.

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| ***[NPRR1010, NPRR1014, and NPRR1029: Replace applicable portions of paragraph (2) above with the following upon system implementation for NPRR1014 or NPRR1029; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]***  (2) A QSE representing a Generation Resource connected to Transmission Facilities or distribution facilities shall provide the following Real-Time telemetry data to ERCOT for each Generation Resource. ERCOT shall make that data available, in accordance with ERCOT Protocols, NERC Reliability Standards, and Governmental Authority requirements, to requesting TSPs and DSPs operating within ERCOT. Such data must be provided to the requesting TSP or DSP at the requesting TSP’s or DSP’s expense, including:  (a) Net real power (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered gross real power and conversion constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process. Net real power represents the actual generation of a Resource for all real power dispatch purposes, including use in Security-Constrained Economic Dispatch (SCED), High Dispatch Limit (HDL), and Low Dispatch Limit (LDL), and is consistent with telemetered HSL, LSL, and Frequency Responsive Capacity (FRC);  (b) Gross real power (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered real power, which may include Supervisory Control and Data Acquisition (SCADA) metering, and conversions constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process;  (c) Gross Reactive Power (in Megavolt-Amperes reactive (MVAr));  (d) Net Reactive Power (in MVAr);  (e) Power to standby transformers serving plant auxiliary Load;  (f) Status of switching devices in the plant switchyard not monitored by the TSP or DSP affecting flows on the ERCOT Transmission Grid;  (g) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;  (h) Generation Resource breaker and switch status;  (i) HSL (Combined Cycle Generation Resources) shall:  (i) Submit the HSL of the current operating configuration; and  (ii) When providing ECRS, update the HSL as needed, to be consistent with Resource performance limitations of ECRS provision;  (j) For Resources with capacity that is not capable of providing Primary Frequency Response (PFR), the current FRC of the Resource;  (k) High Emergency Limit (HEL), under Section 6.5.9.2, Failure of the SCED Process;  (l) Low Emergency Limit (LEL), under Section 6.5.9.2;  (m) LSL;  (n) Configuration identification for Combined Cycle Generation Resources;  (o) For Resources with capacity that is not capable of providing PFR, the high and low limits in MW of the Resource’s capacity that is frequency responsive;  (p) For RRS, including any sub-categories of RRS, the physical capability (in MW) of the Resource to provide RRS;  (q) For Ancillary Services other than RRS, a blended Normal Ramp Rate (in MW/min) that reflects the physical capability of the Resource to provide that specific type of Ancillary Service;  (r) Five-minute blended Normal Ramp Rates (up and down);  (s) The designated Master QSE of a Generation Resource that has been split to function as two or more Split Generation Resources shall provide Real-Time telemetry for items (a), (b), (c), (d), (e), (g), and (h) above, PSS and AVR status for the total Generation Resource in addition to the Split Generation Resource the Master QSE represents;  (t) The telemetered MW of power augmentation capacity that is not On-Line for Resources that have power augmentation capacity included in HSL; and  (u) Ancillary Service Resource Responsibility for DRRS for each quantity of DRRS. |

(3) For each Intermittent Renewable Resource (IRR), the QSE shall set the HSL equal to the current net output capability of the facility. The net output capability should consider the net real power of the IRR generation equipment, IRR generation equipment availability, weather conditions, and whether the IRR net output is being affected by compliance with a SCED Dispatch Instruction.

(4) For each Aggregate Generation Resource (AGR), the QSE shall telemeter the number of its generators online.

(5) A QSE representing a Load Resource connected to Transmission Facilities or distribution facilities shall provide the following Real-Time data to ERCOT for each Load Resource and ERCOT shall make the data available, in accordance with ERCOT Protocols, NERC standards and policies, and Governmental Authority requirements, to the Load Resource’s host TSP or DSP at the TSP’s or DSP’s expense. The Load Resource’s net real power consumption, Low Power Consumption (LPC) and Maximum Power Consumption (MPC) shall be telemetered to ERCOT using a positive (+) sign convention:

(a) Load Resource net real power consumption (in MW);

(b) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;

(c) Load Resource breaker status, if applicable;

(d) LPC (in MW);

(e) MPC (in MW);

(f) Ancillary Service Schedule (in MW) for each quantity of RRS, ECRS, and Non-Spin, which is equal to the Ancillary Service Resource Responsibility minus the amount of Ancillary Service deployment;

(g) Ancillary Service Resource Responsibility (in MW) for each quantity of Reg-Up and Reg-Down for Controllable Load Resources, and RRS, ECRS, and Non-Spin for all Load Resources;

(h) The status of the high-set under-frequency relay, if required for qualification. The under-frequency relay for a Load Resource providing Non-Spin shall be disabled and the status of that relay shall indicate it as disabled or unarmed;

(i) For a Controllable Load Resource providing Non-Spin, the Scheduled Power Consumption that represents zero Ancillary Service deployments;

(j) For a single-site Controllable Load Resource with registered maximum Demand response capacity of ten MW or greater, net Reactive Power (in MVAr);

(k) Resource Status (Resource Status shall be ONRL if high-set under-frequency relay is active);

(l) Reg-Up and Reg-Down participation factor, which represents how a QSE is planning to deploy the Ancillary Service energy on a percentage basis to specific qualified Resource(s). The Reg-Up and Reg-Down participation factors for a Resource providing FRRS-Up or FRRS-Down shall be zero; and

(m) For a Controllable Load Resource providing Non-Spin, the “Scheduled Power Consumption Plus Two Hours,” representing the QSE’s forecast of the Controllable Load Resource’s instantaneous power consumption for a point two hours in the future.

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| ***[NPRR1010, NPRR1029, and NPRR1131: Replace applicable portions of paragraph (5) above with the following upon system implementation for NPRR1029 or NPRR1131; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]***  (5) A QSE representing a Load Resource connected to Transmission Facilities or distribution facilities shall provide the following Real-Time data to ERCOT for each Load Resource and ERCOT shall make the data available, in accordance with ERCOT Protocols, NERC standards and policies, and Governmental Authority requirements, to the Load Resource’s host TSP or DSP at the TSP’s or DSP’s expense. The Load Resource’s net real power consumption, Low Power Consumption (LPC) and Maximum Power Consumption (MPC) shall be telemetered to ERCOT using a positive (+) sign convention:  (a) Load Resource net real power consumption (in MW);  (b) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;  (c) Load Resource breaker status, if applicable;  (d) LPC (in MW);  (e) MPC (in MW);  (f) The Load Resource’s Ancillary Service self-provision (in MW) for RRS and/or ECRS provided via under-frequency relay;  (g) The status of the high-set under-frequency relay, if required for qualification. The under-frequency relay for a Load Resource providing Non-Spin shall be disabled and the status of that relay shall indicate it as disabled or unarmed;  (h) For a Controllable Load Resource providing Non-Spin, the Scheduled Power Consumption that represents zero Ancillary Service deployments;  (i) For a single-site Controllable Load Resource with registered maximum Demand response capacity of ten MW or greater, net Reactive Power (in MVAr);  (j) Resource Status;  (k) For an Aggregate Load Resource (ALR) providing Non-Spin, the “Scheduled Power Consumption Plus Two Hours,” representing the QSE’s forecast of the Controllable Load Resource’s instantaneous power consumption for a point two hours in the future;  (l) For RRS, including any sub-categories of RRS, the current physical capability (in MW) of the Resource to provide RRS;  (m) For Ancillary Service products other than RRS, a blended Normal Ramp Rate (in MW/min) that reflects the current physical capability of the Resource’s ability to provide a particular Ancillary Service product; and  (n) For a Controllable Load Resource, 5-minute blended Normal Ramp Rates (up and down). |

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| ***[NPRR1014 and NPRR1029: Insert applicable portions of paragraph (6) below upon system implementation and renumber accordingly:]***  (6) A QSE representing an ESR connected to Transmission Facilities or distribution facilities shall provide the following Real-Time telemetry data to ERCOT for each ESR. ERCOT shall make that data available, in accordance with ERCOT Protocols, NERC Reliability Standards, and Governmental Authority requirements, to requesting TSPs and DSPs operating within ERCOT. Such data must be provided to the requesting TSP or DSP at the requesting TSP’s or DSP’s expense, including:  (a) Net real power consumption or output (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered gross real power and conversion constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process. Net real power represents the actual generation or consumption of an ESR for all real power dispatch purposes, including use in Security-Constrained Economic Dispatch (SCED), in determination of High Dispatch Limit (HDL), and Low Dispatch Limit (LDL) and is consistent with telemetered HSL, LSL and Frequency Responsive Capacity (FRC);  (b) Gross real power consumption or output (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered real power, which may include Supervisory Control and Data Acquisition (SCADA) metering, and conversion constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process;  (c) Gross Reactive Power (in Megavolt-Amperes reactive (MVAr));  (d) Net Reactive Power (in MVAr);  (e) Power to standby transformers serving plant auxiliary Load;  (f) Status of switching devices in the plant switchyard not monitored by the TSP or DSP affecting flows on the ERCOT Transmission Grid;  (g) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;  (h) ESR breaker and switch status;  (i) HSL;  (j) High Emergency Limit (HEL), under Section 6.5.9.2, Failure of the SCED Process;  (k) Low Emergency Limit (LEL), under Section 6.5.9.2;  (l) LSL;  (m) For RRS, including any sub-category of RRS, the current physical capability (in MW) of the Resource to provide RRS;  (n) For Ancillary Services other than RRS, a blended ramp rate (in MW/min) that reflects the current physical capability of the Resource to provide that specific type of Ancillary Service; and  (o) Five-minute blended normal up and down ramp rates. |

(6) A QSE with Resources used in SCED shall provide communications equipment to receive ERCOT-telemetered control deployments.

(7) A QSE providing any Regulation Service shall provide telemetry indicating the appropriate status of Resources providing Reg-Up or Reg-Down, including status indicating whether the Resource is temporarily blocked from receiving Reg-Up and/or Reg-Down deployments from the QSE. This temporary blocking will be indicated by the enabling of the Raise Block Status and/or Lower Block Status telemetry points.

(a) Raise Block Status and Lower Block Status are telemetry points used in transient unit conditions to communicate to ERCOT that a Resource’s ability to adjust its output has been unexpectedly impaired.

(b) When one or both of the telemetry points are enabled for a Resource, ERCOT will cease using the regulation capacity assigned to that Resource for Ancillary Service deployment.

(c) This hiatus of deployment will not excuse the Resource’s obligation to provide the Ancillary Services for which it has been committed.

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| ***[NPRR1010, NPRR1014, and NPRR1029: Replace applicable portions of paragraph (c) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014 or NPRR1029:]***  (c) This hiatus of deployment will not excuse the Resource’s obligation to provide the Ancillary Services for which it has been awarded. |

(d) These telemetry points shall only be utilized during unforeseen transient unit conditions such as plant equipment failures. Raise Block Status and Lower Block Status shall only be enabled until the Resource operator has time to update the Resource limits and Ancillary Service telemetry to reflect the problem.

(e) The Resource limits and Ancillary Service telemetry shall be updated as soon as practicable.  Raise Block Status and Lower Block Status will then be disabled.

(8) Real-Time data for reliability purposes must be accurate to within three percent. This telemetry may be provided from relaying accuracy instrumentation transformers.

(9) Each QSE shall report the current configuration of combined-cycle Resources that it represents to ERCOT. The telemetered Resource Status for a Combined Cycle Generation Resource may only be assigned a Resource Status of OFFNS if no generation units within that Combined Cycle Generation Resource are On-Line.

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| ***[NPRR1010, NPRR1014, and NPRR1029: Replace applicable portions of paragraph (9) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014 or NPRR1029:]***  (9) Each QSE shall report the current configuration of combined-cycle Resources that it represents to ERCOT. The telemetered Resource Status for a Combined Cycle Generation Resource may only be assigned a Resource Status of OFF if no generation units within that Combined Cycle Generation Resource are On-Line. |

(10) A QSE representing Combined Cycle Generation Resources shall provide ERCOT with the possible operating configurations for each power block with accompanying limits. Combined Cycle Train power augmentation methods may be included as part of one or more of the registered Combined Cycle Generation Resource configurations. Power augmentation methods may include:

(a) Combustion turbine inlet air cooling methods;

(b) Duct firing;

(c) Other ways of temporarily increasing the output of Combined Cycle Generation Resources; and

(d) For Qualifying Facilities (QFs), an LSL that represents the minimum energy available for Dispatch by SCED, in MW, from the Combined Cycle Generation Resource based on the minimum stable steam delivery to the thermal host plus a justifiable reliability margin that accounts for changes in ambient conditions.

(11) A QSE representing Generation Resources other than Combined Cycle Generation Resources may telemeter an NFRC value for their Generation Resource only if the QSE or Resource Entity associated with that Generation Resource has first requested and obtained ERCOT’s approval of the Generation Resource’s NFRC quantity.

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| ***[NPRR1010, NPRR1014, and NPRR1029: Replace applicable portions of paragraph (11) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014 or NPRR1029:]***  (11) A QSE representing a Generation Resource other than a Combined Cycle Generation Resource may provide FRC telemetry for the Generation Resource only if the QSE or Resource Entity associated with that Generation Resource has first requested and obtained ERCOT’s approval. |

(12) A QSE representing an ESR shall provide the following Real-Time telemetry data to ERCOT for each ESR:

(a) Maximum Operating State of Charge, in MWh;

(b) Minimum Operating State of Charge, in MWh;

(c) State of Charge, in MWh;

(d) Maximum Operating Discharge Power Limit, in MW; and

(e) Maximum Operating Charge Power Limit, in MW.

(13) In accordance with ERCOT Protocols, NERC Reliability Standards, and Governmental Authority requirements, ERCOT shall make the data specified in paragraph (12) available to any requesting TSP or DSP at the requesting TSP’s or DSP’s expense.

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| ***[NPRR1077: Insert paragraphs (14)-(16) below upon system implementation:]***  (14) Except as provided in paragraph (15) below, a QSE representing a Settlement Only Generator (SOG) shall provide ERCOT the following Real-Time telemetry:  (a) Net real power injection at the Point of Interconnection (POI) or Point of Common Coupling (POCC) for each site with one or more SOGs;  (b) For any site with one or more ESSs that are registered as an SOG, net real power withdrawal at the POI or POCC;  (c) For each inverter at the site, gross real power output measured at the generator terminals for all SOGs that are located behind that inverter, separately aggregated by fuel type;  (d) For SOGs at the same site that are not located behind an inverter, gross real power output measured at the generator terminals for all SOGs, separately aggregated by fuel type;  (e) For any site with one or more ESSs registered as an SOG, for each inverter, gross real power withdrawal by all such ESSs that are located behind that inverter, as measured at the generator terminals; and  (f) Generator breaker status.  (15) A QSE is not required to provide telemetry for a Settlement Only Distribution Generator (SODG) if:  (a) The site that includes the SODG has not exported more than 10 MWh in any calendar year, exclusive of any energy exported during any Settlement Interval in which an ERCOT-declared Energy Emergency Alert (EEA) is in effect;  (b) The QSE or Resource Entity for the SODG has submitted a written request to ERCOT seeking an exemption from the telemetry requirements under this paragraph; and  (c) ERCOT has provided the QSE or Resource Entity written confirmation that the SODG is exempt from providing telemetry under this paragraph.  (16) If ERCOT determines that a site that includes an SODG has exported more than 10 MWh in a given calendar year, it shall notify the SODG’s QSE that the SODG is no longer eligible for the telemetry exemption. Within 90 days of receiving this notification, the QSE for the SODG shall comply with the telemetry requirements of paragraph (14) above. |

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| ***[NPRR885: Insert paragraph (17) below upon system implementation:]***  (17) A QSE representing a Must-Run Alternative (MRA) shall telemeter the MRA MW currently available (unloaded) and not included in the HSL. |

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| ***[NPRR1029: Insert paragraph (18) below upon system implementation:]***  (18) A QSE representing a DC-Coupled Resource shall provide the following Real-Time telemetry data in addition to that required for other ESRs:  (a) Gross AC MW production of the intermittent renewable generation component of the DC-Coupled Resource, which includes the portion of the intermittent renewable generation used to charge the ESS and/or serve auxiliary Load on the DC side of the inverter; and  (b) Gross AC MW capability of the intermittent renewable generation component of the DC-Coupled Resource, based on Real-Time conditions. |

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| ***[NPRR995: Insert paragraph (19) below upon system implementation:]***  (19) A QSE representing a Settlement Only Energy Storage System (SOESS) that elects to include the net generation and/or net withdrawals of the SOESS in the estimate of Real-Time Liability (RTL) shall provide ERCOT Real-Time telemetry of the net generation and/or net withdrawals of the SOESS. |

**6.5.7.3.1Determination 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 Controllable Load Resources;

(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 Controllable Load Resources 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 Controllable Load Resources 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 Controllable Load Resources 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 approved by the ERCOT Board. ERCOT shall update parameter values on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. | | |

(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.

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| ***[NPRR904, NPRR1006, NPRR1010, NPRR1014, NPRR1091, and NPRR1105: Replace applicable portions of Section 6.5.7.3.1 above with the following upon system implementation for NPRR904, NPRR1006, NPRR1014, NPRR1091, or NPRR1105; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]***  **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 Controllable Load Resources;  (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; and  (o) ERCOT-directed deployment of 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, 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 Controllable Load Resources excluding ones with a telemetered status of OUTL:  (i) If the Controllable Load 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 Controllable Load 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.  (f) Add the deployed MW from Load Resources that are not Controllable Load Resources 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 Controllable Load Resources 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 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 approved by the ERCOT Board. ERCOT shall update parameter values on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. | | |   (h) 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.  (i) 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.  (j) 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.  (k) 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.  (l) 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.  (m) 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.  (n) 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, 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 Report on Capacity, Demand and Reserves 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 (g) above.  (o) Perform a SCED with changes to the inputs in items (a) through (m) above, considering only Competitive Constraints and the non-mitigated Energy Offer Curves.  (p) Perform mitigation on the submitted Energy Offer Curves using the LMPs from the previous step as the reference LMP.  (q) Perform a SCED with the changes to the inputs in items (a) through (m) above, considering both Competitive and Non-Competitive Constraints and the mitigated Energy Offer Curves.  (r) The Real-Time Reliability Deployment Price Adder for Energy is equal to the positive difference between the System Lambda from item (q) 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.  (s) 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 (q) above and 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 Controllable Load Resources;

(iii) Controllable Load Resources; and

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

(b) Ancillary Service Resource Responsibility for RRS from:

(i) Generation Resources;

(ii) Load Resources excluding Controllable Load Resources;

(iii) Controllable Load Resources; and

(iv) Resources capable of FFR;

(c) ECRS capacity from:

(i) Generation Resources;

(ii) Load Resources excluding Controllable Load Resources;

(iii) Controllable Load Resources; and

(iv) Quick Start Generation Resources (QSGRs);

(d) Ancillary Service Resource Responsibility for ECRS from:

(i) Generation Resources;

(ii) Load Resources excluding Controllable Load Resources; and

(iii) Controllable Load Resources; 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 Controllable Load Resources in the ERCOT System that can be used to decrease Base Points (energy consumption) in SCED;

(vi) With RTM Energy Bid curves from available Controllable Load Resources 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.

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**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**





***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***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 Controllable Load Resources 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 Controllable Load Resources active in SCED and not carrying Ancillary Service Resource Responsibility**





***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 15 minutes per the State of Charge), else Min(X% of (HSL – LSL(ESR “charging”) based on droop, the capacity that can be sustained for 15 minutes per the State of Charge – LSL(ESR “charging”)))**





***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 Controllable Load Resources active in SCED and carrying Ancillary Service Resource Responsibility |
| PRC6 | MW | Capacity from Controllable Load Resources 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 Controllable Load Resources carrying Ancillary Service Resource Responsibility |
| LRDF\_2 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources 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 Controllable Load Resources (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.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1010, NPRR1014, NPRR1029, and NPRR1204: Replace applicable portions of Section 6.5.7.5 above with the following upon system implementation for NPRR1014 or NPRR1029; 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 Controllable Load Resources, capable of responding via under-frequency relay;  (iii) Controllable Load Resources 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 Controllable Load Resources, capable of responding by under-frequency relay;  (iii) Controllable Load Resources in the form of PFR; and  (iv) Resources providing FFR;  (c) ECRS capability from:  (i) Generation Resources;  (ii) Load Resources excluding Controllable Load Resources;  (iii) Controllable Load Resources;  (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 Controllable Load Resources; and  (iii) Controllable Load Resources;  (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 Responsibility for DRRS;(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;  (k) 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 RTM Energy Bid curves from available Controllable Load Resources in the ERCOT System that can be used to decrease Base Points (energy consumption) in SCED;  (vi) With RTM Energy Bid curves from available Controllable Load Resources 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, irrespective of whether it is capable of providing Non-Spin; and  (C) Capacity to provide Reg-Up, RRS, ECRS, or Non-Spin, in any combination;  (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 Controllable Load Resources active in SCED 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 Controllable Load Resources active in SCED 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 15 minutes per the State of Charge), else Min(X% of (HSL – LSL(ESR “charging”) based on droop, the capacity that can be sustained for 15 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 15 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 15 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 Controllable Load Resources active in SCED with an Ancillary Service Resource award | | PRC6 | MW | Capacity from Controllable Load Resources active in SCED 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 Controllable Load Resources awarded an Ancillary Service Resource award | | LRDF\_2 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources 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 Controllable Load Resources (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 to manage grid uncertainty while mitigating the need for Reliability Unit Commitment (RUC) instructions and to ensure appropriate reliability during extreme heat and extreme cold weather conditions and during times of low non-dispatchable power production in the power region through compliance with the reliability standard adopted by the Public Utility Commission of Texas (PUCT). 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 DRRS by operator Dispatch Instruction. The deployment of DRRS must always be 100% of the Ancillary Service Resource Responsibility for DRRS on an individual Resource.

(3) Resources providing DRRS must be Off-Line until deployed by ERCOT. Once a Resource is deployed for DRRS and that Resource is available for dispatch through Security-Constrained Economic Dispatch (SCED) with a Resource Status of ON, ERCOT shall use SCED to determine the amount of energy to be dispatched from the Resource.

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

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

***6.7.4 Failure to Provide Dispatchable Reliability Reserve (DRRS) Ancillary Service***

**6.7.4.1 Charges for a Failure to Provide Dispatchable Reliability Reserve (DRRS) Ancillary Service**

(1) A charge to each QSE that fails to provide its Dispatchable Reliability Reserve (DRRS) Ancillary Service Supply Responsibility, due to its failure to provide, is calculated for a given Operating Hour as follows:

(a) The total charge of failure on Ancillary Service Supply Responsibility for DRRS by QSE, if applicable:

**DRRFQAMT *q* = MCPCDRR *DAM* \* TDRRFQ *q***

Where:

TDRRFQ *q* =Max ((DASADRRQ *q* + DRRTRSQ *q* + PCDRR *q* – DRRTRPQ *q* ) – TELDRRR *q, r*, 0)



The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| DRRFQAMT *q* | $ | *DRRS Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for DRRS, for the hour. |
| MCPCDRR *DAM* | $/MW per hour | *Market Clearing Price for Capacity for DRRS—*The MCPC for DRRS in the DAM, for the hour. |
| DASADRRQ *q* | MW | *Day-Ahead Self-Arranged DRRS Quantity per QSE* —The self-arranged DRRS quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| DRRTRSQ *q* | MW | *DRRS Trade Sale per QSE—*QSE *q*’s total time-weighted average capacity Trade Sale for DRRS, for the hour. The time-weighted average value is rounded to 0.1 MW. |
| PCDRR *q* | MW | *Procured Capacity for DRRS per QSE in DAM*—The total DRRS Service capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. |
| DRRTRPQ *q* | MW | *DRRS Trade Purchases per QSE—*QSE *q*’s total time-weighted average capacity Trade Purchasefor DRRS, for the hour. The time-weighted average value is rounded to 0.1 MW. |
| TELDRRR *q, r* | MW | *Telemetered DRRS Responsibility for the Resource—*The time-weighted average telemetered DRRS Ancillary Service Resource Responsibility for the Resource *r*, represented by QSE *q*, for the hour. The time-weighted average value is rounded to 0.1 MW. |
| TDRRFQ *q* | MW | *Telemetered DRRS Failure Quantity per QSE—*Calculated failure quantity for QSE *q* by comparing its average telemetered DRRS Responsibility sum to its Ancillary Service Supply Responsibility for DRRS, for the hour. |
| *i* | None | A 15-minute Settlement Interval within the Operating Hour. |
| *q* | None | A QSE. |
| *r* | None | A Resource that is qualified to provide DRRS. |

**6.7.4.2 Allocation of Charges for a Failure to Provide Dispatchable Reliability Reserve (DRRS) Ancillary Service**

(1)ERCOT shall allocate the failure to provide DRRS charges collected to the QSEs representing Load based on the Hourly Load Ratio Share (HLRS). The payment to each QSE for each Operating Hour is calculated as follows:

**LADRRFQAMT *q* = DRRFQAMTTOT \* HLRS *q***

Where:

DRRFQAMTTOT = DRRFQAMT *q*



The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| LADRRFQAMT *q* | $ | *Load- Allocated DRRS Failure Quantity Amount per QSE –* The payment to QSE *q* for its share of the failure to provide charges for the hour. |
| DRRFQAMTTOT | $ | *DRRS Failure Quantity Amount Total*—The charge to all QSEs for the total capacity associated with failures on Ancillary Service Supply Responsibility for DRRS, for the hour. |
| DRRFQAMT *q* | $ | *DRRS Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for DRRS, for the 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. |
| *q* | None | A QSE. |

***6.7.5 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. |

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| ***[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. |

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| ***[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. |

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| ***[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. |

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| ***[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: Replace Section 6.7.5 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***  ***6.7.5 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* + 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. | | 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. | |

**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. DRRS may only be provided from capability that is not fulfilling any other energy or capacity commitment.

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

(3) For any Resource requesting qualification for providing 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 system and determine the Resource’s qualification to provide DRRS.

(4) For Resources providing DRRS, the Resource must be able to operate at its High Sustained Limit (HSL) for a number of consecutive hours, as determined by ERCOT, but no less than four 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) 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 Resource Responsibility 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, GADS reports, plant operator logs, work orders, or other applicable information.

(4) Resources that been made available through a dispatch of DRRS will be economically dispatched by SCED.

***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.

***9.5.3 Real-Time Market Settlement Charge Types***

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

(a) Section 5.7.1, RUC Make-Whole Payment;

(b) Section 5.7.2, RUC Clawback Charge;

(c) Section 5.7.3, Payment When ERCOT Decommits a QSE-Committed Resource;

(d) Section 5.7.4.1, RUC Capacity-Short Charge;

(e) Section 5.7.4.2, RUC Make-Whole Uplift Charge;

(f) Section [5.7.5, RUC Clawback Payment](#_Toc109528011);

(g) Section [5.7.6, RUC Decommitment Charge](#_Toc109528014);

(h) Section 6.6.3.1, Real-Time Energy Imbalance Payment or Charge at a Resource Node;

(i) Section 6.6.3.2, Real-Time Energy Imbalance Payment or Charge at a Load Zone;

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

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

(l) Section 6.6.3.5, Real-Time Payment for a Block Load Transfer Point;

(m) Section 6.6.3.6, Real-Time High Dispatch Limit Override Energy Payment;

(n) Section 6.6.3.7, Real-Time High Dispatch Limit Override Energy Charge;

(o) 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);

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

(q) Section 6.6.5.1.1.1, Base Point Deviation Charge for Over Generation;

(r) Section 6.6.5.1.1.2, Base Point Deviation Charge for Under Generation;

(s) Section 6.6.5.2, IRR Generation Resource Base Point Deviation Charge;

(t) Section 6.6.5.4, Base Point Deviation Payment;

(u) Section 6.6.6.1, RMR Standby Payment;

(v) Section 6.6.6.2, RMR Payment for Energy;

(w) Section 6.6.6.3, RMR Adjustment Charge;

(x) Section 6.6.6.4, RMR Charge for Unexcused Misconduct;

(y) Section 6.6.6.5, RMR Service Charge;

(z) Section 6.6.6.6, Method for Reconciling RMR Actual Eligible Costs, RMR and MRA Contributed Capital Expenditures, and Miscellaneous RMR Incurred Expenses;

(aa) Paragraph (2) of Section 6.6.7.1, Voltage Support Service Payments;

(bb) Paragraph (4) of Section 6.6.7.1;

(cc) Section 6.6.7.2, Voltage Support Charge;

(dd) Section 6.6.8.1, Black Start Hourly Standby Fee Payment;

(ee) Section 6.6.8.2, Black Start Capacity Charge;

(ff) Section 6.6.9.1, Payment for Emergency Power Increase Directed by ERCOT;

(gg) Section 6.6.9.2, Charge for Emergency Power Increases;

(hh) Section 6.6.10, Real-Time Revenue Neutrality Allocation;

(ii) Section 6.6.14.2, Firm Fuel Supply Service Hourly Standby Fee Payment and Fuel Replacement Cost Recovery;

(jj) Section 6.6.14.3, Firm Fuel Supply Service Capacity Charge;

(kk) Paragraph (1)(a) of Section 6.7.1, Payments for Ancillary Service Capacity Sold in a Supplemental Ancillary Services Market (SASM) or Reconfiguration Supplemental Ancillary Services Market (RSASM);

(ll) Paragraph (1)(b) of Section 6.7.1;

(mm) Paragraph (1)(c) of Section 6.7.1;

(nn) Paragraph (1)(d) of Section 6.7.1;

(oo) Paragraph (1)(e) of Section 6.7.1;

(pp) Paragraph (1)(a) of Section 6.7.2, Payments for Ancillary Service Capacity Assigned in Real-Time Operations;

(qq) Paragraph (1)(b) of Section 6.7.2;

(rr) Paragraph (1)(c) of Section 6.7.2;

(ss) Paragraph (1)(a) of Section 6.7.2.1, Charges for Infeasible Ancillary Service Capacity Due to Transmission Constraints;

(tt) Paragraph (1)(b) of Section 6.7.2.1;

(uu) Paragraph (1)(c) of Section 6.7.2.1;

(vv) Paragraph (1)(d) of Section 6.7.2.1;

(ww) Paragraph (1)(e) of Section 6.7.2.1;

(xx) Paragraph (1)(a) of Section 6.7.3, Charges for Ancillary Service Capacity Replaced Due to Failure to Provide;

(yy) Paragraph (1)(b) of Section 6.7.3;

(zz) Paragraph (1)(c) of Section 6.7.3;

(aaa) Paragraph (1)(d) of Section 6.7.3;

(bbb) Paragraph (1)(e) of Section 6.7.3;

(ccc) Paragraph (2) of Section 6.7.4, Adjustments to Cost Allocations for Ancillary Services Procurement;

(ddd) Paragraph (3) of Section 6.7.4;

(eee) Paragraph (4) of Section 6.7.4;

(fff) Paragraph (5) of Section 6.7.4;

(ggg) Paragraph (6) of Section 6.7.4;

(hhh) Paragraph (7) of Section 6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge (Real-Time Ancillary Service Imbalance Amount);

(iii) Paragraph (7) of Section 6.7.5, (Real-Time Reliability Deployment Ancillary Service Imbalance Amount);

(jjj) Paragraph (8) of Section 6.7.5, (Real-Time RUC Ancillary Service Reserve Amount);

(kkk) Paragraph (8) of Section 6.7.5, (Real-Time Reliability Deployment RUC Ancillary Service Reserve Amount);

(lll) Section 6.7.6, Real-Time Ancillary Service Imbalance Revenue Neutrality Allocation (Load-Allocated Ancillary Service Imbalance Revenue Neutrality Amount);

(mmm) Section 6.7.6, (Load-Allocated Reliability Deployment Ancillary Service Imbalance Revenue Neutrality Amount);

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

(ooo) Section 9.16.1, ERCOT System Administration Fee.

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| ***[NPRR841, NPRR885, NPRR963, NPRR995, NPRR1012, and NPRR1014: Replace applicable portions of paragraph (1) above with the following upon system implementation for NPRR841, NPRR885, NPRR963, NPRR995, or NPRR1014; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1012:]***  (1) ERCOT shall provide, on each RTM Settlement Statement, the dollar amount for each RTM Settlement charge and payment. The RTM Settlement “Charge Types” are:  (a) Section 5.7.1, RUC Make-Whole Payment;  (b) Section 5.7.2, RUC Clawback Charge;  (c) Section 5.7.3, Payment When ERCOT Decommits a QSE-Committed Resource;  (d) Section 5.7.4.1, RUC DRRS-Short Charge;  (e) Section 5.7.4.2, RUC Capacity-Short Charge;  (f) Section 5.7.4.3, RUC Make-Whole Uplift Charge;  (g) Section [5.7.5, RUC Clawback Payment](#_Toc109528011);  (h) Section [5.7.6, RUC Decommitment Charge](#_Toc109528014);  (i) Section 6.6.3.1, Real-Time Energy Imbalance Payment or Charge at a Resource Node;  (j) Section 6.6.3.2, Real-Time Energy Imbalance Payment or Charge at a Load Zone;  (k) Section 6.6.3.3, Real-Time Energy Imbalance Payment or Charge at a Hub;  (l) Section 6.6.3.4, Real-Time Energy Payment for DC Tie Import;  (m) Section 6.6.3.5, Real-Time Payment for a Block Load Transfer Point;  (n) Section 6.6.3.6, Real-Time High Dispatch Limit Override Energy Payment;  (o) Section 6.6.3.7, Real-Time High Dispatch Limit Override Energy Charge;  (p) 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);  (q) Section 6.6.4, Real-Time Congestion Payment or Charge for Self-Schedules;  (r) Section 6.6.5.2, Set Point Deviation Charge for Over Generation;  (s) Section 6.6.5.2.1, Set Point Deviation Charge for Under Generation;  (t) Section 6.6.5.3, Controllable Load Resource Set Point Deviation Charge for Over Consumption;  (u) Section 6.6.5.3.1, Controllable Load Resource Set Point Deviation Charge for Under Consumption;  (v) Section 6.6.5.4, IRR Generation Resource Set Point Deviation Charge;  (w) Section 6.6.5.4, Set Point Deviation Payment;  (x) Section 6.6.5.5, Energy Storage Resource Set Point Deviation Charge for Over Performance;  (y) Section 6.6.5.5.1, Energy Storage Resource Set Point Deviation Charge for Under Performance;  (z) Section 6.6.6.1, RMR Standby Payment;  (aa) Section 6.6.6.2, RMR Payment for Energy;  (bb) Section 6.6.6.3, RMR Adjustment Charge;  (cc) Section 6.6.6.4, RMR Charge for Unexcused Misconduct;  (dd) Section 6.6.6.5, RMR Service Charge;  (ee) Section 6.6.6.6, Method for Reconciling RMR Actual Eligible Costs, RMR and MRA Contributed Capital Expenditures, and Miscellaneous RMR Incurred Expenses;  (ff) Section 6.6.6.7, MRA Standby Payment;  (gg) Section 6.6.6.8, MRA Contributed Capital Expenditures Payment;  (hh) Section 6.6.6.9, MRA Payment for Deployment Event;  (ii) Section 6.6.6.10, MRA Variable Payment for Deployment;  (jj) Section 6.6.6.11, MRA Charge for Unexcused Misconduct;  (kk) Section 6.6.6.12, MRA Service Charge;  (ll) Paragraph (3) of Section 6.6.7.1, Voltage Support Service Payments;  (mm) Paragraph (5) of Section 6.6.7.1;  (nn) Section 6.6.7.2, Voltage Support Charge;  (oo) Section 6.6.8.1, Black Start Hourly Standby Fee Payment;  (pp) Section 6.6.8.2, Black Start Capacity Charge;  (qq) Section 6.6.9.1, Payment for Emergency Operations Settlement;  (rr) Section 6.6.9.2, Charge for Emergency Operations Settlement;  (ss) Section 6.6.10, Real-Time Revenue Neutrality Allocation;  (tt) Section 6.6.11.1, Emergency Response Service Capacity Payments;  (uu) Section 6.6.11.2, Emergency Response Service Capacity Charge;  (vv) Section 6.6.14.2, Firm Fuel Supply Service Hourly Standby Fee Payment and Fuel Replacement Cost Recovery;  (ww) Section 6.6.14.3, Firm Fuel Supply Service Capacity Charge;  (xx) Section 6.7.3.1, Charges for a Failure to Provide Dispatchable Reliability Reserve Service (DRRS) Ancillary Service;  (yy) Section 6.7.3.2, Allocation of Charges for a Failure to Provide Dispatchable Reliability Reserve Service (DRRS) Ancillary Service;  (zz) Section 6.7.4, Real-Time Settlement for Updated Day-Ahead Market Ancillary Service Obligations;  (aaa) Section 6.7.5.2, Regulation Up Service Payments and Charges;  (bbb) Section 6.7.5.3, Regulation Down Service Payments and Charges;  (ccc) Section 6.7.5.4, Responsive Reserve Payments and Charges;  (ddd) Section 6.7.5.5 , Non-Spinning Reserve Service Payments and Charges;  (eee) Section 6.7.5.6 , ERCOT Contingency Reserve Service Payments and Charges;  (fff) Section 6.7.5.7 , Real-Time Derated Ancillary Service Capability Payment;  (ggg) Section 6.7.5.8 , Real-Time Derated Ancillary Service Capability Charge;  (hhh) Section 6.7.6, Real-Time Ancillary Service Revenue Neutrality Allocation;  (iii) Section 7.9.2.1, Payments and Charges for PTP Obligations Settled in Real-Time; and  (jjj) Section 9.16.1, ERCOT System Administration Fee. |

(2) In the event that ERCOT is unable to execute the Day-Ahead Market (DAM), ERCOT shall provide, on each RTM Settlement Statement, the dollar amount for the following RTM Congestion Revenue Right (CRR) Settlement charges and payments:

(a) Section 7.9.2.4, Payments for FGRs in Real-Time; and

(b) Section 7.9.2.5, Payments and Charges for PTP Obligations with Refund in Real-Time.

***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;

(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*))

+ ((MCPCDRR *DAM* – DRROPR *q, r, DAM*) \* PCDRRR *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*

(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:

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| **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. |
| 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*⎯The 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 Point*⎯The total amount of energy represented by QSE *q*’s DAM Energy Bids that would have cleared 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. |
| PCDRRR *r, q, DAM* | 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. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| 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. |
| DRROPR*q, r, DAM* | $/MW per hour | *Dispatchable Reliability Reserve Offer Price*—The offer price for Resource *r* represented by QSE *q,* for the impacted DRRS Ancillary Service Offers. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MCPCRU *DAM* | $/MW per hour | *Market Clearing Price for Capacity for 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. |
| 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*. |

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| DAOBLPR (*j, k)* | $/MWh | *Day-Ahead Obligation Price per pair of source and sink*⎯The DAM clearing price of a PTP Obligation bid with the source *j,* and the sink *k*, for the hour. |
| RTOBLPR *(j, k)* | $/MWh | *Real-Time Obligation Price per pair of source and sink*⎯The Real-Time calculated price of a PTP Obligation bid with the source *j,* and the sink *k*, for the 15 minute period. |
| *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. |

***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 Service 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.

1. PURA § 39.159 (“Power Region Reliability and Dispatchable Generation”). Subsection (a) defines “a generation facility [is] non-dispatchable if the facility's output is controlled primarily by forces outside of human control.”). [↑](#footnote-ref-1)
2. PURA § 39.159(d)(1): “[ERCOT] shall: (1) *determine the quantity of services necessary* based on historical variations in generation availability for each season based on a targeted reliability standard or goal, including intermittency of non-dispatchable generation facilities and forced outage rates, *for dispatchable generation facilities*; ….” (*emphasis added*). [↑](#footnote-ref-2)
3. PURA § 39.159(d)(2): “[ERCOT] shall: (…) (2) develop criteria for resource participation that requires a resource to: (A) be capable of running for at least four hours at the resource's high sustained limit; (B) be online and dispatchable not more than two hours after being called on for deployment; and (C) have the dispatchable flexibility to address inter-hour operational challenges; …” [↑](#footnote-ref-3)
4. *Id.* (PURA § 39.159(d)(2)(C)) [↑](#footnote-ref-4)
5. PURA § 39.159(e): “Notwithstanding Subsection (d)(2)(A), [ERCOT] may require a resource to be capable of running for more than four hours as the organization determines is needed.” [↑](#footnote-ref-5)
6. *Supra* Note 3 (PURA § 39.159(d)(2)(A)) [↑](#footnote-ref-6)
7. PURA § 39.159(b): “The commission shall ensure that the independent organization certified under Section 39.151 for the ERCOT power region: (1) *establishes requirements to meet the reliability needs of the power region*; (2) periodically, but at least annually, determines the quantity and characteristics of ancillary or reliability services necessary to ensure appropriate reliability during extreme heat and extreme cold weather conditions and during times of low non-dispatchable power production in the power region; (3) procures ancillary or reliability services on a competitive basis to ensure appropriate reliability during extreme heat and extreme cold weather conditions and during times of low non-dispatchable power production in the power region; (4) develops appropriate qualification and performance requirements for providing services under Subdivision (3), including appropriate penalties for failure to provide the services; and (5) sizes the services procured under Subdivision (3) to prevent prolonged rotating outages due to net load variability in high demand and low supply scenarios.” (*emphasis added*). Note that recently-adopted 16 Texas Admin. Code (TAC) 25.508 “implements Public Utility Regulatory Act (PURA) §39.159(b)(1) as revised by Section 18 of Senate Bill (S.B.) 3 during the Texas 87th Regular Legislative Session.” *See* Project No. 54584 (“Reliability Standard for the ERCOT Region”), *Order Adopting New §25.508* at 1 (September 9, 2024). [↑](#footnote-ref-7)
8. PURA § 39.159(c): “the commission shall ensure that: (1) resources that provide services under Subsection (b) are *dispatchable and able to meet continuous operating requirements* for the season in which the service is procured; (2) *winter resource capability qualifications* for a service described by Subsection (b) include on-site fuel storage, dual fuel capability, or fuel supply arrangements to *ensure winter performance for several days*; and (3) *summer resource capability qualifications* for a service described by Subsection (b) *include facilities or procedures to ensure operation under drought conditions*.” (*emphasis added*). [↑](#footnote-ref-8)
9. PURA § 39.159(b)(1); see *Supra* Note 7. [↑](#footnote-ref-9)
10. PURA § 39.159(b)(3); see *Supra* Note 7. [↑](#footnote-ref-10)
11. PURA § 39.159(e); see *Supra* Note 5. [↑](#footnote-ref-11)
12. *Supra* Note 7. [↑](#footnote-ref-12)
13. Project No. 52373 (“Review of Wholesale Electric Market Design”), Item No. 384 *The Coalition for Dispatchable Reliability Reserve Service’s Comments* (December 14, 2022). <https://interchange.puc.texas.gov/search/documents/?controlNumber=52373&itemNumber=384> (DRRS Coalition Comments) [↑](#footnote-ref-13)
14. Project No. 52373 (“Review of Wholesale Electric Market Design”), Item No. 373 *E3 Report and Staff Memo* (November 10, 2022). <https://interchange.puc.texas.gov/search/documents/?controlNumber=52373&itemNumber=382> (E3 Report) [↑](#footnote-ref-14)
15. DRRS Coalition comments at 5. [↑](#footnote-ref-15)
16. *Id* at 7. [↑](#footnote-ref-16)
17. *Id* at 3. [↑](#footnote-ref-17)
18. *Id* at 7. [↑](#footnote-ref-18)
19. TXOGA press release (February 27, 2023). <https://www.txoga.org/pcm-drs-assessment/> [↑](#footnote-ref-19)
20. *Assessment of ERCOT Market Reform Alternatives Initial Results* by Bates White Economic Consulting (February 22, 2023). <https://static.spacecrafted.com/f6d99445c40c46b0969fc2bad3ba924c/r/d664a92d37c147408177b6717dc1f280/1/Bates%20White%20-%20ERCOT%20Reforms%20Initial%20Review%202.27.23.pdf> [↑](#footnote-ref-20)
21. *Assessment of ERCOT Market Reform Alternatives*, by Bates White Economic Consulting (May 17, 2023). <https://static.spacecrafted.com/f6d99445c40c46b0969fc2bad3ba924c/r/b0d789f75aa94fcc9a4f9724f91288b6/1/Bates%20White%20-%20Assessment%20of%20ERCOT%20Market%20Reform%20Alternatives%202023.05.17.pdf> [↑](#footnote-ref-21)
22. TXOGA press release (May 17, 2023). <https://www.txoga.org/final-electricity-market-assessment-pcm-bates-white/> [↑](#footnote-ref-22)
23. Bates White Report at 27: “PCM would be a novel and untested alteration to the ERCOT market that would be significantly more complex to implement than the DRRS uncertainty product…” [↑](#footnote-ref-23)
24. *Id* at 20-22. [↑](#footnote-ref-24)
25. *Id* at 24-25. [↑](#footnote-ref-25)
26. <https://txcares.co/> [↑](#footnote-ref-26)
27. PURA § 39.159(b) [↑](#footnote-ref-27)
28. PURA § 39.159(d)(1) [↑](#footnote-ref-28)
29. PURA § 39.159(d)(2)(A) [↑](#footnote-ref-29)
30. PURA § 39.159(e) [↑](#footnote-ref-30)
31. PURA § 39.159(d)(2)(B) [↑](#footnote-ref-31)
32. PURA § 39.159(d)(2)(C) [↑](#footnote-ref-32)
33. PURA § 39.159(d)(3) [↑](#footnote-ref-33)