|  |  |  |  |
| --- | --- | --- | --- |
| NPRR Number | [1149](https://www.ercot.com/mktrules/issues/NPRR1149) | NPRR Title | Implementation of Systematic Ancillary Service Failed Quantity Charges |
| Date of Decision | February 28, 2023 |
| Action | Recommended Approval |
| Timeline  | Normal |
| Proposed Effective Date | Upon system implementation |
| Priority and Rank Assigned | Priority – 2023; Rank – 3780 |
| Nodal Protocol Sections Requiring Revision  | 2.1, Definitions4.4.7.4, Ancillary Service Supply Responsibility6.3.2, Activities for Real-Time Operations6.4.1, Capacity Trade, Energy Trade, Self-Schedule, and Ancillary Service Trades6.4.9.1.3, Replacement of Ancillary Service Due to Failure to Provide6.7.3, Charges for Ancillary Service Capacity Replaced Due to Failure to Provide6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge |
| Related Documents Requiring Revision/Related Revision Requests | None |
| Revision Description | This Nodal Protocol Revision Request (NPRR) charges a Qualified Scheduling Entity (QSE) an Ancillary Service failed quantity if the Ancillary Service Supply Responsibility held by the QSE is not met by Resources in their portfolio in Real-Time, based on a comparison of their Real-Time telemetry. The charges will be done systematically without ERCOT Operators having to take additional action. Specific Protocol changes include:* Details on the new calculations that will be used to do the comparison between Ancillary Service Supply Responsibility and Real-Time telemetry after the Operating Hour is complete;
* Enhancing language in Section 4.4.7.4 to clarify that although a QSE may hold an Ancillary Service Supply Responsibility without having Resources, that responsibility must be met by Resources in Real-Time. The language proposed in this section does not create new responsibilities but clarifies existing requirements for how a QSE must meet its Ancillary Service Supply Responsibility;
* A check on Load Resources providing Responsive Reserve (RRS), Non-Spinning Reserve (Non-Spin), and ERCOT Contingency Reserve Service (ECRS), to ensure that during the deployment period their telemetered Ancillary Service Resource Responsibility does not exceed the amount of deployed MW and overstate the amount of responsibility being carried by that Resource;
* Expanding the window of time during which a QSE can submit an Ancillary Service Trade to include the Operating Period; and
* Other aligning edits.

Under this NPRR, ERCOT Operators retain the ability to charge a failed quantity and replace the MW with a Supplemental Ancillary Services Market (SASM) if they so choose. |
| Reason for Revision |  Addresses current operational issues. Meets Strategic goals (tied to the [ERCOT Strategic Plan](http://www.ercot.com/content/wcm/lists/144926/ERCOT_Strategic_Plan_2019-2023.pdf) or directed by the ERCOT Board). Market efficiencies or enhancements Administrative Regulatory requirements Other: (explain)*(please select all that apply)* |
| Business Case | In May 2019, ERCOT filed NPRR947, Clarification to Ancillary Service Supply Responsibility Definition and Improvements to Determining and Charging for Ancillary Service Failed Quantities, which proposed very similar changes as proposed in this NPRR. NPRR947 was withdrawn by ERCOT after months of deliberation because, although it is important to ensure that QSEs are providing the Ancillary Services for which they are being compensated, the improvements proposed in NPRR947 were deemed to be made obsolete and the issue would be resolved by the implementation of Real-Time Co-Optimization (RTC) of energy and Ancillary Services, scheduled for implementation in 2024. As is widely known today, the effort to implement RTC is currently on hold and a new date for expected implementation is unknown. Additionally, following winter storm Uri, the ERCOT Independent Market Monitor (IMM), Potomac Economics, filed a recommendation at the Public Utility Commission of Texas (PUCT) in Project 51812, Issues Related to the State of Disaster for the February 2021 Winter Weather Event, that ERCOT should charge failed quantities based on Real-Time telemetry and outcomes during the storm. The PUCT agreed with this recommendation (*See* Second Order Addressing Ancillary Services under Project No. 51812) and applicable charges were issued to QSEs by ERCOT. With that knowledge and experience, ERCOT again proposes to implement a systemic charging of Ancillary Service failed quantities. This NPRR implements that process permanently for all periods and in a more systematic way, ensuring that Load is not charged or is reimbursed for Ancillary Services that are not delivered in Real-Time. It also addresses short-comings in the previously applied process for Load Resources that are not Controllable Load Resources that were not included in ERCOT’s application of the PUCT’s Order in 2021.  |
| PRS Decision | On 10/13/22, PRS voted to table NPRR1149 and refer the issue to WMS. There was one abstention from the Consumer (Occidental) Market Segment. All Market Segments participated in the vote.On 12/8/22, PRS voted unanimously to recommend approval of NPRR1149 as amended by the 12/1/22 ERCOT comments. All Market Segments participated in the vote.On 1/17/23, PRS voted unanimously to endorse and forward to TAC the 12/8/22 PRS Report and 9/20/22 Impact Analysis for NPRR1149 with a recommended priority of 2023 and rank of 3780. All Market Segments participated in the vote. |
| Summary of PRS Discussion | On 10/13/22, ERCOT Staff provided an overview of NPRR1149.On 12/8/22, PRS reviewed the 11/30/22 PUCT Staff comments and the 12/1/22 ERCOT comments.On 1/17/23, there was no discussion. |
| TAC Decision | On 1/24/23, TAC voted unanimously to recommend approval of NPRR1149 as recommended by PRS in the 1/17/23 PRS Report. All Market Segments participated in the vote. |
| Summary of TAC Discussion | On 1/24/23, TAC reviewed the ERCOT Opinion, ERCOT Market Impact Statement, and Independent Market Monitor (IMM) Opinion for NPRR1149. Participants confirmed they could continue to adjust Ancillary Services amongst Resources in their portfolio in Real-Time. |
| ERCOT Board Decision | On 2/28/23, the ERCOT Board voted unanimously to recommend approval of NPRR1149 as recommended by TAC in the 1/24/23 TAC Report. |

|  |
| --- |
| **Opinions** |
| Credit Review | ERCOT Credit Staff and the Market Credit Work Group (MCWG) have reviewed NPRR1149 and do not believe that it requires changes to credit monitoring activity or the calculation of liability. |
| Independent Market Monitor Opinion | The IMM supports the approval of NPRR1149 for reasons laid out in the 9/20/22 IMM comments. |
| ERCOT Opinion | ERCOT supports approval of NPRR1149. |
| ERCOT Market Impact Statement | ERCOT Staff has reviewed NPRR1149 and believes the market impact for NPRR1149 is an improvement in the process for invoking “failure to provide” Settlement. This better ensures that Market Participants are not compensated for services that they were unable to provide in Real-Time and provides transparency as to how this Settlement will be applied. |

|  |
| --- |
| Sponsor |
| Name | Dave Maggio / Austin Rosel |
| E-mail Address | david.maggio@ercot.com / austin.rosel@ercot.com |
| Company | ERCOT |
| Phone Number | 512-248-6998 / 512-248-6686 |
| Cell Number |  |
| Market Segment | Not applicable |

|  |
| --- |
| **Market Rules Staff Contact** |
| **Name** | Cory Phillips |
| **E-Mail Address** | cory.phillips@ercot.com |
| **Phone Number** | 512-248-6464 |

|  |
| --- |
| **Comments Received** |
| Comment Author | **Comment Summary** |
| IMM 092022 | Expressed support for NPRR1149 and encouraged stakeholders to approve NPRR1149 on an urgent timeline |
| ERCOT 092722 | Provided additional redlines to Section 6.3.2, Activities for Real-Time Operations, which were inadvertently omitted from the original submission |
| WMS 110922 | Requested PRS continue to table NPRR1149 for further review by the Wholesale Market Working Group (WMWG) |
| PUCT Staff 113022 | Expressed support for NPRR1149 and encouraged prompt approval |
| ERCOT 120122 | Proposed edits based to correct minor errors in a Settlement formula along with other clarifying edits |

|  |
| --- |
| **Market Rules Notes** |

Please note the baseline Protocol language in the following section(s) has been updated to reflect the incorporation of the following NPRR(s) into the Protocols:

* NPRR1085, Ensuring Continuous Validity of Physical Responsive Capability (PRC) and Dispatch through Timely Changes to Resource Telemetry and Current Operating Plans (COPs) (incorporated 10/1/22)
	+ Section 6.7.5
* NPRR1131, Controllable Load Resource Participation in Non-Spin (incorporated 10/1/22)
	+ Section 6.7.5
* NPRR1135, Add On-Line Status Check for Resources Telemetering OFFNS for Ancillary Service Imbalance Settlements (incorporated 10/1/22)
	+ Section 6.7.5
* NPRR1058, Resource Offer Modernization (incorporated 12/1/22)
	+ Section 6.3.2

|  |
| --- |
| Proposed Protocol Language Revision |

**2.1 Definitions**

**Ancillary Service Supply Responsibility**

The net amount of Ancillary Service capacity that a QSE is obligated to deliver to ERCOT, by hour and service type.

**4.4.7.4 Ancillary Service Supply Responsibility**

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

(a) The sum of:

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

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

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

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

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

(b) The sum of:

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

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

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

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

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

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

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

(5) A QSE’s Ancillary Service Supply Responsibility must be met by identified Resources that are qualified to provide the Ancillary Service, per Section 8.1.1.2.1 Ancillary Service Technical Requirements and Qualification Criteria and Test Methods, and available to act on Dispatch Instructions.

6.3.2 Activities for Real-Time Operations

(1) Activities for Real-Time operations begin at the end of the Adjustment Period and conclude at the close of the Operating Hour.

(2) The following table summarizes the timeline for the Operating Period and the activities of QSEs and ERCOT during Real-Time operations where “T” represents any instant within the Operating Hour. The table is intended to be only a general guide and not controlling language, and any conflict between this table and another section of the Protocols is controlled by the other section:

| **Operating Period** | **QSE Activities** | **ERCOT Activities** |
| --- | --- | --- |
| During the first hour of the Operating Period  |  | Execute the Hour-Ahead Sequence, including HRUC, beginning with the second hour of the Operating PeriodReview the list of Off-Line Available Resources with a start-up time of one hour or lessReview and communicate HRUC commitments and Direct Current Tie (DC Tie) Schedule curtailmentsSnapshot the Scheduled Power Consumption for Controllable Load Resources |
| Before the start of each SCED run | Update Output Schedules for DSRs | Validate Output Schedules for DSRsExecute Real-Time Sequence |
| SCED run |  | Execute SCED and pricing run to determine impact of reliability deployments on energy prices |
| During the Operating Hour | Telemeter the Ancillary Service Resource Responsibility for each ResourceAcknowledge receipt of Dispatch InstructionsComply with Dispatch Instruction Review Resource Status to assure current state of the Resources is properly telemeteredUpdate COP with actual Resource Status and limits and Ancillary Service Schedules Communicate Resource Forced Outages to ERCOT Communicate to ERCOT Resource changes to Ancillary Service Resource Responsibility via telemetry in the time window beginning 30 seconds prior to the five-minute clock interval and ending ten seconds prior to that five-minute clock interval | Communicate all binding Base Points, Dispatch Instructions, and the sum of each type of available reserves, including total Real-Time reserve amount for On-Line reserves, total Real-Time reserve amount for Off-Line reserves, Real-Time Reserve Price Adders for On-Line Reserves, and Real-Time Reserve Price Adders for Off-Line Reserves and LMPs for energy and Ancillary Services, and for the pricing run as described in Section 6.5.7.3.1, Determination of Real-Time On-Line Reliability Deployment Price Adder, the total Reliability Unit Commitment (RUC)/Reliability Must-Run (RMR) MW relaxed, total Load Resource MW deployed that is added to the Demand, total Emergency Response Service (ERS) MW deployed that is added to the Demand, total emergency DC Tie MW that is added to or subtracted from the Demand, total Block Load Transfer (BLT) MW that is added to or subtracted from the Demand, total Low Ancillary Service Limit (LASL), total High Ancillary Service Limit (HASL), Real-Time On-Line Reliability Deployment Price Adder using Inter-Control Center Communications Protocol (ICCP) or Verbal Dispatch Instructions (VDIs)Monitor Resource Status and identify discrepancies between COP and telemetered Resource StatusRestart Real-Time Sequence on major change of Resource or Transmission Element StatusMonitor ERCOT total system capacity providing Ancillary ServicesValidate COP informationValidate Ancillary Service TradesMonitor ERCOT control performanceDistribute by ICCP, and post on the ERCOT website, System Lambda and the LMPs for each Resource Node, Load Zone and Hub, and the sum of each type of available reserves, including total Real-Time reserve amount for On-Line reserves, total Real-Time reserve amount for Off-Line reserves, Real-Time Reserve Price Adders for On-Line Reserves and Real-Time Reserve Price Adders for Off-Line Reserves, and for the pricing run as described in Section 6.5.7.3.1 the total RUC/RMR MW relaxed, total Load Resource MW deployed that is added to the Demand, total ERS MW deployed that is added to the Demand, total emergency DC Tie MW that is added to or subtracted from the Demand, total BLT MW that is added to or subtracted from the Demand, total On-Line LASL, total On-Line HASL, Real-Time On-Line Reliability Deployment Price Adder created for each SCED process. These prices shall be posted immediately subsequent to deployment of Base Points from SCED with the time stamp the prices are effectivePost on the ERCOT website the nodal prices for Settlement Only Distribution Generators (SODGs) and Settlement Only Transmission Generator (SOTGs). These prices shall include all Real-Time Reserve Price Adders for On-Line Reserves and Real-Time On-Line Reliability Deployment Price Adders created for each SCED process. These prices shall be posted immediately subsequent to deployment of Base Points from SCED with the time stamp the prices are effectivePost LMPs for each Electrical Bus on the ERCOT website. These prices shall be posted immediately subsequent to deployment of Base Points from each binding SCED with the time stamp the prices are effectivePost on the ERCOT website the projected non-binding LMPs created by each SCED process for each Resource Node, the projected total Real-Time reserve amount for On-Line reserves and Off-Line reserves, the projected Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders, and for the projected non-binding pricing runs as described in Section 6.5.7.3.1 the total RUC/RMR MW relaxed, total Load Resource MW deployed that is added to Demand, total emergency DC Tie MW that is added to or subtracted from the Demand, total BLT MW that is added to or subtracted from the Demand, total ERS MW deployed that are deployed that is added to the Demand, total LASL, total HASL, Real-Time On-Line Reliability Deployment Price Adder and the projected Hub LMPs and Load Zone LMPs. These projected prices shall be posted at a frequency of every five minutes from SCED for at least 15 minutes in the future with the time stamp of the SCED process that produced the projections Post on the MIS Certified Area the projected non-binding Base Points for each Resource created by each SCED process. These projected non-binding Base Points shall be posted at a frequency of every five minutes from SCED for at least 15 minutes in the future with the time stamp of the SCED process that produced the projectionsPost each hour on the ERCOT website binding SCED Shadow Prices and active binding transmission constraints by Transmission Element name (contingency /overloaded element pairs) Post on the ERCOT website the Settlement Point Prices for each Settlement Point and the Real-Time price for each SODG and SOTG immediately following the end of each Settlement IntervalPost the Real-Time On-Line Reliability Deployment Price, Real-Time Reserve Price for On-Line Reserves and the Real-Time Reserve Price for Off-Line Reserves immediately following the end of each Settlement Interval Post parameters as required by Section 6.4.9, Ancillary Services Capacity During the Adjustment Period and in Real-Time, on the ERCOT website |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR829, NPRR904, NPRR995, NPRR1000, NPRR1006, NPRR1010, NPRR1058, and NPRR1077: Replace applicable portions of paragraph (2) above with the following upon system implementation for NPRR829, NPRR904, NPRR995, NPRR1000, NPRR1006, NPRR1058, or NPRR1077; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:](2) The following table summarizes the timeline for the Operating Period and the activities of QSEs and ERCOT during Real-Time operations where “T” represents any instant within the Operating Hour. The table is intended to be only a general guide and not controlling language, and any conflict between this table and another section of the Protocols is controlled by the other section:

| **Operating Period** | **QSE Activities** | **ERCOT Activities** |
| --- | --- | --- |
| During the first hour of the Operating Period  |  | Execute the Hour-Ahead Sequence, including HRUC, beginning with the second hour of the Operating PeriodReview the list of Off-Line Available Resources with a start-up time of one hour or lessReview and communicate HRUC commitments and Direct Current Tie (DC Tie) Schedule curtailmentsSnapshot the Scheduled Power Consumption for Controllable Load Resources |
| SCED run |  | Execute SCED and pricing run to determine impact of reliability deployments on energy and Ancillary Service prices |
| During the Operating Hour | Acknowledge receipt of Dispatch InstructionsComply with Dispatch Instruction Review Resource Status to assure current state of the Resources is properly telemeteredUpdate COP and telemetry with actual Resource Status and limits and Ancillary Service capabilitiesSubmit and update Ancillary Service OffersCommunicate Resource Forced Outages to ERCOT Submit and update Energy Offer Curves and/or RTM Energy Bids  | Communicate all binding Base Points, Updated Desired Set Points (UDSPs), Ancillary Service awards, Dispatch Instructions, LMPs for energy, Real-Time MCPCs for Ancillary Services, and for the pricing run as described in Section 6.5.7.3.1, Determination of Real-Time Reliability Deployment Price Adders, the total Reliability Unit Commitment (RUC)/Reliability Must-Run (RMR) MW relaxed, total Load Resource MW deployed that is added to the Demand, total Transmission and/or Distribution Service Provider (TDSP) standard offer Load management MW deployed that is added to the Demand, total Emergency Response Service (ERS) MW deployed that is added to the Demand, total ERCOT-directed DC Tie MW that is added to or subtracted from the Demand, total Block Load Transfer (BLT) MW that is added to or subtracted from the Demand Real-Time Reliability Deployment Price Adder for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Service using Inter-Control Center Communications Protocol (ICCP) or Verbal Dispatch Instructions (VDIs). In communicating Ancillary Service awards, the awards shall be broken out by Ancillary Service sub-type, where applicableMonitor Resource Status and identify discrepancies between COP and telemetered Resource StatusRestart Real-Time Sequence on major change of Resource or Transmission Element StatusMonitor ERCOT total system capacity providing Ancillary ServicesValidate COP informationValidate Ancillary Service TradesMonitor ERCOT control performanceDistribute by ICCP, and post on the ERCOT website, System Lambda and the LMPs for each Resource Node, Load Zone and Hub, and Real-Time MCPCs for each Ancillary Service, and for the pricing run as described in Section 6.5.7.3.1 the total RUC/RMR MW relaxed, total Load Resource MW deployed that is added to the Demand, total ERS MW deployed that is added to the Demand, total TDSP standard offer Load management MW deployed that is added to the Demand, total ERCOT-directed DC Tie MW that is added to or subtracted from the Demand, total BLT MW that is added to or subtracted from the Demand, Real-Time Reliability Deployment Price Adder for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Service created for each SCED process. These prices shall be posted immediately subsequent to deployment of Base Points and Ancillary Service awards from SCED with the time stamp the prices are effective Post on the ERCOT website the nodal prices for Settlement Only Distribution Generators (SODGs), Settlement Only Distribution Energy Storage Systems (SODESSs), Settlement Only Transmission Generators (SOTGs), and Settlement Only Transmission Energy Storage Systems (SOTESSs). These prices shall include Real-Time Reliability Deployment Price Adders for Energy created for each SCED process. These prices shall be posted immediately subsequent to deployment of Base Points from SCED with the time stamp the prices are effectivePost LMPs for each Electrical Bus on the ERCOT website. These prices shall be posted immediately subsequent to deployment of Base Points from each binding SCED with the time stamp the prices are effectivePost every 15 minutes on the ERCOT website the aggregate net injection from Settlement Only Generators (SOGs) and Settlement Only Energy Storage Systems (SOESSs)Post on the ERCOT website the projected non-binding LMPs for each Resource Node and Real-Time MCPCs for each Ancillary Service created by each SCED process and for the projected non-binding pricing runs as described in Section 6.5.7.3.1 the total RUC/RMR MW relaxed, total Load Resource MW deployed that is added to Demand, total TDSP standard offer Load management MW deployed that is added to the Demand, total ERCOT-directed DC Tie MW that is added to or subtracted from the Demand, total BLT MW that is added to or subtracted from the Demand, total ERS MW deployed that are deployed that is added to the Demand, Real-Time Reliability Deployment Price Adder for Energy, Real-Time On-Line Reliability Deployment Price Adders for Ancillary Service, and the projected Hub LMPs and Load Zone LMPs. These projected prices shall be posted at a frequency of every five minutes from SCED for at least 15 minutes in the future with the time stamp of the SCED process that produced the projectionsPost on the MIS Certified Area the projected non-binding Base Points and Ancillary Service awards for each Resource created by each SCED process. These projected non-binding Base Points shall be posted at a frequency of every five minutes from SCED for at least 15 minutes in the future with the time stamp of the SCED process that produced the projections. In posting Ancillary Service awards, the awards shall be broken out by Ancillary Service sub-type, where applicablePost each hour on the ERCOT website binding SCED Shadow Prices and active binding transmission constraints by Transmission Element name (contingency /overloaded element pairs) Post on the ERCOT website, the Settlement Point Prices for each Settlement Point and the Real-Time price for each SODG, SODESS, SOTG, and SOTESS immediately following the end of each Settlement Interval By Settlement Interval, post the 15-minute Real-Time Reliability Deployment Price for Energy, and the 15-minute Real-Time Reliability Deployment Price for Ancillary Service for each of the Ancillary Services |

 |

(3) At the beginning of each hour, ERCOT shall post on the ERCOT website the following information:

(a) Changes in ERCOT System conditions that could affect the security and dynamic transmission limits of the ERCOT System, including:

(i) Changes or expected changes, in the status of Transmission Facilities as recorded in the Outage Scheduler for the remaining hours of the current Operating Day and all hours of the next Operating Day; and

(ii) Any conditions such as adverse weather conditions as determined from the ERCOT-designated weather service;

(b) Updated system-wide Mid-Term Load Forecasts (MTLFs) for all forecast models available to ERCOT Operations, as well as an indicator for which forecast was in use by ERCOT at the time of publication;

(c) The quantities of RMR Services deployed by ERCOT for each previous hour of the current Operating Day; and

(d) Total ERCOT System Demand, from Real-Time operations, integrated over each Settlement Interval.

(4) No later than 0600, ERCOT shall post on the ERCOT website the actual system Load by Weather Zone, the actual system Load by Forecast Zone, and the actual system Load by Study Area for each hour of the previous Operating Day.

(5) ERCOT shall provide notification to the market and post on the ERCOT website Electrical Bus Load distribution factors and other information necessary to forecast Electrical Bus Loads. This report will be published when updates to the Load distribution factors are made. Private Use Network net Load will be redacted from this posting.

|  |
| --- |
| [NPRR1010: Insert paragraphs (6) and (7) below upon system implementation of the Real-Time Co-Optimization (RTC) project:](6) After every SCED run, ERCOT shall post to the ERCOT website the total capability of Resources available to provide the following Ancillary Service combinations, based on the Resource telemetry from the QSE and capped by the limits of the Resource, for the most recent SCED execution:(a) Capacity to provide Reg-Up, irrespective of whether it is capable of providing any other Ancillary Service;(b) Capacity to provide RRS, irrespective of whether it is capable of providing any other Ancillary Service;(c) Capacity to provide ECRS, irrespective of whether it is capable of providing any other Ancillary Service;(d) Capacity to provide Non-Spin, irrespective of whether it is capable of providing any other Ancillary Service;(e) Capacity to provide Reg-Up, RRS, or both, irrespective of whether it is capable of providing ECRS or Non-Spin;(f) Capacity to provide Reg-Up, RRS, ECRS, or any combination, irrespective of whether it is capable of providing Non-Spin;(g) Capacity to provide Reg-Up, RRS, ECRS, Non-Spin, or any combination; and(h) Capacity to provide Reg-Down.(7) Each week, ERCOT shall post on the ERCOT website the historical SCED-interval data described in paragraph (6) above. |

***6.4.1 Capacity Trade, Energy Trade, Self-Schedule, and Ancillary Service Trades***

(1) A detailed explanation of Capacity Trade criteria and validations performed by ERCOT is provided in Section 4.4.1, Capacity Trades. A Qualified Scheduling Entity (QSE) may submit and update Capacity Trades during the Adjustment Period.

(2) A detailed explanation of Energy Trade criteria and validations performed by ERCOT is provided in Section 4.4.2, Energy Trades. A QSE may submit and update Energy Trades during the Adjustment Period and through 1430 on the day following the Operating Day for Settlement.

(3) A detailed explanation of Self-Schedule criteria and validations performed by ERCOT is provided in Section 4.4.3, Self-Schedules. A QSE may submit and update Self-Schedules during the Adjustment Period.

(4) A detailed explanation of Ancillary Service Trade criteria and validations performed by ERCOT is provided in Section 4.4.7.3, Ancillary Service Trades. A QSE may submit and update Ancillary Service Trades during the Adjustment Period and through the Operating Period for Settlement.

***6.4.9.1.3 Failure to Provide Ancillary Service***

(1) ERCOT may procure Ancillary Services to replace those of a QSE that has failed to provide its Ancillary Services Supply Responsibility through a SASM, as described below in Section 6.4.9.2, Supplemental Ancillary Services Market.

(2) A QSE is considered to have failed to provide its Ancillary Services Supply Responsibility when ERCOT determines, in its sole discretion, that some or all of the QSE’s Ancillary Service capacity will not be available in Real-Time, was not available during any interval for which the QSE had an Ancillary Service Supply Responsibility, or that the QSE assigned all or part of an Ancillary Service Supply Responsibility to a Resource that was not qualified to provide that Ancillary Service. This Section does not apply to a failure to provide caused by events described in Section 6.4.9.1.2, Replacement of Infeasible Ancillary Service Due to Transmission Constraints.

(3) Within a time frame acceptable to ERCOT, each affected QSE may either substitute capacity to meet its Ancillary Services Supply Responsibility or inform ERCOT that the Ancillary Services capacity needs to be replaced. If a QSE elects to substitute capacity, ERCOT shall determine the feasibility of the substitution. If the substitution is deemed infeasible by ERCOT or the QSE informs ERCOT that the Ancillary Services capacity needs to be replaced, then ERCOT shall procure, if in its sole discretion it finds that the service is still needed, the Ancillary Services capacity required under Section 6.4.9.2.

(4) ERCOT shall charge each QSE that has failed to provide its Ancillary Service Supply Responsibility, according to paragraph (2) above for a particular Ancillary Service for a specific hour, in the manner described in Section 6.7.3, Charges for a Failure to Provide Ancillary Service.

***6.7.3 Charges for a Failure to Provide Ancillary Service***

(1) A charge to each QSE that fails to provide its Ancillary Service Supply Responsibility, whether or not a SASM is executed due to its failure to provide, is calculated by service for a given Operating Hour, as follows:

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

**RUFQAMTQSETOT *q* = RUFQAMT *q +*RRUFQAMT *q***

Where:

RUFQAMT *q* = Max( MCPCRU *m*, AVGRTASIP) \* (RUFQ *q* +TRUFQ *q*)

RRUFQAMT *q* = MCPCRU *rs* \* RRUFQ *q,* *rs*

AVGRTASIP = (RTRSVPOR *i* + RTRDP *i*) / 4

Where for all Resources:

TRUFQ *q* =Max ([(SARUQ *q* + RUTRSQ *q* + (RTPCRU *q, m*) + PCRU *q* + RUCRUQ *q*) – (RUTRPQ *q* + RUFQ *q* + RRUFQ *q, rs* + RUINFQ *q*)] – TELRUR *q, r*, 0)

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

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RUFQAMTQSETOT *q* | $ | *Reg-Up Failure Quantity Amount per QSE*—The total 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. |
| RRUFQAMT *q* | $ | *Reconfiguration Reg-Up Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| RUFQAMT *q* | $ | *Reg-Up Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| MCPCRU *m* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Up by market—*The MCPC for Reg-Up in the market *m*, for the hour. |
| MCPCRU *rs* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Up by RSASM—*The MCPC for Reg-Up in the RSASM *rs*, for the hour. |
| RUFQ *q* | MW | *Reg-Up Failure Quantity per QSE—*QSE *q* total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| RRUFQ *q, rs* | 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. |
| RTRDP *i* | $/MWh | *Real-Time On-Line Reliability Deployment Price—*The Real-Time price for the 15-minute Settlement Interval *i*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. |
| RTRSVPOR *i* | $/MWh | *Real-Time Reserve Price for On-Line Reserves—*The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval *i*. |
| AVGRTASIP | $/MW per hour | *Average Real-Time Ancillary Service Imbalance Price*– The average of the sum of the Real-Time On-Line Reliability Deployment Price and the Real-Time Reserve Price for On-Line Reserves used in the calculation of Real Time Ancillary Service Imbalance Amount per Section 6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge, for the Operating 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. |
| RUTRSQ *q* | MW | *Reg-Up Trade Sale per QSE -* QSE *q*’s total time-weighted average capacity Trade Sale for Reg-Up, for the hour. The time-weighted average value is rounded to 0.1 MW. |
| RTPCRU *q, m* | MW | *Procured Capacity for Reg-Up by QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* (SASM or RSASM) to provide Reg-Up, for the hour. |
| PCRU *q* | MW | *Procured Capacity for Reg-Up per QSE in DAM*—The total Reg-Up Service capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. |
| RUCRUQ *q* | MW | *RUC-committed for Reg-Up per QSE –* The total quantity of Reg-Up Service committed by the RUC Process for Resources represented by QSE *q*, for the hour |
| RUTRPQ *q* | MW | *Reg-Up Trade Purchases per QSE -* QSE *q*’s total time-weighted average capacity Trade Purchasefor Reg-Up, for the hour. The time-weighted average value is rounded to 0.1 MW. |
| RUINFQ *q* | MW | *Reg-Up Infeasible Quantity per QSE —*QSE *q*’s total capacity associated with infeasibleAncillary Service Supply Responsibilitiesfor Reg-Up, for the hour. |
| TELRUR *q, r* | MW | *Telemetered Reg-Up Responsibility for the Resource -* The time-weighted average telemetered Reg-Up 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. |
| 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. |
| TRUFQ *q* | MW | *Telemetered Reg-Up Failure Quantity per QSE—* Calculated failure quantity for QSE *q* by comparing its average telemetered Reg-Up Responsibility sum to its Ancillary Service Supply Responsibility for Reg-Up as calculated per paragraph (1) of Section 4.4.7.4, for the hour. |
| *i* | none | A 15-minute Settlement Interval within the Operating Hour. |
| *rs* | none | The RSASM for the given Operating Hour. |
| *m* | none | The DAM, SASM, or RSASM for the given Operating Hour. |
| *q* | none | A QSE. |
| *r* | none | A Resource that is qualified to provide Reg-Up. |

(b) The total charge of failure on Ancillary Service Supply Responsibility for Reg-Down by QSE, if applicable:

**RDFQAMTQSETOT *q* = RDFQAMT *q +*RRDFQAMT *q***

Where:

RDFQAMT *q* = Max ( MCPCRD *m*, AVGRTASIP) \* (RDFQ *q* + TRDFQ *q*)

RRDFQAMT *q* = MCPCRD *rs* \* RRDFQ *q,* *rs*

AVGRTASIP = (RTRSVPOR *i* + RTRDP *i*) / 4

Where for all Resources:

TRDFQ *q* =Max ([(SARDQ *q* + RDTRSQ *q* + (RTPCRD *q, m*) + PCRD *q* + RUCRDQ *q*) – (RDTRPQ *q* + RDFQ *q* + RRDFQ *q* + RDINFQ *q*)] –  TELRDR *q, r*, 0)

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

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RDFQAMTQSETOT *q* | $ | *Reg-Down Failure Quantity Amount per QSE*—The total 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. |
| RRDFQAMT *q* | $ | *Reconfiguration Reg-Down Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| RDFQAMT *q* | $ | *Reg-Down Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| MCPCRD *m* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Down by market—*The MCPC for Reg-Down in the market *m*, for the hour. |
| MCPCRD *rs* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Down by RSASM—*The MCPC for Reg-Down in the RSASM *rs*, 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, rs* | 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. |
| RTRDP *i* | $/MWh | *Real-Time On-Line Reliability Deployment Price—*The Real-Time price for the 15-minute Settlement Interval *i*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-time On-Line Reliability Deployment Price Adder. |
| RTRSVPOR *i* | $/MWh | *Real-Time Reserve Price for On-Line Reserves—*The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval *i*. |
| AVGRTASIP | $/MW per hour | *Average Real-Time Ancillary Service Imbalance Price*—The average of the sum of the Real-Time On-Line Reliability Deployment Price and the Real-Time Reserve Price for On-Line Reserves used in the calculation of Real Time Ancillary Service Imbalance Amount per Section 6.7.5 for the Operating 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. |
| RDTRSQ *q* | MW | *Reg-Down Trade Sale per QSE*—QSE *q*’s total time-weighted average capacity Trade Sale for Reg-Down, for the hour. The time-weighted average value is rounded to 0.1 MW. |
| RTPCRD *q, m* | MW | *Procured Capacity for Reg-Down by QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* (SASM or RSASM) to provide Reg-Down, for the hour. |
| 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. |
| RUCRDQ *q* | MW | *RUC-committed for Reg-Down per QSE*—The total quantity of Reg-Down committed by the RUC Process for Resources represented by QSE *q*, for the hour. |
| RDTRPQ *q* | MW | *Reg-Down Trade Purchases per QSE*—QSE *q*’s total time-weighted average capacity Trade Purchasefor Reg-Down, for the hour. The time-weighted average value is rounded to 0.1 MW. |
| RDINFQ *q* | MW | *Reg-Down Infeasible Quantity per QSE—*QSE *q*’s total capacity associated with infeasibleAncillary Service Supply Responsibilitiesfor Reg-Down, for the hour. |
| TELRDR*,q, r* | MW | *Telemetered Reg-Down Responsibility for the Resource*—The time-weighted average telemetered Reg-Down Ancillary Service Resource Responsibility for the Resource *r* that is qualified to provide Reg-Down Ancillary Service, represented by QSE *q,* for the hour. The time-weighted average value is rounded to 0.1 MW. |
| DASARDQ *q* | MW | *Day-Ahead Self-Arranged Reg-Down Quantity per QSE*—The self-arranged Reg-Down quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| 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, Self-Arranged Ancillary Service Quantities. |
| TRDFQ *q* | MW | *Telemetered Reg-Down Failure Quantity per QSE—*Calculated failure quantity for QSE *q* by comparing its average telemetered Reg-Down Responsibility sum to its Ancillary Service Supply Responsibility for Reg-Down as calculated per paragraph (1) of Section 4.4.7.4, for the hour. |
| *i* | none | A 15-minute Settlement Interval within the Operating Hour. |
| *rs* | none | The RSASM for the given Operating Hour. |
| *m* | none | The DAM, SASM, or RSASM for the given Operating Hour. |
| *q* | none | A QSE. |
| *r* | none | A Resource that is qualified to provide Reg-Down. |

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

**RRFQAMTQSETOT *q* = RRFQAMT *q +*RRRFQAMT *q***

Where:

RRFQAMT *q* = Max(MCPCRR *m*, AVGRTASIP) \* (RRFQ *q* + TRRFQ *q*)

RRRFQAMT *q* = MCPCRR *rs* \* RRRFQ *q,* *rs*

AVGRTASIP = (RTRSVPOR *i* + RTRDP *i*) / 4

Where for all Resources:

TRRFQ *q =* Max([(SARRQ *q* + RRTRSQ *q* + (RTPCRR *q, m*) + PCRR *q* + RUCRRQ *q*) – (RRTRPQ *q* + RRFQ *q* + RRRFQ *q* + RRINFQ *q*)] –  TELRRSRC *q, r*, 0)

Where for Load Resources, other than Controllable Load Resources, during an RRS deployment event:

TELRRSRC *q, r* =Min (NPF *q, r* – LPC *q, r*, TELRRSR *q, r*) snapshot to be used will be from the time of deployment until 180 minutes after recall or if the time between a recall of Load Resources and a redeployment is less than 180 minutes, the snapshot to be used will be the time of the first deployment

Where for Load Resources, other than Controllable Load Resources, prior to an RRS deployment event:

TELRRSRC *q, r* =Min (NPF *q, r* – LPC *q, r*, TELRRSR *q, r*)

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

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RRFQAMTQSETOT *q* | $ | *Responsive Reserve Failure Quantity Amount per QSE*—The total 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. |
| RRRFQAMT *q* | $ | *Reconfiguration Responsive Reserve Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| RRFQAMT *q* | $ | *Responsive Reserve Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| MCPCRR *m* | $/MW per hour | *Market Clearing Price for Capacity for Responsive Reserve per market—*The MCPC for RRS in the market *m*, for the hour. |
| MCPCRR *rs* | $/MW per hour | *Market Clearing Price for Capacity for Responsive Reserve per RSASM—*The MCPC for RRS in the RSASM *rs*, 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, rs* | 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. |
| RTRDP *i* | $/MWh | *Real-Time On-Line Reliability Deployment Price—*The Real-Time price for the 15-minute Settlement Interval *i*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-time On-Line Reliability Deployment Price Adder. |
| RTRSVPOR *i* | $/MWh | *Real-Time Reserve Price for On-Line Reserves—*The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval *i*. |
| AVGRTASIP | $/MW per hour | *Average Real-Time Ancillary Service Imbalance Price*—The average of the sum of the Real-Time On-Line Reliability Deployment Price and the Real-Time Reserve Price for On-Line Reserves used in the calculation of Real Time Ancillary Service Imbalance Amount per Section 6.7.5 for the Operating 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. |
| RRTRSQ *q* | MW | *Responsive Reserve Trade Sale per QSE*—QSE *q*’s total time-weighted average capacity Trade Sale for RRS, for the hour. The time-weighted average value is rounded to 0.1 MW. |
| 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* (SASM or RSASM) to provide RRS, for the hour. |
| PCRR *q* | MW | *Procured Capacity for Responsive Reserve per QSE in DAM*—The total RRS capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. |
| RUCRRQ *q* | MW | *RUC-committed for Responsive Reserve per QSE*—The total quantity of RRS committed by the RUC Process for Resources represented by QSE *q*, for the hour. |
| RRTRPQ *q* | MW | *Responsive Reserve Trade Purchases per QSE*—QSE *q*’s total time-weighted average capacity Trade Purchasefor RRS, for the hour. The time-weighted average value is rounded to 0.1 MW. |
| RRINFQ *q* | MW | *Responsive Reserve Infeasible Quantity per QSE—*QSE *q*’s total capacity associated with infeasibleAncillary Service Supply Responsibilitiesfor RRS, for the hour. |
| TELRRSR *q, r* | MW | *Telemetered Responsive Reserve Responsibility for the Resource*—The average time-weighted telemetered RRS Ancillary Service Resource Responsibility for the Resource *r*, represented by the QSE *q,* for the hour. The time-weighted average value is rounded to 0.1 MW. |
| TELRRSRC *q, r* | MW | *Telemetered Responsive Reserve Responsibility for the Resource as Calculated*—The calculated comparison of the time-weighted average telemetered RRS Ancillary Service Resource Responsibility as compared to available capacity for the Resource *r*, represented by the QSE *q,* for the hour. |
| NPF *q, r* | MW | *Non-Controllable Load Resource Net Power Consumption for the QSE*—The average NPF from Load Resource other than Controllable Load Resources *r*, represented by QSE *q,* for the hour. |
| LPC *q, r* | MW | *Non-Controllable Load Resource Low Power Consumption for the QSE*—The average LPC from Load Resource other than Controllable Load Resources *r*, represented by 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, Self-Arranged Ancillary Service Quantities. |
| TRRFQ *q* | MW | *Telemetered Responsive Reserve Failure Quantity per QSE—*Calculated failure quantity for QSE q by comparing its average telemetered Responsive Reserve Responsibility sum to its Ancillary Service Supply Responsibility for RRS as calculated per paragraph (1) of Section 4.4.7.4, for the hour. |
| *i* | none | A 15-minute Settlement Interval within the Operating Hour. |
| *rs* | none | The RSASM for the given Operating Hour. |
| *m* | none | The DAM, SASM, or RSASM for the given Operating Hour. |
| *q* | none | A QSE. |
| *r* | none | A Resource that is qualified to provide RRS. |

(d) The total charge of failure on Ancillary Service Supply Responsibility for Non-Spin by QSE, if applicable:

**NSFQAMTQSETOT *q* = NSFQAMT *q +*RNSFQAMT *q***

Where:

NSFQAMT *q* = Max (MCPCNS *m*, AVGRTASIP) \* (NSFQ *q* + TNSFQ *q*)

RNSFQAMT *q* = MCPCNS *rs* \* RNSFQ *q,* *rs*

AVGRTASIP = (RTRSVPOR *i* + RTRDP *i*) / 4

Where for all Resources:

TNSFQ *q =* Max([(SANSQ *q* + NSTRSQ *q* + (RTPCNS *q, m*) + PCNS *q* + RUCNSQ *q*) – (NSTRPQ *q* + NSFQ *q* + RNSFQ *q* + NSINFQ *q*)] –TELNSRC *q, r*, 0)

Where for Load Resources, other than Controllable Load Resources, during a Non-Spin deployment event:

TELNSRC *q, r* = Min(NPF *q, r* – LPC *q, r* – TELECRRC *q, r*, TELNSR *q, r*) snapshot to be used will be from the time of deployment until 180 minutes after recall or if the time between a recall of Load Resources and a redeployment is less than 180 minutes, the snapshot to be used will be the time of the first deployment

Where for Load Resources, other than Controllable Load Resources, prior to a Non-Spin deployment event:

TELNSRC *q, r* = Min(NPF *q, r* – LPC *q, r* – TELECRRC *q, r*, TELNSR *q, r*)

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

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| NSFQAMTQSETOT *q* | $ | *Non-Spin Failure Quantity Amount per QSE*—The total 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. |
| RNSFQAMT *q* | $ | *Reconfiguration Non-Spin Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| NSFQAMT *q* | $ | *Non-Spin Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| MCPCNS *m* | $/MW per hour | *Market Clearing Price for Capacity for Non-Spin by market—*The MCPC for Non-Spin in the market *m*, for the hour. |
| MCPCNS *rs* | $/MW per hour | *Market Clearing Price for Capacity for Non-Spin by RSASM—*The MCPC for Non-Spin in the RSASM *rs*, 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, rs* | 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. |
| RTRDP *i* | $/MWh | *Real-Time On-Line Reliability Deployment Price—*The Real-Time price for the 15-minute Settlement Interval *i*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-time On-Line Reliability Deployment Price Adder. |
| RTRSVPOR *i* | $/MWh | *Real-Time Reserve Price for On-Line Reserves—*The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval *i*. |
| AVGRTASIP | $/MW per hour | *Average Real-Time Ancillary Service Imbalance Price*—The average of the sum of the Real-Time On-Line Reliability Deployment Price and the Real-Time Reserve Price for On-Line Reserves used in the calculation of Real Time Ancillary Service Imbalance Amount per Section 6.7.5 for the Operating Hour. |
| SANSQ *q* | MW | *Total Self-Arranged Non-Spin Quantity per QSE for all markets*—The sum of all self-arranged Non-Spin quantities submitted by QSE *q* for DAM and all SASMs. |
| NSTRSQ *q* | MW | *Non-Spinning Reserve Trade Sale per QSE*—QSE *q*’s total time-weighted average capacity Trade Sale for Non-Spin, for the hour. The time-weighted average value is rounded to 0.1 MW. |
| RTPCNS *q, m* | MW | *Procured Capacity for Non-Spin Reserve per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* (SASM or RSASM) to provide Non-Spin, for the hour. |
| PCNS *q* | MW | *Procured Capacity for Non-Spin Reserve 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. |
| RUCNSQ *q* | MW | *RUC-committed for Non-Spin Reserve per QSE*—The total quantity of Non-Spin committed by the RUC Process for Resources represented by QSE *q*, for the hour. |
| NSTRPQ *q* | MW | *Non-Spin Reserve Trade Purchases per QSE*—QSE *q*’s total time-weighted average capacity Trade Purchasefor Non-Spin, for the hour. The time-weighted average value is rounded to 0.1 MW. |
| NSINFQ *q* | MW | *Non-Spin Reserve Infeasible Quantity per QSE—*QSE *q*’s total capacity associated with infeasibleAncillary Service Supply Responsibilitiesfor Non-Spin, for the hour. |
| TELNSR *q, r* | MW | *Telemetered Non-Spin Reserve Responsibility for the Resource*—The time-weighted average telemetered Non-Spin Ancillary Service Resource Responsibility for the Resource, for the hour. The time-weighted average value is rounded to 0.1 MW. |
| TELNSRC *q, r* | MW | *Telemetered Non-Spin Reserve Responsibility for the Resource as Calculated*—The time-weighted average calculated telemetered Non-Spin Ancillary Service Resource Responsibility as compared to available capacity for the Resource, for the hour. |
| NPF *q, r* | MW | *Non-Controllable Load Resource Net Power Consumption for the QSE*—The average NPF from Load Resource other than Controllable Load Resources *r*, represented by QSE *q,* for the hour. |
| LPC *q, r* | MW | *Non-Controllable Load Resource Low Power Consumption for the QSE*—The average LPC from Load Resource other than Controllable Load Resources *r*, represented by QSE *q,* for the hour. |
| DASANSQ *q* | MW | *Day-Ahead Self-Arranged Non-Spin Reserve Quantity per QSE*—The self-arranged Non-Spin quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| RTSANSQ *q* | MW | *Self-Arranged Non-Spinning Reserve 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, Self-Arranged Ancillary Service Quantities. |
| TELECRRC *q, r* | MW | *Telemetered ERCOT Contingency Reserve Service Responsibility for the Resource as Calculated*—The time-weighted average telemetered ECRS Ancillary Service Resource Responsibility as compared to available capacity for the Resource *r*, represented by QSE *q,* for the hour. |
| TNSFQ *q* | MW | *Telemetered Non-Spin Failure Quantity per QSE—*Calculated failure quantity for QSE *q* by comparing its average telemetered Non-Spin Responsibility to its Ancillary Service Supply Responsibility for Non-Spin as calculated per paragraph (1) of Section 4.4.7.4, for the hour. |
| *i* | none | A 15-minute Settlement Interval within the Operating Hour. |
| *rs* | none | The RSASM for the given Operating Hour. |
| *m* | none | The DAM, SASM, or RSASM for the given Operating Hour. |
| *q* | none | A QSE. |
| *r* | none | A Resource that is qualified to provide Non-Spin. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR863: Insert paragraph (e) below upon system implementation:]***(e) The total charge of failure on Ancillary Service Supply Responsibility for ECRS by QSE, if applicable:**ECRFQAMTQSETOT *q* = ECRFQAMT *q +*RECRFQAMT *q***Where:ECRFQAMT *q* = Max( MCPCECR *m*, AVGRTASIP) \* (ECRFQ *q* + TECRFQ *q*)RECRFQAMT *q* = MCPCECR *rs* \* RECRFQ *q,* *rs*AVGRTASIP = (RTRSVPOR *i* + RTRDP *i*) / 4 Where for all Resources:TECRFQ *q =* Max ([(SAECRQ *q* + ECRTRSQ *q* + (RTPCECR *q, m*) + PCECR *q* + RUCECRQ *q*) – (ECRTRPQ *q* + ECRFQ *q* + RECRFQ *q* + ECRINFQ *q*)] - TELECRRC *q, r*, 0)Where for Load Resources, other than Controllable Load Resources, during an ECRS deployment event:TELECRRC *q, r =* Min(NPF *q, r* – LPC *q, r*, TELECRR *q, r*) snapshot to be used will be from the time of deployment until 180 minutes after recall or if the time between a recall of Load Resources and a redeployment is less than 180 minutes, the snapshot to be used will be the time of the first deploymentWhere for Load Resources, other than Controllable Load Resources, prior to an ECRS deployment event:TELECRRC *q, r =* Min(NPF *q,r* – LPC *q, r*, TELECRR *q, r*) SAECRQ *q* = DASAECRQ *q* + RTSAECRQ *q*The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| ECRFQAMTQSETOT *q* | $ | *ERCOT Contingency Reserve Service Failure Quantity Amount per QSE*—The total 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. |
| RECRFQAMT *q* | $ | *Reconfiguration ERCOT Contingency Reserve Service Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for ECRS, for the hour. |
| ECRFQAMT *q* | $ | *ERCOT Contingency Reserve Service Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for ECRS, for the hour. |
| RTRDP *i* | $/MWh | *Real-Time On-Line Reliability Deployment Price—*The Real-Time price for the 15-minute Settlement Interval *i*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-time On-Line Reliability Deployment Price Adder. |
| RTRSVPOR *i* | $/MWh |

|  |
| --- |
| *Real-Time Reserve Price for On-Line Reserves—*The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval *i*.  |

 |
| AVGRTASIP | $/MW per hour | *Average Real-Time Ancillary Service Imbalance Price*—The average of the sum of the Real-Time On-Line Reliability Deployment Price and the Real-Time Reserve Price for On-Line Reserves used in the calculation of Real Time Ancillary Service Imbalance Amount per Section 6.7.5 for the Operating 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. |
| ECRTRSQ *q* | MW | *ERCOT Contingency Reserve Service Trade Sale per QSE*—QSE *q’s* total time-weighted average capacity Trade Sale for ECRS, for the hour. The time-weighted average value is rounded to 0.1 MW. |
| 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 (SASM or RSASM) to provide ECRS, for the hour. |
| PCECR *q* | MW | *Procured Capacity for ERCOT Contingency Reserve Service per QSE in DAM—*The total ECRS capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. |
| RUCECRQ *q* | MW | *RUC-committed for ERCOT Contingency Reserve Service per QSE*—The total quantity of ECRS committed by the RUC Process for Resourcesrepresented by QSE *q*, for the hour. |
| ECRTRPQ *q* | MW | *ERCOT Contingency Reserve Service Trade Purchases per QSE*—QSE *q’s* total time-weighted average capacity Trade Purchase for ECRS, for the hour. The time-weighted average value is rounded to 0.1 MW. |
| ECRINFQ *q* | MW | *ERCOT Contingency Reserve Service Infeasible Quantity per QSE—*QSE *q’s* total capacity associated with infeasible Ancillary Service Supply Responsibilities for ECRS, for the hour. |
| TELECRR *q, r* | MW | *Telemetered ERCOT Contingency Reserve Service Responsibility for the Resource*—The time-weighted average telemetered ECRS 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. |
| TELECRRC *q, r* | MW | *Telemetered ERCOT Contingency Reserve Service Responsibility for the Resource as Calculated*—The time-weighted average telemetered ECRS Ancillary Service Resource Responsibility as compared to available capacity for the Resource *r*, represented by QSE *q,* for the hour. |
| NPF *q, r* | MW | *Non-Controllable Load Resource Net Power Consumption for the QSE*—The average NPF from Load Resource other than Controllable Load Resources *r*, represented by QSE *q,* for the hour. |
| LPC *q, r* | MW | *Non-Controllable Load Resource Low Power Consumption for the QSE*—The average LPC from Load Resource other than Controllable Load Resources *r*, represented by 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. |
| MCPCECR *m* | $/MW per hour | *Market Clearing Price for Capacity for ERCOT Contingency Reserve Service per market—*The MCPC for ECRS in the market *m*, for the hour. |
| MCPCECR *rs* | $/MW per hour | *Market Clearing Price for Capacity for ERCOT Contingency Reserve Service per RSASM—*The MCPC for ECRS in the RSASM *rs*, 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, rs* | 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. |
| TECRFQ *q* | MW | *Telemetered ERCOT Contingency Reserve Service Failure Quantity per QSE—*Calculated failure quantity for QSE *q* by comparing its average telemetered ECRS Responsibility to its Ancillary Service Supply Responsibility for ECRS as calculated per paragraph (1) of Section 4.4.7.4, for the hour. |
| *i* | none | A 15-minute Settlement Interval within the Operating Hour. |
| *rs* | none | The RSASM for the given Operating Hour. |
| *m* | none | The DAM, SASM, or RSASM for the given Operating Hour. |
| *q* | none | A QSE. |
| *r* | none | A Resource that is qualified to provide ECRS. |

 |

***6.7.5 Real-Time Ancillary Service Imbalance Payment or Charge***

(1) Based on the Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders and a Real-Time Off-Line Reserve Price Adders, ERCOT shall calculate Ancillary Service imbalance Settlement, which will make Resources indifferent to the utilization of their capacity for energy or Ancillary Service reserves, as set forth in this Section.

(2) The payment or charge to each QSE for Ancillary Service imbalance is calculated based on the price calculation set forth in paragraph (12) of Section 6.5.7.3, Security Constrained Economic Dispatch, and applied to the following amounts for each QSE:

(a) The amount of Real-Time Metered Generation from all Generation Resources, represented by the QSE for the 15-minute Settlement Interval;

|  |
| --- |
| ***[NPRR987: Replace paragraph (a) above with the following upon system implementation:]***(a) The amount of Real-Time Metered Generation from all Generation Resources and Energy Storage Resources (ESRs), represented by the QSE for the 15-minute Settlement Interval; |

(b) The amount of On-Line capacity based on the telemetered High Sustained Limit (HSL) for all On-Line Generation Resources, the telemetered consumption from Load Resources with a validated Ancillary Service Schedule for RRS controlled by high-set under-frequency relay or Non-Spin, and the capacity from Controllable Load Resources available to SCED;

|  |
| --- |
| ***[NPRR863 and NPRR987: Replace applicable portions of paragraph (b) above with the following upon system implementation:]***(b) The amount of On-Line capacity based on the telemetered High Sustained Limit (HSL) for all On-Line Generation Resources and ESRs, the telemetered consumption from Load Resources with a validated Ancillary Service Schedule for ECRS or RRS controlled by high-set under-frequency relay or Non-Spin, and the capacity from Controllable Load Resources available to SCED, including capacity from modeled Controllable Load Resources associated with ESRs; |

(c) The amount of Ancillary Service Resource Responsibility for Reg-Up, RRS and Non-Spin for the QSE for the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR863 and NPRR987: Replace applicable portions of paragraph (c) above with the following upon system implementation:]***(c) The amount of Ancillary Service Resource Responsibility for Reg-Up, ECRS, RRS and Non-Spin for the QSE for the 15-minute Settlement Interval.  |

(3) Resources meeting one or more of the following conditions will be excluded from the amounts calculated pursuant to paragraphs (2)(a) and (b) above:

(a) Nuclear Resources;

(b) Resources with a telemetered ONTEST, STARTUP (except Resources with Non-Spin Ancillary Service Resource Responsibility greater than zero), or SHUTDOWN Resource Status excluding Resources telemetering both STARTUP Resource Status and greater than zero Non-Spin Ancillary Service Responsibility; or

|  |
| --- |
| ***[NPRR1085: Replace paragraph (b) above with the following upon system implementation:]***(b) Resources with a telemetered ONTEST, ONHOLD, STARTUP (except Resources with Non-Spin Ancillary Service Resource Responsibility greater than zero), or SHUTDOWN Resource Status excluding Resources telemetering both STARTUP Resource Status and greater than zero Non-Spin Ancillary Service Responsibility; or |

(c) Resources with a telemetered net real power (in MW) less than 95% of their telemetered Low Sustained Limit (LSL) excluding Resources telemetering both STARTUP Resource Status and greater than zero Non-Spin Ancillary Service Responsibility.

|  |
| --- |
| ***[NPRR987: Replace paragraph (c) above with the following upon system implementation:]***(c) Resources with a telemetered net real power (in MW) less than 95% of their telemetered Low Sustained Limit (LSL) excluding the following: (i) Resources telemetering both STARTUP Resource Status and greater than zero Non-Spin Ancillary Service Responsibility; or(ii) ESRs. |

(4) Reliability Must-Run (RMR) Units and Reliability Unit Commitment (RUC) Resources On-Line during the hour due to an ERCOT instruction, except for any RUC Resource committed by a RUC Dispatch Instruction where that Resource’s QSE subsequently opted out of RUC Settlement pursuant to paragraph (14) of Section 5.5.2, Reliability Unit Commitment (RUC) Process, those RUC Resources that had a Three-Part Supply Offer cleared in the DAM for the hour, or a Switchable Generation Resource (SWGR) released by a non-ERCOT Control Area Operator (CAO) to operate in the ERCOT Control Area due to an ERCOT RUC instruction for an actual or anticipated Energy Emergency Alert (EEA) condition, and any Combined Cycle Generation Resource that was RUC-committed from one On-Line configuration to a different configuration with additional capacity, as described in paragraph (3) of Section 5.5.2, will be excluded from the amounts calculated for the 15-minute Settlement Interval pursuant to paragraphs (2)(a), (b), and (c) above.

|  |
| --- |
| ***[NPRR885 and NPRR1092: Replace applicable portions of paragraph (4) above with the following upon system implementation:]***(4) Reliability Must-Run (RMR) Units, and Must-Run Alternatives (MRAs), and Reliability Unit Commitment (RUC) Resources On-Line during the hour due to an ERCOT instruction will be excluded from the amounts calculated for the 15-minute Settlement Interval pursuant to paragraphs (2)(a), (b), and (c) above except for: (a) Those RUC Resources that had a Three-Part Supply Offer cleared in the DAM for the hour;(b) A Switchable Generation Resource (SWGR) released by a non-ERCOT Control Area Operator (CAO) to operate in the ERCOT Control Area due to an ERCOT RUC instruction for an actual or anticipated Energy Emergency Alert (EEA) condition;(c) Any Combined Cycle Generation Resource that was RUC-committed from one On-Line configuration to a different configuration with additional capacity, as described in paragraph (3) of Section 5.5.2, Reliability Unit Commitment (RUC) Process; or(d) Any RUC Resource committed by a RUC Dispatch Instruction where that Resource’s QSE subsequently opted out of RUC Settlement pursuant to paragraph (14) of Section 5.5.2. |

(5) The Real-Time Off-Line Reserve Capacity for the QSE (RTOFFCAP) shall be administratively set to zero when the SCED snapshot of the Physical Responsive Capability (PRC) is less than or equal to the PRC MW at which EEA Level 1 is initiated.

(6) Resources that have a Under Generation Volume (UGEN) greater than zero, and are not-exempt from a Base Point Deviation Charge, as set forth in Section 6.6.5, Base Point Deviation Charge, or are not already excluded in paragraphs (3) or (4) above, for the 15-minute Settlement Interval will have the UGEN amounts removed from the amounts calculated pursuant to paragraphs (2)(a) and (b) above.

|  |
| --- |
| ***[NPRR987: Replace paragraph (6) above with the following upon system implementation:]***(6) Resources that have an Under Generation Volume (UGEN) or an Under Performance Volume (UPESR) greater than zero, and are not exempt from a Base Point Deviation Charge, as set forth in Section 6.6.5, Base Point Deviation Charge, or are not already excluded in paragraphs (3) or (4) above, for the 15-minute Settlement Interval will have the UGEN or UPESR amounts removed from the amounts calculated pursuant to paragraphs (2)(a) and (b) above. |

(7) The payment or charge to each QSE for the Ancillary Service imbalance for a given 15-minute Settlement Interval is calculated as follows:

**RTASIAMT *q* = (-1) \* [(RTASOLIMB *q* \* RTRSVPOR) + (RTASOFFIMB *q* \* RTRSVPOFF)]**

**RTRDASIAMT *q*= (-1) \* (RTASOLIMB *q* \* RTRDP)**

Where:

RTASOLIMB *q*= RTOLCAP *q* – [((SYS\_GEN\_DISCFACTOR \* RTASRESP *q* ) \* ¼) – RTASOFF *q* – RTRUCNBBRESP *q*– RTCLRNSRESP *q* – RTNCLRNSRESP *q* – RTRMRRESP *q*]

|  |
| --- |
| ***[NPRR1131: Replace the formula “RTASOLIMB q” above with the following upon system implementation:]***RTASOLIMB *q*= RTOLCAP *q* – [((SYS\_GEN\_DISCFACTOR \* RTASRESP *q* ) \* ¼) – RTASOFF *q* – RTRUCNBBRESP *q* – RTNCLRNSRESP *q* – RTRMRRESP *q*] |

Where:

 RTASOFF *q* = SYS\_GEN\_DISCFACTOR \* RTASOFFR *q, r, p*

 RTRUCNBBRESP *q*= SYS\_GEN\_DISCFACTOR \*  RTRUCASA *q, r* \* ¼

 RTCLRNSRESP *q* = SYS\_GEN\_DISCFACTOR \* RTCLRNSRESPR *q, r, p*

|  |
| --- |
| ***[NPRR1131: Delete the formula “RTCLRNSRESP q” above upon system implementation.]*** |

RTNCLRNSRESP *q* =  SYS\_GEN\_DISCFACTOR \* RTNCLRNSRESPR *q, r, p*

RTRMRRESP *q* = SYS\_GEN\_DISCFACTOR \*(HRRADJ *q, r, p* + HRUADJ *q, r, p* + HNSADJ *q, r, p*) \* ¼

|  |
| --- |
| ***[NPRR863: Replace the formula “RTRMRRESP q” above with the following upon system implementation:]***RTRMRRESP *q* = SYS\_GEN\_DISCFACTOR \* (HRRADJ *q, r, p* + HECRADJ *q, r, p* + HRUADJ *q, r, p* + HNSADJ *q, r, p*) \* ¼ |

RTOLCAP *q* = (RTOLHSL *q* – RTMGQ *q* – SYS\_GEN\_DISCFACTOR \* (****UGENA *q, r, p*)) + RTCLRCAP *q* + RTNCLRCAP *q*

|  |
| --- |
| ***[NPRR987: Replace the formula “RTOLCAP q” above with the following upon system implementation:]***RTOLCAP *q* = (RTOLHSL *q* – RTMGQ *q* – SYS\_GEN\_DISCFACTOR \* ((UGENA *q, r, p* **+** UPESRA *q, r, p*))) + RTCLRCAP *q* + RTNCLRCAP *q* **+** RTESRCAP *q* |

Where:

RTNCLRCAP *q* = Min(Max(RTNCLRNPC *q* – RTNCLRLPC *q*, 0.0), RTNCLRRRS *q* \* 1.5)

|  |
| --- |
| ***[NPRR863: Replace the formula “RTNCLRCAP q” above with the following upon system implementation:]***RTNCLRCAP *q* = Min(Max(RTNCLRNPC *q* – RTNCLRLPC *q*, 0.0), (RTNCLRECRS *q +* RTNCLRRRS *q*) \* 1.5) |

RTNCLRRRS *q =* SYS\_GEN\_DISCFACTOR \*  RTNCLRRRSR *q, r, p*

|  |
| --- |
| ***[NPRR863: Insert the formula “RTNCLRECRS q” below upon system implementation:]***RTNCLRECRS *q =* SYS\_GEN\_DISCFACTOR \*  RTNCLRECRSR *q, r, p*  |

RTNCLRNPC *q =* SYS\_GEN\_DISCFACTOR \* RTNCLRNPCR *q, r, p*

RTNCLRLPC *q =* SYS\_GEN\_DISCFACTOR \* RTNCLRLPCR *q, r, p*

RTOLHSL *q* = SYS\_GEN\_DISCFACTOR \* RTOLHSLRA *q, r, p*

RTMGQ *q* = SYS\_GEN\_DISCFACTOR \* RTMGA *q, r, p*

 If RTMGA *q, r, p* > RTOLHSLRA *q, r, p*

 Then RTMGA *q, r, p* = RTOLHSLRA *q, r, p*

|  |
| --- |
| ***[NPRR987: Insert the language below upon system implementation:]***Where for a Controllable Load Resource other than a modeled Controllable Load Resource associated with an Energy Storage Resource (ESR): |

RTCLRCAP *q* = RTCLRNPC *q* – RTCLRLPC *q* – RTCLRNS *q* + RTCLRREG *q*

|  |
| --- |
| ***[NPRR1131: Replace the formula “RTCLRCAP q” above with the following upon system implementation:]***RTCLRCAP *q* = RTCLRNPC *q* – RTCLRLPC *q* + RTCLRREG *q* |

RTCLRNPC *q* = SYS\_GEN\_DISCFACTOR \* RTCLRNPCR ***q, r, p***

RTCLRLPC *q* = SYS\_GEN\_DISCFACTOR \* RTCLRLPCR ***q, r, p***

RTCLRNS *q* = SYS\_GEN\_DISCFACTOR \*  RTCLRNSR ***q, r, p***

|  |
| --- |
| ***[NPRR1131: Delete the formula “RTCLRNS q” above upon system implementation.]*** |

RTCLRREG *q* = SYS\_GEN\_DISCFACTOR \* RTCLRREGR *q, r, p*

Where:

RTRSVPOR = (RNWF  *y* \* RTORPA *y*)

RTASOFFIMB *q* = RTOFFCAP *q* – (RTASOFF *q* + RTCLRNSRESP *q* + RTNCLRNSRESP *q*)

|  |
| --- |
| ***[NPRR1131: Replace the formula “RTASOFFIMB q” above with the following upon system implementation:]***RTASOFFIMB *q* = RTOFFCAP *q* – (RTASOFF *q* + RTNCLRNSRESP *q*) |

RTOFFCAP *q* = (SYS\_GEN\_DISCFACTOR \* RTCST30HSL *q*) + (SYS\_GEN\_DISCFACTOR \* RTOFFNSHSL *q*) + RTCLRNS *q* + RTNCLRNSCAP*q*

|  |
| --- |
| ***[NPRR1131: Replace the formula “RTOFFCAP q” above with the following upon system implementation:]***RTOFFCAP *q* = (SYS\_GEN\_DISCFACTOR \* RTCST30HSL *q*) + (SYS\_GEN\_DISCFACTOR \* RTOFFNSHSL *q*) + RTNCLRNSCAP*q* |

RTNCLRNSCAP *q* = Min(Max(RTNCLRNPC *q* – RTNCLRLPC *q*, 0.0), RTNCLRNS *q* \* 1.5)

RTNCLRNS *q* = SYS\_GEN\_DISCFACTOR \* RTNCLRNSR *q, r, p*

RTRSVPOFF = (RNWF  *y* \* RTOFFPA *y*)

RTRDP = (RNWF  *y* \* RTORDPA *y*)

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

|  |
| --- |
| ***[NPRR987: Insert the language below upon system implementation:]***Where for an ESR:RTESRCAP *q* = (RTESRCAPR *q, g, p*)Where:RTESRCAPR *q, g, p* *=* Min[(RTOLHSLRA *q, r, p* – RTMGA *q, r, p* + RTCLRNPCR *q, r, p*),(RTCLRNPCR *q, r, p* + SOCT *q, r* – SOCOM *q, r*)] |

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RTASIAMT *q* | $ | *Real-Time Ancillary Service Imbalance Amount*—The total payment or charge to QSE *q* for the Real-Time Ancillary Service imbalance associated with Operating Reserve Demand Curve (ORDC) for each 15-minute Settlement Interval. |
| RTRDASIAMT *q* | $ | *Real-Time Reliability Deployment Ancillary Service Imbalance Amount*—The total payment or charge to QSE *q* for the Real-Time Ancillary Service imbalance associated with Reliability Deployments for each 15-minute Settlement Interval. |
| RTASOLIMB *q* | MWh | *Real-Time Ancillary Service On-Line Reserve Imbalance for the QSE* ⎯The Real-Time Ancillary Service On-Line reserve imbalance for the QSE *q*, for each 15-minute Settlement Interval.  |
| RTORPA*y* | $/MWh | *Real-Time On-Line Reserve Price Adder per interval*⎯The Real-Time Price Adder for On-Line Reserves for the SCED interval *y*. |
| RTOFFPA *y* | $/MWh | *Real-Time Off-Line Reserve Price Adder per interval*⎯The Real-Time Price Adder for Off-Line Reserves for the SCED interval *y*. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y*. |
| RTRDP | $/MWh | *Real-Time On-Line Reliability Deployment Price*⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. |
| RTORDPA*y* | $/MWh | *Real-Time On-Line Reliability Deployment Price Adder*⎯The Real-Time Price Adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. |
| RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Resource Node Settlement Point Price calculation for the portion of the SCED interval *y* within the 15-minute Settlement Interval. |
| RTRSVPOR | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval. |
| RTRSVPOFF | $/MWh | *Real-Time Reserve Price for Off-Line Reserves*⎯The Real-Time Reserve Price for Off-Line Reserves for the 15-minute Settlement Interval. |
| RTOLCAP *q*  | MWh | *Real-Time On-Line Reserve Capacity for the QSE*⎯The Real-Time reserve capacity of On-Line Resources available for the QSE *q*, for the 15-minute Settlement Interval. |
| RTOLHSLRA *q, r, p* | MWh | *Real-Time Adjusted On-Line High Sustained Limit for the Resource*⎯The Real-Time telemetered HSL for the Resource *r* represented by QSE *q* at Resource Node *p* that is available to SCED, integrated over the 15-minute Settlement Interval, and adjusted pursuant to paragraphs (3) and (4) above. |
| RTOLHSL *q* | MWh | *Real-Time On-Line High Sustained Limit for the QSE*⎯The Real-Time telemetered HSL for all Generation Resources available to SCED, pursuant to paragraphs (3) and (4) above, integrated over the 15-minute Settlement Interval for the QSE *q*, discounted by the system-wide discount factor.

|  |
| --- |
| ***[NPRR987: Replace the description above with the following upon system implementation:]****Real-Time On-Line High Sustained Limit for the QSE*⎯The integrated Real-Time telemetered HSL for all Generation Resources, not including modeled Generation Resources associated with ESRs, available to SCED, pursuant to paragraphs (3) and (4) above, integrated over the 15-minute Settlement Interval for the QSE *q*, discounted by the system-wide discount factor. |

 |
| RTASRESP *q* | MW | *Real-Time Ancillary Service Supply Responsibility for the QSE*⎯The Real-Time Ancillary Service Supply Responsibility for Reg-Up, RRS and Non-Spin pursuant to Section 4.4.7.4, Ancillary Service Supply Responsibility, for the QSE *q*, for the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR863: Replace the description above with the following upon system implementation:]****Real-Time Ancillary Service Supply Responsibility for the QSE*⎯The Real-Time Ancillary Service Supply Responsibility for Reg-Up, ECRS, RRS and Non-Spin pursuant to Section 4.4.7.4, Ancillary Service Supply Responsibility, for the QSE *q*, for the 15-minute Settlement Interval. |

 |
| RTCLRCAP *q* | MWh | *Real-Time Capacity from Controllable Load Resources for the QSE*—The Real-Time capacity and Reg-Up minus Non-Spin available from all Controllable Load Resources available to SCED for the QSE *q*, integrated over the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR987: Replace the description above with the following upon system implementation:]****Real-Time Capacity from Controllable Load Resources for the QSE*—The Real-Time capacity and Reg-Up minus Non-Spin available from all Controllable Load Resources, not including modeled Controllable Load Resources associated with ESRs available to SCED for the QSE *q*, integrated over the 15-minute Settlement Interval. |

 |
| RTNCLRCAP ***q*** | MWh | *Real-Time Capacity from Non-Controllable Load Resources carrying Responsive Reserve for the QSE*—The Real-Time capacity for all Load Resources other than Controllable Load Resources that have a validated Real-Time RRS Ancillary Service Schedule for the QSE *q*, integrated over the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR863: Replace the description above with the following upon system implementation:]****Real-Time Capacity from Non-Controllable Load Resources carrying ERCOT Contingency Reserve or Responsive Reserve for the QSE*—The Real-Time capacity for all Load Resources other than Controllable Load Resources that have a validated Real-Time ECRS or RRS Ancillary Service Schedule for the QSE *q*, integrated over the 15-minute Settlement Interval. |

 |
| RTNCLRRRS *q* | MWh | *Real-Time Non-Controllable Load Resources Responsive Reserve for the QSE—*The validated Real-Time telemetered RRS Ancillary Service Supply Responsibility for all Load Resources other than Controllable Load Resources for QSE *q* discounted by the system-wide discount factor, integrated over the 15-minute Settlement Interval. |
| RTNCLRRRSR *q, r, p* | MWh | *Real-Time Non-Controllable Load Resource Responsive Reserve—*The validated Real-Time telemetered RRS Ancillary Service Resource Responsibility for the Load Resource *r* (which is not a Controllable Load Resource) represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval. |
|

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR863: Insert the variables “RTNCLRECRS**q” and “RTNCLRECRSR**q, r, p” below upon system implementation:]***

|  |  |  |
| --- | --- | --- |
| RTNCLRECRS *q* | MWh | *Real-Time Non-Controllable Load Resources ERCOT Contingency Reserve for the QSE—*The validated Real-Time telemetered ECRS Ancillary Service Supply Responsibility for all Load Resources other than Controllable Load Resources for QSE *q* discounted by the system-wide discount factor, integrated over the 15-minute Settlement Interval. |
| RTNCLRECRSR *q, r, p* | MWh | *Real-Time Non-Controllable Load Resource ERCOT Contingency Reserve —*The validated Real-Time telemetered ECRS Ancillary Service Resource Responsibility for the Load Resource *r* (which is not a Controllable Load Resource) represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval. |

 |

 |
| RTNCLRNPCR *q, r, p* | MWh | *Real-Time Non-Controllable Load Resource Net Power Consumption—*The Real-Time net real power consumption from the Load Resource *r* (which is not a Controllable Load Resource)represented by QSE *q* at Resource Node *p* that has a validated Real-Time RRS or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR863: Replace the description above with the following upon system implementation:]****Real-Time Non-Controllable Load Resource Net Power Consumption—*The Real-Time net real power consumption from the Load Resource *r* (which is not a Controllable Load Resource)represented by QSE *q* at Resource Node *p* that has a validated Real-Time ECRS, RRS, or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval. |

 |
| RTNCLRLPCR *q, r, p* | MWh | *Real-Time Non-Controllable Load Resource Low Power Consumption—*The Real-Time Low Power Consumption (LPC) from the Load Resource *r* (which is not a Controllable Load Resource)represented by QSE *q* at Resource Node *p* that has a validated Real-Time RRS or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR863: Replace the description above with the following upon system implementation:]****Real-Time Non-Controllable Load Resource Low Power Consumption—*The Real-Time Low Power Consumption (LPC) from the Load Resource *r* (which is not a Controllable Load Resource)represented by QSE *q* at Resource Node *p* that has a validated Real-Time ECRS, RRS, or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval  |

 |
| RTNCLRNPC *q* | MWh | *Real-Time Non-Controllable Load Resource Net Power Consumption for the QSE—*The Real-Time net real power consumption from all Load Resources other than Controllable Load Resources for QSE *q* that have a validated Real-Time RRS or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor.

|  |
| --- |
| ***[NPRR863: Replace the description above with the following upon system implementation:]****Real-Time Non-Controllable Load Resource Net Power Consumption for the QSE—*The Real-Time net real power consumption from all Load Resources other than Controllable Load Resources for QSE *q* that have a validated Real-Time ECRS, RRS, or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |

 |
| RTNCLRLPC *q* | MWh | *Real-Time Non-Controllable Load Resource Low Power Consumption for the QSE—*The Real-Time LPC from all Load Resources other than Controllable Load Resourcesfor QSE *q* that have a validated Real-Time RRS or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor.

|  |
| --- |
| ***[NPRR863: Replace the description above with the following upon system implementation:]****Real-Time Non-Controllable Load Resource Low Power Consumption for the QSE—*The Real-Time LPC from all Load Resources other than Controllable Load Resourcesfor QSE *q* that have a validated Real-Time ECRS, RRS, or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |

 |
| RTNCLRNSCAP ***q*** | MWh | *Real-Time Capacity from Non-Controllable Load Resources carrying Non-Spin for the QSE*—The Real-Time capacity for all Load Resources that are not Controllable Load Resources and that have a validated Real-Time Non-Spin Ancillary Service Schedule for the QSE *q*, integrated over the 15-minute Settlement Interval. |
| RTNCLRNSR *q, r, p* | MWh | *Real-Time Non-Spin Schedule for the Non-Controllable Load Resource ⎯*The validated Real-Time telemetered Non-Spin Ancillary Service Schedule for the Load Resource *r* that is not a Controllable Load Resources represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval. |
| RTNCLRNS *q* | MWh | *Real-Time Non-Spin Schedule for Non-Controllable Load Resources for the QSE*⎯The Real-Time telemetered Non-Spin Ancillary Service Schedule for all Load Resources that are not Controllable Load Resources for the QSE *q*, integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |
| RTNCLRNSRESP *q* | MWh | *Real-Time Non-Controllable Load Resource Non-Spin Responsibility for the QSE*⎯The Real Time telemetered Non-Spin Ancillary Service Supply Responsibility for all Load Resources that are not Controllable Load Resources discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval. |
| RTNCLRNSRESPR *q, r, p* | MWh | *Real-Time Non-Controllable Load Resource Non-Spin Responsibility for the Resource*⎯The Real-Time telemetered Non-Spin Ancillary Service Resource Responsibility for the Load Resource *r* that is not a Controllable Load Resource represented by QSE *q* at Resource Node *p* integrated over the 15-minute Settlement Interval. |
| RTCLRNPCR *q, r, p* | MWh | *Real-Time Net Power Consumption from the Controllable Load Resource—*The Real-Time net real power consumption from the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p* available to SCED integrated over the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR987: Replace the description above with the following upon system implementation:]****Real-Time Net Power Consumption from the Controllable Load Resource—*The Real-Time net real power consumption from the Controllable Load Resource or modeled Controllable Load Resource associated with an ESR, *r* represented by QSE *q* at Resource Node *p* available to SCED integrated over the 15-minute Settlement Interval. |

 |
| RTCLRNPC *q* | MWh | *Real-Time Net Power Consumption from Controllable Load Resources for the QSE*—The Real-Time net real power consumption from all Controllable Load Resources available to SCED integrated over the 15-minute Settlement Interval for the QSE *q* discounted by the system-wide discount factor.

|  |
| --- |
| ***[NPRR987: Replace the description above with the following upon system implementation:]****Real-Time Net Power Consumption from Controllable Load Resources for the QSE*—The Real-Time net real power consumption from all Controllable Load Resources, not including modeled Controllable Load Resources associated with ESRs, available to SCED integrated over the 15-minute Settlement Interval for the QSE *q* discounted by the system-wide discount factor. |

 |
| RTCLRLPCR *q, r, p* | MWh | *Real-Time Low Power Consumption for the Controllable Load Resource—*The Real-Time LPC from the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p* available to SCED integrated over the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR987: Replace the description above with the following upon system implementation:]****Real-Time Low Power Consumption for the Controllable Load Resource—*The Real-Time LPC from the Controllable Load Resource or modeled Controllable Load Resource associated with an ESR, *r* represented by QSE *q* at Resource Node *p* available to SCED integrated over the 15-minute Settlement Interval. |

 |
| RTCLRLPC *q* | MWh | *Real-Time Low Power Consumption from Controllable Load Resources for the QSE*—The Real-Time LPC from Controllable Load Resources available to SCED integrated over the 15-minute Settlement Interval for the QSE *q* discounted by the system-wide discount factor.

|  |
| --- |
| ***[NPRR987: Replace the description above with the following upon system implementation:]****Real-Time Low Power Consumption from Controllable Load Resources for the QSE*—The Real-Time LPC from Controllable Load Resources, not including modeled Controllable Load Resources associated with ESRs, available to SCED integrated over the 15-minute Settlement Interval for the QSE *q* discounted by the system-wide discount factor. |

 |
| RTCLRREG *q* | MWh | *Real-Time Controllable Load Resources Regulation-Up Schedule for the QSE*—The Real-Time Reg-Up Ancillary Service Schedule from all Controllable Load Resources not available to SCED with Primary Frequency Response for the QSE *q*, integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |
| RTCLRREGR*q, r, p* | MWh | *Real-Time Controllable Load Resource Regulation-Up Schedule for the Resource*—The validated Real-Time Reg-Up Ancillary Service Schedule for the Controllable Load Resource not available to SCED *r* represented by QSE *q* at Resource Node *p* with Primary Frequency Response, integrated over the 15-minute Settlement Interval. |
| RTMGA *q, r, p* | MWh | *Real-Time Adjusted Metered Generation per QSE per Settlement Point per Resource*—The adjusted metered generation, pursuant to paragraphs (3) and (4) above, of Generation Resource *r* represented by QSE *q* at Resource Node *p* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMGQ *q* | MWh | *Real-Time Metered Generation per QSE*—The metered generation, discounted by the system-wide discount factor, of all generation Resources represented by QSE *q* in Real-Time for the 15-minute Settlement Interval, pursuant to paragraphs (3) and (4) above.

|  |
| --- |
| ***[NPRR987: Replace the description above with the following upon system implementation:]****Real-Time Metered Generation per QSE*—The metered generation, discounted by the system-wide discount factor, of all Generation Resources, not including modeled Generation Resources associated with ESRs, represented by QSE *q* in Real-Time for the 15-minute Settlement Interval, pursuant to paragraphs (3) and (4) above. |

 |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR987: Insert the variables “RTESRCAPR q, g, p”, “RTESRCAP q”, “SOCT q, r”, and “SOCOM q, r” below upon system implementation:]***

|  |  |  |
| --- | --- | --- |
| RTESRCAPR *q, g, p* | MWh | *Real-Time Capacity from an Energy Storage Resource* –Capacity provided by an ESR *g*, represented by QSE *q* at Resource Node *p,* which considers energy limitations of the ESR and potentially higher contribution when charging for the15-minute Settlement Interval*.* |
| RTESRCAP *q* | MWh | *Real-Time Capacity from Energy Storage Resources per QSE –* Capacity provided by all ESRs, represented by QSE *q*, for the 15-minute Settlement Interval.  |
| SOCT *q, r* | MWh | *State of Charge Telemetered by an Energy Storage Resource –* The average telemetered state of charge of Resource *r*, represented by QSE *q*, over the 15-minute Settlement Interval. |
| SOCOM *q, r* | MWh | *State of Charge Operating Minimum for an Energy Storage Resource* –The average telemetered state of charge operating minimum of Resource *r*, represented by QSE *q*, over the 15-minute Settlement Interval. |

 |

 |
| RTASOFFIMB *q* | MWh | *Real-Time Ancillary Service Off-Line Reserve Imbalance for the QSE*⎯The Real-Time Ancillary Service Off-Line reserve imbalance for the QSE *q*, for each 15-minute Settlement Interval.  |
| RTOFFCAP *q*  | MWh | *Real-Time Off-Line Reserve Capacity for the QSE*⎯The Real-Time reserve capacity of Off-Line Resources available for the QSE *q*, for the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR1069: Replace the description above with the following upon system implementation of NPRR987:]****Real-Time Off-Line Reserve Capacity for the QSE*⎯The Real-Time reserve capacity of Off-Line Resources, not including modeled Generation Resources associated with ESRs, available for the QSE *q*, for the 15-minute Settlement Interval. |

 |
| RTCST30HSL *q* | MWh | *Real-Time Generation Resources with Cold Start Available in 30 Minutes*⎯The Real-Time telemetered HSLs of Generation Resources, excluding Intermittent Renewable Resources (IRRs), that have telemetered an OFF Resource Status and can be started from a cold temperature state in 30 minutes for the QSE *q*, time-weighted over the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR1069: Replace the description above with the following upon system implementation of NPRR987:]****Real-Time Generation Resources with Cold Start Available in 30 Minutes*⎯The Real-Time telemetered HSLs of Generation Resources, excluding Intermittent Renewable Resources (IRRs) and modeled Generation Resources associated with ESRs, that have telemetered an OFF Resource Status and can be started from a cold temperature state in 30 minutes for the QSE *q*, time-weighted over the 15-minute Settlement Interval. |

 |
| RTOFFNSHSL *q* | MWh | *Real-Time Generation Resources with Off-Line Non-Spin Schedule*⎯The Real-Time telemetered HSLs of Generation Resources that have telemetered an OFFNS Resource Status for the QSE *q*, time-weighted over the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR1069 and NPRR1135: Replace applicable portions of the description above with the following upon system implementation of NPRR987 for NPRR1069; or upon system implementation for NPRR1135:]****Real-Time Generation Resources with Off-Line Non-Spin Schedule*⎯The Real-Time telemetered HSLs of Off-Line Generation Resources, not including modeled Generation Resources associated with ESRs, that have telemetered an OFFNS Resource Status for the QSE *q*, time-weighted over the 15-minute Settlement Interval. |

 |
| RTASOFFR *q, r, p* | MWh | *Real-Time Ancillary Service Schedule for the Off-Line Generation Resource*⎯The validated Real-Time telemetered Ancillary Service Schedule for the Off-Line Generation Resource *r* represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval. |
| RTASOFF *q* | MWh | *Real-Time Ancillary Service Schedule for Off-Line Generation Resources for the QSE*⎯The Real-Time telemetered Ancillary Service Schedule for all Off-Line Generation Resources discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR1069: Replace the description above with the following upon system implementation of NPRR987:]****Real-Time Ancillary Service Schedule for Off-Line Generation Resources for the QSE*⎯The Real-Time telemetered Ancillary Service Schedule for all Off-Line Generation Resources, not including modeled Generation Resources associated with ESRs, discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval. |

 |
| HRRADJ *q, r, p* | MW  | *Ancillary Service Resource Responsibility Capacity for Responsive Reserve at Adjustment Period—*The RRS Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last Current Operating Plan (COP) and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval. |
|

|  |  |  |  |
| --- | --- | --- | --- |
| ***[NPRR863: Insert the variable “HECRADJ q, r, p” below upon system implementation:]***

|  |  |  |
| --- | --- | --- |
| HECRADJ *q, r, p* | MW  | *Ancillary Service Resource Responsibility Capacity for ERCOT Contingency Reserve Service at Adjustment Period—*The ECRS Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last Current Operating Plan (COP) and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval. |

 |

 |
| HRUADJ *q, r, p* | MW | *Ancillary Service Resource Responsibility Capacity for Reg-Up at Adjustment Period—*The Regulation Up Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last COP and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval. |
| HNSADJ *q, r, p* | MW | *Ancillary Service Resource Responsibility Capacity for Non-Spin at Adjustment Period—*The Non-Spin Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last COP and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval. |
| RTRUCNBBRESP *q* | MWh | *Real-Time RUC Ancillary Service Supply Responsibility for the QSE in Non-Buy-Back hours*⎯The Real-Time Ancillary Service Supply Responsibility for Reg-Up, RRS and Non-Spin pursuant to the Ancillary Service awards, for the 15-minute Settlement Interval that falls within a RUC-Committed Hour, discounted by the system-wide discount factor for the QSE *q.*

|  |
| --- |
| ***[NPRR863: Replace the description above with the following upon system implementation:]****Real-Time RUC Ancillary Service Supply Responsibility for the QSE in Non-Buy-Back hours*⎯The Real-Time Ancillary Service Supply Responsibility for Reg-Up, ECRS, RRS, and Non-Spin pursuant to the Ancillary Service awards, for the 15-minute Settlement Interval that falls within a RUC-Committed Hour, discounted by the system-wide discount factor for the QSE *q.* |

 |
| RTRUCASA *q, r* | MW | *Real-Time RUC Ancillary Service Awards*⎯The Real-Time Ancillary Service award to the RUC Resource *r* for Reg-Up, RRS, and Non-Spin for the hour that includes the 15-minute Settlement Interval that falls within a RUC-Committed Hour for the QSE *q.*

|  |
| --- |
| ***[NPRR863: Replace the description above with the following upon system implementation:]****Real-Time RUC Ancillary Service Awards*⎯The Real-Time Ancillary Service award to the RUC Resource *r* for Reg-Up, ECRS, RRS, and Non-Spin for the hour that includes the 15-minute Settlement Interval that falls within a RUC-Committed Hour for the QSE *q.* |

 |
| RTCLRNSRESP *q* | MWh | *Real-Time Controllable Load Resource Non-Spin Responsibility for the QSE*⎯The Real Time telemetered Non-Spin Ancillary Service Supply Responsibility for all Controllable Load Resources available to SCED discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR1069: Replace the description above with the following upon system implementation of NPRR987:]****Real-Time Controllable Load Resource Non-Spin Responsibility for the QSE*⎯The Real Time telemetered Non-Spin Ancillary Service Supply Responsibility for all Controllable Load Resources, not including modeled Controllable Load Resources associated with ESRs, available to SCED discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval. |

 |
|

|  |
| --- |
| ***[NPRR1131: Delete the variable “RTCLRNSRESP q” above upon system implementation.]*** |

 |
| RTCLRNSRESPR *q, r, p* | MWh | *Real-Time Controllable Load Resource Non-Spin Responsibility for the Resource*⎯The Real-Time telemetered Non-Spin Ancillary Service Resource Responsibility for the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p* available to SCED, integrated over the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR1069: Replace the description above with the following upon system implementation of NPRR987:]****Real-Time Controllable Load Resource Non-Spin Responsibility for the Resource*⎯The Real-Time telemetered Non-Spin Ancillary Service Resource Responsibility for the Controllable Load Resource *r* or modeled Controllable Load Resource associated with an ESR represented by QSE *q* at Resource Node *p* available to SCED, integrated over the 15-minute Settlement Interval. |

 |
|

|  |
| --- |
| ***[NPRR1131: Delete the variable “RTCLRNSRESPR q, r, p” above upon system implementation.]*** |

 |
| RTRMRRESP *q* | MWh | *Real-Time Ancillary Service Supply Responsibility for RMR Units represented by the QSE*⎯The Real-Time Ancillary Service Supply Responsibility as set forth in the end of the Adjustment Period COP for Reg-Up, RRS, and Non-Spin for all RMR Units discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR863: Replace the description above with the following upon system implementation:]****Real-Time Ancillary Service Supply Responsibility for RMR Units represented by the QSE*⎯The Real-Time Ancillary Service Supply Responsibility as set forth in the end of the Adjustment Period COP for Reg-Up, ECRS, RRS, and Non-Spin for all RMR Units discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval. |

 |
| RTCLRNSR *q, r, p* | MWh | *Real-Time Non-Spin Schedule for the Controllable Load Resource ⎯*The validated Real-Time telemetered Non-Spin Ancillary Service Schedule for the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR987: Replace the description above with the following upon system implementation:]****Real-Time Non-Spin Schedule for the Controllable Load Resource ⎯*The validated Real-Time telemetered Non-Spin Ancillary Service Schedule for the Controllable Load Resourceor modeled Controllable Load Resource associated with an ESR, *r* represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval. |

 |
|

|  |
| --- |
| ***[NPRR1131: Delete the variable “RTCLRNSR q, r, p” above upon system implementation.]*** |

 |
| RTCLRNS *q* | MWh | *Real-Time Non-Spin Schedule for Controllable Load Resources for the QSE*⎯The Real-Time telemetered Non-Spin Ancillary Service Schedule for all Controllable Load Resources for the QSE *q*, integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor.

|  |
| --- |
| ***[NPRR987: Replace the description above with the following upon system implementation:]****Real-Time Non-Spin Schedule for Controllable Load Resources for the QSE*⎯The Real-Time telemetered Non-Spin Ancillary Service Schedule for all Controllable Load Resources, not including modeled Controllable Load Resources associated with ESRs, for the QSE *q*, integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |

 |
|

|  |
| --- |
| ***[NPRR1131: Delete the variable “RTCLRNS q” above upon system implementation.]*** |

 |
| SYS\_GEN\_DISCFACTOR  | none | *System-Wide Discount Factor* – The system-wide discount factor used to discount inputs used in the calculation of Real-Time Ancillary Services Imbalance payment or charge is calculated as the average of the currently approved Reserve Discount Factors (RDFs) applied to the temperatures from the current Season from the year prior.   |
| UGEN *q, r, p* | MWh | *Under Generation Volumes per QSE per Settlement Point per Resource*—The amount under-generated by the Generation Resource *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval. |
| UGENA *q, r, p* | MWh | *Adjusted Under Generation Volumes per QSE per Settlement Point per Resource*—The amount under-generated by the Generation Resource *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval adjusted pursuant to paragraph (6) above. |
|

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR987: Insert the variables “UPESR q, r, p” and “UPESRA q, r, p” below upon system implementation:]***

|  |  |  |
| --- | --- | --- |
| UPESR *q, r, p* | MWh | *Under-Performance Volumes per QSE per Settlement Point per Resource*—The amount the ESR under-performed divided evenly among the modeled Generation and Controllable Load Resources *r* in the ESR*,* represented by QSE *q* at Resource Node *p,* for the 15-minute Settlement Interval. |
| UPESRA *q, r, p* | MWh | *Adjusted Under-Performance Volumes per QSE per Settlement Point per Resource* — The amount the ESR under-performed divided evenly among the modeled Generation and Controllable Load Resources *r* in the ESR*,* represented by QSE *q* at Resource Node *p,* for the 15-minute Settlement Interval adjusted pursuant to paragraph (6) above. |

 |

 |
| *r* | none | A Generation or Load Resource. |
| *y* | none | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Resource Node Settlement Point. |
|

|  |  |  |  |
| --- | --- | --- | --- |
| ***[NPRR987: Insert the variable “g” below upon system implementation:]***

|  |  |  |
| --- | --- | --- |
| *g* | none | An ESR. |

 |

 |

(8) The payment to each QSE for the Ancillary Service reserves associated with RUC Resources that have received a RUC Dispatch to provide Ancillary Services in which the 15-minute Settlement Interval is part of a RUC Buy-Back Hour based on the RUC opt out provision set forth in paragraph (14) of Section 5.5.2 for a given 15-minute Settlement Interval is calculated as follows:

**RTRUCRSVAMT *q* = (-1) \* (RTRUCRESP *q* \* RTRSVPOR)**

**RTRDRUCRSVAMT *q* = (-1) \* (RTRUCRESP *q* \* RTRDP)**

Where:

RTRUCRESP *q* =  RTRUCASA *q, r* \* ¼

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RTRUCRSVAMT*q* | $ | *Real-Time RUC Ancillary Service Reserve Amount*—The total payment |to QSE *q* for the Real-Time RUC Ancillary Service Reserve payment associated with ORDC for each 15-minute Settlement Interval. |
| RTRDRUCRSVAMT *q* | $ | *Real-Time Reliability Deployment RUC Ancillary Service Reserve Amount*—The total payment |to QSE *q* for the Real-Time RUC Ancillary Service Reserve payment associated with reliability deployments for each 15-minute Settlement Interval. |
| RTRUCRESP *q* | MWh | *Real-Time RUC Ancillary Service Supply Responsibility for the QSE*⎯The Real-Time Ancillary Service Supply Responsibility pursuant to the Ancillary Service awards for Reg-Up, RRS, and Non-Spin for all RUC Resources that have opted out per paragraph (14) of Section 5.5.2 for the QSE *q*, for the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR863: Replace the description above with the following upon system implementation:]****Real-Time RUC Ancillary Service Supply Responsibility for the QSE*⎯The Real-Time Ancillary Service Supply Responsibility pursuant to the Ancillary Service awards for Reg-Up, ECRS, RRS, and Non-Spin for all RUC Resources that have opted out per paragraph (14) of Section 5.5.2 for the QSE *q*, for the 15-minute Settlement Interval. |

 |
| RTRUCASA *q, r* | MW | *Real-Time RUC Ancillary Service Awards*⎯The Real-Time Ancillary Service award to the RUC Resource *r* for Reg-Up, RRS, and Non-Spin for the 15-minute Settlement Interval that falls within a RUC-Committed Hour for the QSE *q.*

|  |
| --- |
| ***[NPRR863: Replace the description above with the following upon system implementation:]****Real-Time RUC Ancillary Service Awards*⎯The Real-Time Ancillary Service award to the RUC Resource *r* for Reg-Up, ECRS, RRS, and Non-Spin for the 15-minute Settlement Interval that falls within a RUC-Committed Hour for the QSE *q.* |

 |
| RTRSVPOR | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval. |
| RTRDP | $/MWh | *Real-Time On-Line Reliability Deployment Price* ⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |