**ERCOT Nodal Protocols**

**Section 6: Adjustment Period and Real-Time Operations**

**September 23, 2015**

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# Adjustment Period and Real-Time Operations

6.1 Introduction

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

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

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

(4) Under Emergency Conditions, as described in Section 6.5.9, Emergency Operations, ERCOT may implement manual procedures and must keep the Market Participants informed of the status of the system.

(5) Real-Time energy settlements use Real-Time Settlement Point Prices that are calculated for Resource Nodes, Load Zones, and Hubs for a 15-minute Settlement Interval, using the Locational Marginal Prices (LMPs) from all of the executions of SCED in the Settlement Interval. In contrast, the Day-Ahead Market (DAM) energy settlements will use DAM Settlement Point Prices that are calculated for Resource Nodes, Load Zones, and Hubs for a one-hour Settlement Interval.

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

6.2 Market Timeline Summary

The figure below is a high-level summary of the overall market timeline:



6.3 Adjustment Period and Real-Time Operations Timeline

(1) The figure below highlights the major activities that occur in the Adjustment Period and Real-Time operations:

**Preparation for**

**Real**

**-**

**Time Ops**

**Adj Period**

**18:00**

**(D**

**–**

**1)**

**60 Minutes**

**Prior to**

**Op Hour**

**QSE Deadline:**

**Update Energy Bids and Offers**

**Submit HRUC Offers**

**Update Output Schedules**

**Update Inc/Dec Offers for**

**DSRs**

**ERCOT Activity:**

**LFC Process every 4 secs**

**Execute SCED every 5**

**mins**

**Communicate Instructions**

**& Prices**

**ERCOT Activity:**

**Snapshot Inputs &**

**Execute HRUC**

**Operating Period**

**Operating Hour**

**Clock**

**Hour**

**T**

**Adjustment Period & Real**

**-**

**Time Operations**

**Real**

**-**

**Time**

**Operations**

**QSE Deadline:**

**Update Output Schedules for**

**DSRs**

**Provide SCADA Telemetry**

**ERCOT Activity:**

**Communicate**

**HRUC Commitments**

(2) Activities for the Adjustment Period begin at 1800 in the Day-Ahead and end one full hour before the start of the Operating Hour. The figure above is intended to be only a general guide and not controlling language, and any conflict between this figure and another section of the Protocols is controlled by the other section.

(3) ERCOT shall monitor Real-Time Locational Marginal Prices (LMPs), Supplemental Ancillary Services Market (SASM) Market Clearing Prices for Capacity (MCPCs), and Real-Time Settlement Point Prices, including Real-Time prices for energy metered, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reliability Deployment Prices, Real-Time Off-Line Reserve Price Adders, Real-Time On-Line Reserve Price Adders, Real-Time Reserve Prices for On-Line Reserves and Real-Time Reserve Prices for Off-Line Reserves, for errors and if there are conditions that cause the price to be questionable, ERCOT shall notify all Market Participants that the Real-Time LMPs, SASM MCPCs, and Real-Time Settlement Point Prices are under investigation as soon as practicable.

(4) ERCOT shall correct prices when: (i) a market solution is determined to be invalid, (ii) invalid prices are identified in an otherwise valid market solution, or (iii) the Base Points received by Market Participants are inconsistent with the Base Points of a valid market solution, unless accurate prices cannot be determined. The following are some reasons that may cause these conditions.

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

(b) Data Output error: These include: (i) incorrect or incomplete data transfer, (ii) price recalculation error in post-processing, and (iii) Base Points inconsistent with prices due to the Emergency Base Point flag remaining activated even when the Security-Constrained Economic Dispatch (SCED) solution is valid.

(c) Hardware/Software error: These include unpredicted hardware or software failures, planned market system or database outages, planned application or database upgrades, software implementation errors, and failure of the market run to complete.

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

(5) If it is determined that any Real-Time Settlement Point Prices, Settlement Point LMPs, Electrical Bus LMPs, Real-Time prices for energy metered, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reliability Deployment Prices, Real-Time On-Line Reserve Price Adders, Real-Time Off-Line Reserve Price Adders, Real-Time Reserve Prices for On-Line Reserves, Real-Time Reserve Prices for Off-Line Reserves, and/or constraint Shadow Prices are erroneous, ERCOT shall correct the prices before the prices are considered final in paragraph (6) below. Specifically:

(a) If it is determined that correcting the Real-Time Settlement Point Prices will not affect the Base Points that were received by Qualified Scheduling Entities (QSEs), then ERCOT shall correct the prices before the prices are considered final in paragraph (6) below.

(b) If it is determined that correcting the Real-Time Settlement Point Prices will affect the Base Points that were received by QSEs, then ERCOT shall correct the prices before the prices are considered final and settle the SCED executions as failed in accordance with Section 6.5.9.2, Failure of the SCED Process.

(c) If the Base Points received by QSEs are inconsistent with the Real-Time Settlement Point Prices reduced by the sum of the Real-Time On-Line Reliability Deployment Prices and the Real-Time Reserve Prices for On-Line Reserves averaged over the 15-minute Settlement Interval, then ERCOT shall consider those Base Points as due to manual override from the ERCOT Operator and settle the relevant Settlement Interval(s) in accordance with Section 6.6.9, Emergency Operations Settlement.

(6) All Real-Time LMPs, Real-Time Settlement Point Prices, Real-Time prices for energy metered, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reliability Deployment Prices, Real-Time Reserve Prices for On-Line Reserves, Real-Time Reserve Prices for Off-Line Reserves, Real-Time On-Line Reserve Price Adders, Real-Time Off-Line Reserve Price Adders and SASM MCPCs are final at 1600 of the second Business Day after the Operating Day.

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

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

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

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

(b) The ERCOT Board may review and change Real-Time LMPs, Real-Time Settlement Point Prices, Real-Time prices for energy metered, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reliability Deployment Prices, Real-Time Reserve Prices for On-Line Reserves, Real-Time Reserve Prices for Off-Line Reserves, Real-Time On-Line Reserve Price Adders, Real-Time Off-Line Reserve Price Adders and SASM MCPCs if ERCOT gave timely notice to Market Participants and the ERCOT Board finds that such prices are significantly affected by an error.

(c) In review of Real-Time LMPs, Real Time Settlement Point Prices, Real-Time prices for energy metered, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reliability Deployment Prices,Real-Time Reserve Prices for On-Line Reserves, Real-Time Reserve Prices for Off-Line Reserves, Real-Time On-Line Reserve Price Adders, Real-Time Off-Line Reserve Price Adders and SASM MCPCs, the ERCOT Board may rely on the same reasons identified in paragraph (4) above to find that the prices are significantly affected by an error.

6.3.1 Activities for the Adjustment Period

The following table summarizes the timeline for the Adjustment Period and the activities of QSEs and ERCOT. 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:

| Adjustment Period | QSE Activities | ERCOT Activities |
| --- | --- | --- |
| Time = From 1800 in the Day-Ahead up to one hour before the start of the Operating Hour | Submit and update Energy Trades, Capacity Trades, Self-Schedules, and Ancillary Service Trades  Submit and update Output Schedules  Submit and update Incremental and Decremental Energy Offer Curves for Dynamically Scheduled Resources (DSRs)  Submit and update Energy Offer Curves and/or Real-Time Market (RTM) Energy Bids  Update Current Operating Plan (COP)  Request Resource decommitments  Submit Three-Part Supply Offers for Off-Line Generation Resources  Submit offers for any Supplemental Ancillary Service Markets  Communicate Resource Forced Outages | Post shift schedules on the Market Information System (MIS) Secure Area  Validate Energy Trades, Capacity Trades, Self-Schedules, and Ancillary Service Trades and identify invalid or mismatched trades  Validate Output Schedules  Validate Incremental and Decremental Energy Offer Curves  Validate Energy Offer Curves and/or RTM Energy Bids  Validate COP including validation of the deliverability of Ancillary Services from Resources for the next Operating Period  Review and approve or reject Resource decommitments  Validate Three-Part Supply Offers  Publish Notice of Need to Procure Additional Ancillary Service capacity if required  Validate Ancillary Service Offers  At the end of the Adjustment Period snap-shot the net capacity credits for Hourly Reliability Unit Commitment (HRUC) Settlement  Update Short-Term Wind Power Forecast (STWPF)  Execute the Hour-Ahead Sequence  Notify the QSE via the MIS Certified Area that an Energy Offer Curve, RTM Energy Bid or Output Schedule has not yet been submitted for a Resource as a reminder that one of the three must be submitted by the end of the Adjustment Period |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| [NPRR615: Replace Section 6.3.1 above with the following upon system implementation:]  6.3.1 Activities for the Adjustment Period  The following table summarizes the timeline for the Adjustment Period and the activities of QSEs and ERCOT. 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:   | Adjustment Period | QSE Activities | ERCOT Activities | | --- | --- | --- | | Time = From 1800 in the Day-Ahead up to one hour before the start of the Operating Hour | Submit and update Energy Trades, Capacity Trades, Self-Schedules, and Ancillary Service Trades  Submit and update Output Schedules  Submit and update Incremental and Decremental Energy Offer Curves for Dynamically Scheduled Resources (DSRs)  Submit and update Energy Offer Curves and/or Real-Time Market (RTM) Energy Bids  Update Current Operating Plan (COP)  Request Resource decommitments  Submit Three-Part Supply Offers for Off-Line Generation Resources  Submit offers for any Supplemental Ancillary Service Markets  Communicate Resource Forced Outages | Post shift schedules on the Market Information System (MIS) Secure Area  Validate Energy Trades, Capacity Trades, Self-Schedules, and Ancillary Service Trades and identify invalid or mismatched trades  Validate Output Schedules  Validate Incremental and Decremental Energy Offer Curves  Validate Energy Offer Curves and/or RTM Energy Bids  Validate COP including validation of the deliverability of Ancillary Services from Resources for the next Operating Period  Review and approve or reject Resource decommitments  Validate Three-Part Supply Offers  Publish Notice of Need to Procure Additional Ancillary Service capacity if required  Validate Ancillary Service Offers  At the end of the Adjustment Period snap-shot the net capacity credits for Hourly Reliability Unit Commitment (HRUC) Settlement  Update Short-Term Wind Power Forecast (STWPF)  Update Short-Term PhotoVoltaic Power Forecast (STPPF)  Execute the Hour-Ahead Sequence  Notify the QSE via the MIS Certified Area that an Energy Offer Curve, RTM Energy Bid or Output Schedule has not yet been submitted for a Resource as a reminder that one of the three must be submitted by the end of the Adjustment Period | |

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 Period  Review and communicate HRUC commitments and Direct Current Tie (DC Tie) Schedule curtailments  Snapshot the Scheduled Power Consumption for Controllable Load Resources |
| Before the start of each SCED run | Update Output Schedules for DSRs | Validate Output Schedules for DSRs  Execute 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 Resource  Acknowledge receipt of Dispatch Instructions  Comply with Dispatch Instruction    Review Resource Status to assure current state of the Resources is properly telemetered  Update 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 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 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 Status  Restart Real-Time Sequence on major change of Resource or Transmission Element Status  Monitor ERCOT total system capacity providing Ancillary Services  Validate COP information  Monitor ERCOT control performance  Distribute by ICCP, and post on the MIS Public Area, 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 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 effective  Post LMPs for each Electrical Bus on the MIS Public Area. These prices shall be posted immediately subsequent to deployment of Base Points from each binding SCED with the time stamp the prices are effective  Post on the MIS Public Area 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 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 projections  Post each hour on the MIS Public Area binding SCED Shadow Prices and active binding transmission constraints by Transmission Element name (contingency /overloaded element pairs)  Post the Settlement Point Prices for each Settlement Point immediately following the end of each Settlement Interval  Post 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 MIS Public Area |

(3) At the beginning of each hour, ERCOT shall post on the MIS Public Area 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 Load forecasts;

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

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

(e) Updated Electrical Bus Load distribution factors and other information necessary to forecast Electrical Bus Loads for each hour of the current Operating Day and all hours of the next Operating Day.

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

6.3.3 Real-Time Timeline Deviations

ERCOT may temporarily deviate from the Real-Time deadlines but only to the extent necessary to ensure the secure operation of the ERCOT System. Temporary measures may include varying the timing requirements as specified below or omitting one or more procedures in the Real-Time Sequence. In such an event, ERCOT shall immediately issue a Watch and notify all QSEs of the following:

(a) Details of the affected timing requirements and procedures;

(b) Details of any interim requirements;

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

(d) Reasons for the temporary variation.

6.3.4 ERCOT Notification of Validation Rules for Real-Time

ERCOT shall provide each QSE with the information necessary to pre-validate its data for Real-Time operations, including publishing validation rules for offers, bids, and trades.

6.4 Adjustment Period

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 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.

6.4.2 Output Schedules

(1) A QSE that represents a Resource, other than an RMR Unit, must submit and maintain either an Energy Offer Curve or an Output Schedule for the Resource for all times when the Resource is On-Line.

(2) For an On-Line RMR Unit, ERCOT, in its sole discretion, shall submit either an Output Schedule or an Energy Offer Curve, considering contractual constraints on the Resource and any other adverse effects on, or implications arising from, the RMR Agreement, that may occur as the result of the Dispatch of the RMR Unit.

(3) The entry of an Energy Offer Curve for a Resource automatically nullifies the Output Schedule for that Resource and prohibits entry of future Output Schedules for that Resource for the time during which the Energy Offer Curve is in effect.

(4) For a Resource for which an Energy Offer Curve has not been submitted, the SCED process uses the Output Schedule submitted for that Resource as desired Dispatch levels for the Resource.

6.4.2.1 Output Schedules for Resources Other than Dynamically Scheduled Resources

(1) An Output Schedule for a non-DSR Resource may be submitted and updated only during the Adjustment Period. An Output Schedule for a non-DSR Resource may be submitted and updated for each five-minute interval for each Operating Hour.

(2) For a Resource that is not a DSR and that is On-Line, the following provisions apply:

(a) The Output Schedule for a Qualifying Facility (QF) not submitting an Energy Offer Curve is considered to be equal to the telemetered output of the QF at the time that the SCED runs;

(b) The Output Schedule for Intermittent Renewable Resources (IRR) not submitting Energy Offer Curves is considered to be equal to the telemetered output of the Resource at the time that the SCED runs; and

(c) ERCOT shall create proxy Energy Offer Curves for the Resource under paragraph (4)(a) of Section 6.5.7.3, Security Constrained Economic Dispatch.

6.4.2.2 Output Schedules for Dynamically Scheduled Resources

(1) A QSE representing a DSR may update the Output Schedule for a dispatch interval at any time before the SCED process for that interval.

(2) For a DSR that is On-Line, the following provisions apply:

(a) For an On-Line DSR for which its QSE has not submitted an Incremental and Decremental Energy Offer Curve, ERCOT shall use the Output Schedule available at the SCED snapshot for the execution of the SCED and shall assume that the scheduled MW amount in the Output Schedule is the Base Point for the DSR for that SCED interval. ERCOT shall create proxy Energy Offer Curves for the DSR under paragraph (4)(a) of Section 6.5.7.3, Security Constrained Economic Dispatch.

(b) If the QSE representing a DSR submits an Incremental and Decremental Energy Offer Curve under Section 6.4.5, Incremental and Decremental Energy Offer Curves, then ERCOT shall use the Incremental and Decremental Energy Offer Curve to create proxy Energy Offer Curves for the DSR under paragraph (4)(b) of Section 6.5.7.3.

(c) For a DSR that is dispatched to a Base Point other than its Output Schedule for that SCED interval, the Base-Point Deviation Charge under Section 6.6.5.1, Resource Base Point Deviation Charge, applies:

(i) Beginning after four consecutive, complete 15-minute Settlement Intervals have occurred after the DSR is dispatched to a Base Point other than its Output Schedule; and

(ii) Ending when the DSR is no longer dispatched to a Base Point other than its Output Schedule.

(d) After the DSR is no longer dispatched to a Base Point other than its Output Schedule, the 15 MW or 15% limit, whichever is greater, under paragraph (3) of Section 6.4.2.3, Output Schedule Criteria, does not apply to the DSR until four consecutive, complete 15-minute Settlement Intervals have occurred after the DSR is no longer dispatched to a Base Point other than its Output Schedule.

6.4.2.3 Output Schedule Criteria

(1) An Output Schedule submitted by a QSE for a Resource that is not an RMR Unit and by ERCOT for an RMR Unit must include the following:

(a) The name of the Entity submitting the Output Schedule for the Resource;

(b) The name of the Resource;

(c) The desired MW output level for each five-minute interval for the Resource for all of the remaining five-minute intervals in the Operating Day for which an Energy Offer Curve has not been submitted.

(2) ERCOT must reject an Output Schedule for a Resource if an Energy Offer Curve corresponding to any period in the Output Schedule exists;

(3) For a QSE representing one or more DSRs, the sum of all Output Schedules (excluding Ancillary Services energy deployments, energy deployed through Dispatch Instructions, and Energy Trades) for the QSE must be within 15% or 15 MW (whichever is greater) of the aggregate telemetered DSR Load;

(4) The MW difference between Output Schedules for any two consecutive five-minute intervals must be less than ten times the SCED Up Ramp Rate (SURAMP) for schedules showing an increase from the prior period and the SCED Down Ramp Rate (SDRAMP) for schedules showing a decrease from the prior period.

(5) The Output Schedule for each interval in the Operating Period must be less than or equal to the Resource’s High Sustained Limit (HSL) and must be greater than or equal to the Resource’s Low Sustained Limit (LSL) for the corresponding hour.

6.4.2.4 Output Schedule Validation

(1) A validated Output Schedule is a schedule that ERCOT has determined meets the criteria listed in Section 6.4.2.3, Output Schedule Criteria.

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

(3) ERCOT shall continuously validate Output Schedules and continuously display on the Market Information System (MIS) Certified Area information that allows any QSE to view its valid Output Schedule.

(4) If a valid Output Schedule does not exist for a Resource that has a status of On-Line DSR at the time of SCED execution, then ERCOT shall notify the QSE and set the Output Schedule equal to the telemetered output of the Resource until a revised Output Schedule is validated.

(5) For Generation Resources with a Resource Status other than ONTEST, STARTUP, or SHUTDOWN, if a valid Energy Offer Curve or an Output Schedule does not exist for a non-DSR that has a status of On-Line at the end of the Adjustment Period, then ERCOT shall notify the QSE and set the Output Schedule equal to the then current telemetered output of the Resource until an Output Schedule or Energy Offer Curve is submitted in a subsequent Adjustment Period.

6.4.2.5 DSR Load

(1) A QSE may designate a Resource in the Current Operating Plan (COP) and through the telemetered Resource Status as a participant in the QSE’s control of DSR Load under the requirements in Section 16.2.3.1, Process to Gain Approval to Follow DSR Load.

(2) Each QSE may not have more than one DSR Load.

(3) The following principles for DSR Load apply:

(a) All power signals for DSR Load must be sent to ERCOT in Real-Time by telemetry; and

(b) If a DSR Load signal is lost for any reason for a period greater than one 15-minute Settlement Interval, then ERCOT shall notify the QSE and suspend validation of DSR Output Schedules. If the DSR Load signal fails for more than ten consecutive hours, ERCOT shall suspend the QSE’s ability to use DSRs until the signal is reliably restored (as determined by ERCOT). If the signal failure is identified to be an ERCOT communication problem, ERCOT may not suspend the QSE’s ability to use DSRs.

6.4.3 Real-Time Market (RTM) Energy Bids and Offers

6.4.3.1 RTM Energy Bids

(1) A QSE may submit Controllable Load Resource-specific Real-Time Market (RTM) Energy Bids by the end of the Adjustment Period on behalf of a Load Serving Entity (LSE) representing a Controllable Load Resource.

(2) An RTM Energy Bid represents the willingness to buy energy at or below a certain price, not to exceed the System-Wide Offer Cap (SWCAP), for the Demand response capability of a Controllable Load Resource in the RTM.

(3) RTM Energy Bids remain active for the offered period until either:

(a) Selected by ERCOT; or

(b) Automatically inactivated at the offer expiration time specified in the RTM Energy Bid.

(4) For any Operating Hour, the QSE may submit or change an RTM Energy Bid in the Adjustment Period. If, by the end of the Adjustment Period, the QSE has not submitted a valid RTM Energy Bid, ERCOT shall create a proxy RTM Energy Bid for the entire Demand response capability of that Load Resource with a not-to-exceed price at the SWCAP.

(5) The QSE may remove the Controllable Load Resource from SCED Dispatch by changing the Load Resource’s telemetered Resource Status or ramp rates appropriately. The QSE will update the COP Resource Status accordingly as soon as practicable.

6.4.3.1.1 RTM Energy Bid Criteria

(1) Each RTM Energy Bid submitted by a QSE must include the following information:

(a) The QSE;

(b) The relevant Load Resource;

(c) A bid curve with no more than ten price/quantity pairs with monotonically non-increasing not-to-exceed prices (in $/MWh) and with increasing quantities ranging from zero to the Load Resource’s maximum demand response capability (in MW) represented by the difference between the Load Resource’s telemetered Maximum Power Consumption (MPC) and Low Power Consumption (LPC);

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

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

(2) The software systems must be able to provide ERCOT with the ability to enter Resource-specific RTM Energy Bid floors and caps.

(3) The minimum amount per Load Resource for each RTM Energy Bid that may be submitted is one-tenth (0.1) MW.

(4) If a Controllable Load Resource is carrying Ancillary Service Resource Responsibility, its RTM Energy Bid must be priced no higher than the SWCAP.

6.4.3.1.2 RTM Energy Bid Validation

(1) A valid RTM Energy Bid is a bid that ERCOT has determined meets the criteria listed in Section 6.4.3.1.1, RTM Energy Bid Criteria.

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

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

6.4.4 Energy Offer Curve

(1) A detailed description of Energy Offer Curve and validations performed by ERCOT is in Section 4.4.9, Energy Offers and Bids.

(2) For an On-Line RMR Unit, ERCOT, in its sole discretion, shall submit either an Output Schedule or an Energy Offer Curve considering contractual constraints on the Resource and any other adverse effects on, or implications arising from, the RMR Agreement, that may occur as the result of the Dispatch of the RMR Unit. If ERCOT chooses to submit an Energy Offer Curve instead of an Output Schedule, the RMR Unit’s Energy Offer Curve must price all energy at the SWCAP in $/MWh.

(3) For Generation Resources with a Resource Status other than ONTEST, STARTUP, or SHUTDOWN, if a valid Energy Offer Curve or an Output Schedule does not exist for a Resource that has a status of On-Line at the end of the Adjustment Period, then ERCOT shall notify the QSE. Except for IRRs, QF Resources, and DSRs, ERCOT shall create an Output Schedule equal to the then-current telemetered output of the Resource until an Output Schedule or Energy Offer Curve is submitted in a subsequent Adjustment Period.

6.4.4.1 Energy Offer Curve for RUC-Committed Resources

(1) Prior to the end of the Adjustment Period for an Operating Hour during which a Generation Resource has been committed by ERCOT as part of a Reliability Unit Commitment (RUC) process, the QSE shall ensure that an Energy Offer Curve that prices all energy from LSL to HSL at or above $1,500 per MWh for the Operating Hours in the RUC commitment period, has been submitted and accepted by ERCOT.

(2) If the QSE receives a RUC Dispatch Instruction from ERCOT for its Generation Resource during the Operating Period that includes a RUC-Committed Hour, then the QSE shall be exempt from the submission timeline requirement specified in paragraph (1) above for the RUC-Committed Hours during the Operating Period. The QSE shall submit the required Energy Offer Curve as soon as reasonably practicable after receipt of the RUC Dispatch Instruction for the RUC-Committed Hours in the Adjustment Period.

(3) The requirement in paragraph (1) above is not applicable for Weekly Reliability Unit Commitment (WRUC)-instructed hours during which the Resource was Day-Ahead Market (DAM)-committed or QSE self-committed.

**6.4.4.2 Energy Offer Curve for On-Line Non-Spinning Reserve Capacity**

The following applies to Generation Resources that a QSE assigns Non-Spinning Reserve (Non-Spin) Ancillary Service Resource Responsibility in its COP to meet the QSE’s Ancillary Service Supply Responsibility for Non-Spin and applies to On-Line Non-Spin assignments arising as the result of DAM or Supplemental Ancillary Services Market (SASM) Ancillary Service awards, or Self-Arranged Ancillary Service Quantity.

(a) Prior to the end of the Adjustment Period for an Operating Hour during which a Generation Resource is assigned On-Line Non-Spin Ancillary Service Resource Responsibility, the QSE shall ensure that a valid Output Schedule or Energy Offer Curve for the Operating Hour has been submitted and accepted by ERCOT. The Energy Offer Curves submitted by the QSE may not be offered at less than $75 per MWh.

6.4.5 Incremental and Decremental Energy Offer Curves

A QSE for a DSR may submit an Incremental Energy Offer Curve and a Decremental Energy Offer Curve in addition to the Output Schedule for the DSR. The Incremental and Decremental Energy Offer Curves prices must be within the range of -$250.00 per MWh and the SWCAP in dollars per MWh with the quantity within the range of the High Reasonability Limit (HRL) and Low Reasonability Limit (LRL), which are described in the Resource Registration Glossary and provided in Resource Registration data. The first price/quantity pair for both the Incremental and Decremental Energy Offer Curves must provide an energy price at LRL and the last price/quantity pair must provide a price at HRL. At every MW value of the curves, the price of the Incremental Energy Offer Curve must be greater than the Decremental Energy Offer Curve. Incremental and Decremental Energy Offer Curves are subject to the same requirements for the same criteria and validations performed by ERCOT as provided in Section 4.4.9, Energy Offers and Bids.

6.4.6 Resource Status

(1) ERCOT shall use the telemetered Resource Status for all applications requiring status of Resources during the Operating Hour, including SCED and Load Frequency Control (LFC). QSEs shall provide ERCOT with accurate telemetry of the current capability of each Resource including the Resource Status, Ramp Rates, HSL, and LSL.

(2) ERCOT shall perform the following validations during the Operating Period:

(a) Each QSE shall provide the Real-Time operating status of each Resource to ERCOT by telemetry using the status codes in the COP for Real-Time as described in Section 3.9, Current Operating Plan (COP); and

(b) Five minutes before the end of each hour, ERCOT shall identify inconsistencies between the telemetered Resource Status and the Resource Status stated in the COP for that Resource in the next hour. On detecting an inconsistency, ERCOT shall provide a notice of inconsistent Resource Status to the QSE using the Messaging System.

6.4.7 QSE-Requested Decommitment of Resources and Changes to Ancillary Service Resource Responsibility of Resources

(1) A Resource must remain committed during any RUC-Committed Interval or RUC Buy-Back Hour unless the Resource has a Forced Outage.

(2) In the Operating Period, a QSE may request to decommit a Resource other than a Quick Start Generation Resource (QSGR) for any interval that is not a RUC-Committed Interval or RUC Buy-Back Hour by verbally requesting ERCOT to consider its request.

(3) In the Operating Period, a QSE may decommit a QSGR without any request for any interval that is neither a RUC-Committed Interval, a RUC Buy-Back Hour, nor an interval in which a manual override by the ERCOT Operator has been given.

(4) In the Adjustment Period, a QSE may request to decommit a Resource for any interval that is not a RUC-Committed Interval or RUC Buy-Back Hour by indicating a change in unit status in the QSE’s COP, unless the Resource received a WRUC instruction for the hour. A QSE may request to decommit a Resource for any interval that is a WRUC-instructed Interval and that is not a RUC-Committed Interval or RUC Buy-Back Hour by verbally requesting ERCOT to consider its request.

(5) In the Adjustment Period, a QSE may request ERCOT approval for moving an Ancillary Service Resource Responsibility from one Resource to another like Resource by changing its COP. A QSE may transfer Ancillary Service Resource Responsibility for any Ancillary Service to any like Generation Resource telemetering an ONOPTOUT Resource Status. ERCOT shall use the Hourly Reliability Unit Commitment (HRUC) and other processes to study the move and if Ancillary Services become undeliverable as a result of the proposed move, ERCOT shall follow the provisions of Section 6.4.9.1.2, Replacement of Undeliverable Ancillary Service Due to Transmission Constraints. The phrase “like Resource” means that Ancillary Service Resource Responsibility moves may only be from a Generation Resource to a Generation Resource, from a Load Resource to a Load Resource, or from a Load Resource to a Generation Resource.

(6) In the Operating Period, a QSE shall only provide an Ancillary Service from a Resource which was reported to ERCOT in the COP to be providing that Ancillary Service for the effective Operating Hour unless modified pursuant to paragraph (7) below.

(7) A QSE may vary the quantity of the Ancillary Service Resource Responsibility on Resources without obtaining prior ERCOT approval during the time window beginning 30 seconds prior to a five-minute clock interval and ending ten seconds prior to that five-minute clock interval, provided that the QSE complies with its total Ancillary Service Supply Responsibility.

6.4.7.1 QSE Request to Decommit Resources in the Operating Period

(1) For a request made during the Operating Period to decommit a Resource, ERCOT may perform a study using Real-Time conditions to determine if ERCOT will remain n-1 secure with that Resource Off-Line. ERCOT may grant the request provided the Resource is not providing any Ancillary Service Resource Responsibility and if analysis indicates the Resource Outage contingency results in no additional active constraints for SCED. ERCOT may only approve requests that do not have a reliability impact.

(2) If more units are requesting decommitment than can be accommodated, ERCOT shall review the requests in order of receipt.

6.4.7.2 QSE Request to Decommit Resources in the Adjustment Period

(1) To decommit an otherwise available Resource for hours other than the Operating Period, the QSE must update the COP indicating the change in Resource Status for each hour in the COP for the remaining hours in the Adjustment Period. On detection of a change from On-Line to Off-Line Available state in future hours for a Resource, ERCOT shall review all requests for decommitment using the next scheduled HRUC. The Resource must be shown as available for HRUC commitment. The next HRUC commitment must consider the Resource’s Minimum-Energy Offer excluding the Resource’s Startup Offer from the Three-Part Supply Offer.

(2) If HRUC continues to require the Resource to be committed, ERCOT shall notify the QSE, using the process described in Section 5.5.3, Communication of RUC Commitments and Decommitments, that the decommitment has been denied, and the affected intervals become RUC-Committed Intervals instead of QSE-Committed Intervals for RUC Settlement purposes. The QSE must update its COP to denote the RUC-Committed Intervals.

6.4.8 Notification of Forced Outage of a Resource

In the event of a Forced Outage of a Resource, the telemetered status of the Resource automatically notifies ERCOT of the event. In the event of a Forced Outage, an impending Forced Outage, or de-rating of a Resource, the QSE shall inform ERCOT of the following:

(a) Time of expected change in Resource Status or rating;

(b) Text message describing the nature of the Forced Outage or de-rating updated as new information becomes available; and

(c) The expected minimum and maximum duration of the Forced Outage or de-rating.

6.4.9 Ancillary Services Capacity During the Adjustment Period and in Real-Time

6.4.9.1 Evaluation and Maintenance of Ancillary Service Capacity Sufficiency

(1) ERCOT shall evaluate Ancillary Service requirements and capacity sufficiency using evaluation tools including the Ancillary Services Capacity Monitor, described in Section 6.5.7.5, Ancillary Services Capacity Monitor, throughout the Adjustment Period and Operating Period.

(2) ERCOT may procure Ancillary Services in the Adjustment Period for the following reasons:

(a) Increased need of Ancillary Services capacity above that specified in the Day-Ahead;

(b) Replacement of Ancillary Services capacity that is undeliverable due to transmission constraints; or

(c) Replacement of Ancillary Services capacity due to failure to provide.

(3) A QSE may change the specific Resources supplying Ancillary Services under Section 3.9, Current Operating Plan (COP), using the QSE’s Ancillary Service Resource Responsibility in the COP only if, in ERCOT’s determination, that change does not adversely affect the deliverability of the service(s) being allocated to an alternate Resource and if that change does not adversely affect the deliverability of other services previously procured by ERCOT. A QSE may not change the quantity provided of each type of Ancillary Services awarded through the ERCOT procurement process or the aggregate Self-Arranged Ancillary Service Quantity (by Ancillary Service type) from the DAM. On detection of a change in COP for Resources providing Ancillary Services, ERCOT shall review the impact on deliverability and communicate to the QSE if the change is not approved. The QSE must update its COP to reflect the ERCOT decision. If ERCOT does not act on the request by the beginning of the Operating Hour in which the change will take effect, the request is deemed approved.

6.4.9.1.1 ERCOT Increases to the Ancillary Services Plan

(1) If ERCOT determines in the Adjustment Period, in its sole discretion, that more Ancillary Services are needed for one or more Operating Hours than were provided in the Day-Ahead Ancillary Services Plan, it shall notify each QSE of its increased Ancillary Service Supply Obligation.

(2) ERCOT may procure more Ancillary Services through a SASM, as described below in Section 6.4.9.2, Supplemental Ancillary Services Market, if the Self-Arranged Ancillary Service quantities are insufficient to meet the total Ancillary Service Supply Obligation.

(3) When a SASM has been executed in response to ERCOT increasing the Ancillary Services Plan, each QSE that purchases Ancillary Service capacity shall be charged its share of the net cost incurred for that service, in accordance with Section 6.7.3, Adjustments to Cost Allocations for Ancillary Services Procurement.

6.4.9.1.2 Replacement of Undeliverable Ancillary Service Due to Transmission Constraints

(1) The HRUC process must honor the High Ancillary Service Limit (HASL) and Low Ancillary Service Limit (LASL) for each Resource for each hour of the RUC Study Period unless by doing so a transmission constraint exists where energy from the Resource is needed to resolve the constraint that cannot be resolved by any other means or the energy output from the Resource must be decreased such that the Resource is unable to provide the Ancillary Service capacity allocated to that Resource in the COP. If ERCOT Operator decides that the Ancillary Service capacity allocated to that Resource is undeliverable based on ERCOT System conditions, then ERCOT shall provide the following information to each affected QSE with two hours’ advance notice of:

(a) The amount by which the QSE must reduce the Ancillary Services currently allocated to each affected Resource; and

(b) The start and stop times of the reduction.

(2) Within the two-hour advance notice period, each affected QSE may do one or more of the following:

(a) Substitute capacity from other Resources represented by that QSE to meet its Ancillary Services Supply Responsibility;

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

(c) Inform ERCOT that all or part of the Ancillary Services capacity needs to be replaced.

(3) 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, Supplemental Ancillary Services Market.

(4) If ERCOT procures additional Ancillary Services for the amount of substituted capacity that is deemed infeasible or the amount of Ancillary Services capacity that each affected QSE does not replace, then all QSEs that bought the specific Ancillary Service in the DAM are charged for their share of the net cost incurred for the Ancillary Service procured by ERCOT as part of the multiple procurement processes (DAM and SASMs) , in accordance with Section 6.7.3, Adjustments to Cost Allocations for Ancillary Services Procurement.

(5) If the QSE’s Ancillary Service capacity that is undeliverable because of a transmission constraint identified by ERCOT, as set forth in (1) above, was not awarded in the DAM or any SASM (i.e., the capacity is part of Self-Arranged Ancillary Services for the hours of the RUC Study Period), then the QSE is charged for the insufficient Ancillary Service capacity the same price paid for the Ancillary Service as purchasers in the DAM paid for that time period, as determined under paragraph (4) above.

(6) If the QSE’s Ancillary Service capacity that is undeliverable because of a transmission constraint identified by ERCOT, as set forth in (1) above, was awarded in the DAM or any SASM, then the QSE is not compensated for the quantity of the Ancillary Service capacity that is undeliverable.

6.4.9.1.3 Replacement of Ancillary Service Due to Failure to Provide

(1) ERCOT may procure Ancillary Services to replace those of a QSE that has failed on its Ancillary Services Supply Responsibility through a Supplemental Ancillary Services Market, as described below in Section 6.4.9.2, Supplemental Ancillary Services Market. A QSE is considered to have failed on its Ancillary Services Supply Responsibility when ERCOT determines, in its sole discretion, that some or all of the QSE’s Resource-specific Ancillary Service capacity will not be available in Real-Time. This Section does not apply to a failure to provide caused by events described in Section 6.4.9.1.2, Replacement of Undeliverable Ancillary Service Due to Transmission Constraints.

(2) 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.

(3) ERCOT shall charge each QSE that has failed according to paragraph (1) on its Ancillary Service Supply Responsibility for a particular Ancillary Service for a specific hour. The hourly charge of the failure is either (a) or (b):

(a) If a SASM is executed for that hour, then the charge equals the MW amount of the failed Ancillary Services Supply Responsibility multiplied by the greater of the:

(i) The Market Clearing Price for Capacity (MCPC) for the Ancillary Service in the DAM for that hour ; or

(ii) The maximum MCPC set from any SASM for the same operating hour.

(b) If no SASM is executed for failure to supply for that hour, then the cost equals the MW amount of the failed Ancillary Services Supply Responsibility multiplied by the MCPC for the Ancillary Service in the DAM for that hour.

(4) If the Ancillary Service capacity of the affected QSE was awarded in the DAM or any SASM, then the QSE is still compensated for the quantity of the Ancillary Service capacity.

(5) If the Ancillary Service capacity of the affected QSE was not awarded in the DAM or any SASM (i.e., Self-Arranged Ancillary Service), then the QSE continues to receive credit toward its Ancillary Service Supply Responsibility.

6.4.9.2 Supplemental Ancillary Services Market

(1) During the Adjustment Period, ERCOT may procure additional Regulation-Up (Reg-Up), Regulation Down (Reg-Down), Responsive Reserve (RRS), and Non-Spin services for the reasons, and in the amounts, specified in Section 6.4.9.1, Evaluation and Maintenance of Ancillary Service Capacity Sufficiency, using a SASM.

(2) ERCOT shall allow QSEs to request to modify their Ancillary Service positions through a Reconfiguration SASM (RSASM). The RSASM is executed at 0900 daily. This RSASM allows QSEs to potentially change their Ancillary Service Supply Responsibility from hour ending 1300 through hour ending 2400 of the current Operating Day. QSEs attempt to reduce their Ancillary Service Supply Responsibility through the RSASM by submitting less Ancillary Service capacity in their Resource’s COPs than their Ancillary Service Supply Responsibility. The difference between the Ancillary Service Supply Responsibility and the COP Ancillary Service capacity is the reconfiguration amount that is procured by the RSASM. The QSE must also have valid Ancillary Service Offers of an amount equal to or greater than their requested reconfiguration amount. The RSASM shall not be executed if there are not enough offers to procure the Ancillary Service reconfiguration amount.

(3) The SASM process for acquiring more Ancillary Service capacity or an Ancillary Service reconfiguration must use the following timelines:

(a) For Ancillary Service capacity related to ERCOT desired increases, for replacement of Ancillary Service capacity related to undeliverability or for failure of a QSE to provide one or more Ancillary Services, ERCOT shall send a notice at time X to all QSEs of the SASM. Time X may be any time not less than two hours before the start of the Operating Hour for which the additional Ancillary Services capacity is required.

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| SASM Process | QSE Activities: | ERCOT Activities: |
| Time = X |  | Notify all QSEs of intent to procure Ancillary Services.  Notify QSEs of any additional Ancillary Service Obligation, allocated to each LSE and aggregated to the QSE level. |
| Time = X plus 30 minutes | May submit additional Self-Arranged Ancillary Service Quantities limited to the additional Ancillary Services Obligation of the QSE and Ancillary Service Offers. | Determine the amount of Ancillary Services to be procured. |
| [NPRR680: Replace “Time = X plus 30 minutes” above with the following upon system implementation:]   |  |  |  | | --- | --- | --- | | Time = X plus 30 minutes | May submit additional Self-Arranged Ancillary Service Quantities pursuant to Section 4.4.7.1, Self-Arranged Ancillary Service Quantities | Determine the amount of Ancillary Services to be procured. | | | |
| Time = X plus 35 minutes |  | Execute SASM. |
| Time = X plus 45 minutes |  | Notify QSEs with awards of results.  Post the quantities and MCPCs of Ancillary Services bought in the SASM. |
| Time = X plus 60 minutes | Submit updated COP with updated Ancillary Service Resource Responsibility. | Validate COPs for Ancillary Service Resource Responsibility. |

(b) For an Ancillary Services reconfiguration, ERCOT shall execute an RSASM at 0900 (time E), for hour ending 1300 through hour ending 2400 of the current Operating Day.

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| SASM Process | QSE Activities: | ERCOT Activities: |
| Time = E – 15 minutes | QSEs nominate quantities of Ancillary Services that shall be included in the RSASM by submitting COPs with less Ancillary Service capacity than their Ancillary Service Supply Responsibility and submitting Ancillary Service Offers to cover the difference between the Ancillary Service Supply Responsibility and COP Ancillary Service capacity. | ERCOT sets the quantities of Ancillary Services to be procured in the RSASM equal to the difference between total Ancillary Service Supply Responsibility and total COP Ancillary Service capacity. |
| Time = E |  | Execute RSASM for hour ending 1300 through hour ending 2400 of the current Operating Day. |
| Time = E plus 15 minutes |  | Notify QSEs with awards of results.  Post the quantities and MCPCs of Ancillary Services bought in the RSASM. |
| Time = E plus 30 minutes | Submit updated COP with updated Ancillary Service Resource Responsibility. | Validate COPs for Ancillary Service Resource Responsibility. |

(4) Each QSE that is awarded capacity in a SASM is paid the SASM MCPC for the quantity it is awarded.

(5) For purpose of Settlement, the reduction to the Ancillary Service Supply Responsibility is considered a failure quantity and each QSE that has their Ancillary Service Supply Responsibility reduced by an RSASM is charged in accordance with Sections 6.7.2, Charges for Ancillary Service Capacity Replaced Due to Failure to Provide, and 6.7.3, Adjustments to Cost Allocations for Ancillary Services Procurement. QSEs participating in RSASMs are not subject to performance metrics for “failure to provide” amounts until the end of the Adjustment Period for each hour cleared in the RSASM.

(6) ERCOT shall allocate additional Ancillary Service Obligations to QSEs using the same percentages as the original Day-Ahead allocation of Ancillary Service Obligations.

6.4.9.2.1 Resubmitting Offers for Ancillary Services in the Adjustment Period

During the Adjustment Period, a QSE may resubmit an offer for an Ancillary Service that it submitted for a Resource but was not struck in a previous market. The resubmitted offer for that Resource may be submitted at any price subject to applicable offer caps and offer floors to be considered a valid offer in any subsequent market.

6.4.9.2.2 SASM Clearing Process

SASM procurement requirements are:

(a) ERCOT shall procure the additional quantity required of each Ancillary Service, less the quantity self-arranged, if applicable. ERCOT may not buy more of one Ancillary Service in place of the quantity of a different service.

(b) ERCOT shall select Ancillary Service Offers submitted by QSEs, such that:

(i) For each Ancillary Service being procured, other than Reg-Down, ERCOT shall select offers that minimize the overall offer-based cost of these Ancillary Services. For each of these Ancillary Services, if selection of the Resource offer exceeds ERCOT’s required Ancillary Service quantity, then ERCOT shall select a portion of the Resource offer to meet the Ancillary Service quantity required. For Load Resources offering a block of capacity, ERCOT shall ignore the offer unless the entire block can be accepted.

(ii) For Reg-Down, ERCOT shall procure required quantities by selecting capacity in ascending order starting from the lowest-priced offer. ERCOT shall continue this selection process until the required quantity of Reg-Down is obtained. If selection of the Resource offer exceeds ERCOT’s required Ancillary Service quantity, then ERCOT shall select a portion of the Resource offer to meet the Ancillary Service quantity required. For Load Resources offering a block of capacity, ERCOT shall ignore the offer unless the entire block can be accepted.

(iii) For each Ancillary Service Offer from an Off-Line Resource considered in a SASM, the offer will be awarded only if it can meet the start-up time of the Resource based on the current and the historical operational state of the Resource. If the start-up time cannot be met for the first hour of a block offer, then the whole block offer shall not be considered.

(c) If a QSE has submitted offers of the same Resource capacity for more than one Ancillary Service (sometimes called linked offers), ERCOT may not select any one part of that Resource capacity to provide more than one Ancillary Service in the same Operating Hour. ERCOT may, however, select part of that Resource capacity to provide one Ancillary Service and another part of that capacity to provide a different Ancillary Service in the same Operating Hour.

(d) The SASM MCPC for each hour for each service is the Shadow Price for the corresponding Ancillary Service constraint for the hour as determined by the SASM algorithm.

6.4.9.2.3 Communication of SASM Results

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

(2) For each QSE for which ERCOT has procured replacement Ancillary Services capacity in a SASM pursuant to Section 6.4.9.1.2, Replacement of Undeliverable Ancillary Service Due to Transmission Constraints, or Section 6.4.9.1.3, Replacement of Ancillary Service Due to Failure to Provide, ERCOT shall, as soon as practicable but no later than the time specified in Section 6.4.9.2, notify each affected QSE of the procured Ancillary Service quantities, the Ancillary Service types, and the SASM MCPCs by hour.

(3) As soon as practicable, but no later than the time specified in Section 6.4.9.2, ERCOT shall post on the MIS Public Area the hourly:

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

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

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

6.5 Real-Time Energy Operations

6.5.1 ERCOT Activities

ERCOT activities during Real-Time operations are summarized in the table located in Section 6.3.2, Activities for Real-Time Operations. That table is intended to be only a general guide and not controlling language, and any conflict between the table and another section of the Protocols is controlled by the other section.

6.5.1.1 ERCOT Control Area Authority

(1) ERCOT, as Control Area Operator (CAO), is authorized to perform the following actions for the limited purpose of securely operating the ERCOT Transmission Grid under the standards specified in North American Electric Reliability Corporation (NERC) Standards, the Operating Guides and these Protocols,including:

(a) Direct the physical operation of the ERCOT Transmission Grid, including circuit breakers, switches, voltage control equipment, and Load-shedding equipment;

(b) Dispatch Resources that have committed to provide Ancillary Services;

(c) Direct changes in the operation of voltage control equipment;

(d) Direct the implementation of Reliability Must-Run (RMR) Service, Remedial Action Plans (RAPs), Special Protection Systems (SPSs), and transmission switching to prevent the violation of ERCOT Transmission Grid security limits; and

(e) Perform additional actions required to prevent an imminent Emergency Condition or to restore the ERCOT Transmission Grid to a secure state in the event of an ERCOT Transmission Grid Emergency Condition.

(2) Consistent with paragraph (1)(e) above, if ERCOT seeks to exercise its authority to prevent an anticipated Emergency Condition relating to serving Load in the current or next Season by procuring existing capacity that may be used to maintain ERCOT System reliability in a manner not otherwise delineated in these Protocols and the Operating Guides, ERCOT shall take the following actions:

(a) Upon determination by ERCOT that additional capacity is needed to prevent an Emergency Condition and prior to any procurement activity associated with such additional capacity, ERCOT shall issue a Notice as soon as practicable with the following information:

(i) A detailed description of the reliability condition and need for additional capacity as determined by ERCOT and the timing of the proposed procurement;

(ii) Justification for the quantity of additional capacity to be requested;

(iii) Identification of potential Generation Resources or Load providing capacity considered by ERCOT to be acceptable for providing the additional capacity. Load capacity may be provided by Entities who, at ERCOT’s direction, would interrupt consumption of electric power and remain interrupted until released by ERCOT; and

(iv) A schedule of activities associated with the proposed procurement.

(b) If ERCOT identifies a specific Entity with which it will negotiate the terms for procurement of additional capacity, then ERCOT shall issue a Notice as soon as practicable that includes the Entity name and, as applicable, the Resource mnemonic, the Resource MW rating by Season, the name of the Resource Entity, and the potential duration of any contract, including anticipated start and end dates.

(c) ERCOT shall, to the fullest extent practicable, ensure that any actions taken to procure additional capacity meet the following criteria:

(i) Any capacity procured pursuant to this paragraph will be procured using an open process, and the terms of the procurement between ERCOT and the Entity will be memorialized in contracts that will be publicly available for inspection on the ERCOT website.

(ii) Each contract will include specified financial terms and termination dates. For purposes of Settlement, any contract associated with a Generation Resource will include substantially the same terms and conditions as an RMR Unit under a RMR Agreement, including the Eligible Cost budgeting process.

(iii) ERCOT shall provide notice to the ERCOT Board, at the next ERCOT Board meeting after ERCOT has signed the contract, that the actions required prior to execution of the contract, pursuant to paragraphs (2)(a) through (c) above, were completed by ERCOT before the contract was executed.

(iv) Any information submitted by the Entity to ERCOT through the procurement process may be designated as Protected Information and treated in accordance with the provisions of Section 1.3, Confidentiality, provided that final contract terms must be made available for public inspection.

(d) A Generation Resource that has received capital contributions from ERCOT pursuant to a contract executed under this paragraph (2) may not participate in the energy or Ancillary Services markets until such capital contributions have been refunded to ERCOT. For the purposes of this Section, capital contributions are defined as improvements with an asset life greater than one year under the applicable federal tax rules. The Resource Entity’s refund of capital contributions shall be a lump sum payment calculated as follows:

(i) If the Generation Resource chooses to participate in the energy or Ancillary Service markets after the termination date of the contract executed under this paragraph (2), the Qualified Scheduling Entity (QSE) representing the Resource Entity shall repay, in a lump sum payment, 100% of the book value of the capitalized equipment and all installation charges leading to turn key, one-time startup based on a linear depreciation over the estimated life of the capitalized component(s) in accordance with Generally Accepted Accounting Principles (GAAP) standards for electric utility equipment. The estimated life shall be based on documentation provided by the manufacturer; if installing used equipment, the estimated life may be based on an approximation agreed to by the Resource Entity and ERCOT.

(ii) If the Generation Resource chooses to participate in the energy or Ancillary Services markets as contemplated in item (2)(d)(i) above, and its participation requires a lump sum payment of capital contributions, ERCOT will issue a notice to all registered Market Participants announcing the Generation Resource’s decision to participate in the market(s) and identifying the amount of the lump sum payment due pursuant to item (2)(d)(i) above. ERCOT will also issue a notice to all registered Market Participants after completion of the collection and disbursement of the capital contributions, as described in item (2)(d)(iii) below, and after resolution of any disputes related to these capital contributions.

(iii) After ERCOT receives a Notification of Change of Generation Resource Designation (Section 22, Attachment H, Notification of Change of Generation Resource Designation) changing the Resource designation to “operational” at a future date, ERCOT shall charge the QSE representing the Resource Entity for capital expenditures incurred and previously paid to the Resource Entity as a result of the Resource’s return to service pursuant to this Section.

(A) For months in the contract term where notice is received more than five Business Days prior to True-Up Settlement of the first Operating Day of that month, ERCOT shall claw back any payments made for the capital expenditure associated with that month and subsequent months of the term, on the next practical Settlement but no later than the True-Up Settlement.

(B) For months in the contract term where notice is received five Business Days or less prior to True-Up Settlement of the first Operating Day of that month, ERCOT shall claw back any payments made for the capital expenditures within 45 days of receipt of the notice.

(C) ERCOT shall distribute the repayment to QSEs representing Load on the same basis used to collect the monthly capital expenditures, using a monthly Load Ratio Share (LRS). A QSE’s monthly LRS shall be the QSE’s total Real-Time Adjusted Metered Load (AML) for the month divided by the total ERCOT Real-Time AML for the same month.

(e) ERCOT shall endeavor to minimize the deployment of capacity procured pursuant to this paragraph with the goal of reducing the potential distortion of markets. Resources and Loads deployed to alleviate imminent Emergency Conditions will not be offered into the Day-Ahead Market (DAM). Rather, ERCOT will determine whether to use the capacity as part of the Hourly Reliability Unit Commitment (HRUC) process based on system conditions and the ability to meet Demand. In the event Generation Resources are committed and On-Line, ERCOT systems will generate a proxy offer for the Generation Resource at the System-Wide Offer Cap (SWCAP). The default offer will place the Generation Resources among the last for economic Dispatch, so as not to displace Generation Resources that are On-Line and offering into the market. To the extent practicable, the capacity deployed to alleviate imminent Emergency Conditions will not be used solely for the purpose of reducing local congestion.

(f) An Entity cannot be compelled to enter into a contract under this paragraph.

6.5.1.2 Centralized Dispatch

(1) ERCOT shall centrally Dispatch Resources and Transmission Facilities under these Protocols, including deploying energy by establishing Base Points, and Emergency Base Points, and by deploying Regulation Service, Responsive Reserve (RRS) service, and Non-Spinning Reserve (Non-Spin) service to ensure operational security.

(2) ERCOT shall verify that either an Energy Offer Curve providing prices for the Resource between its High Sustained Limit (HSL) and Low Sustained Limit (LSL) or an Output Schedule has been submitted for each On-Line Resource an hour before the end of the Adjustment Period for the upcoming Operating Hour. ERCOT shall notify QSEs that have not submitted an Output Schedule or Energy Offer Curve through the Market Information System (MIS) Certified Area.

(3) ERCOT may only issue Dispatch Instructions for the Real-Time operation of Transmission Facilities to a Transmission Service Provider (TSP), for the Real-Time operation of distribution facilities to a Distribution Service Provider (DSP), or for a Resource to the QSE that represents it.

(4) ERCOT shall post shift schedules on the MIS Secure Area.

6.5.2 Operating Standards

ERCOT and each TSP shall operate the ERCOT Transmission Grid pursuant to NERC Reliability Standards, these Protocols, and Good Utility Practice. The requirements of the NERC Reliability Standards shall prevail to the extent there are any inconsistencies with these Protocols or Good Utility Practice. These Protocols control to the extent of any inconsistency between the Protocols and any of the following documents:

(a) The Operating Guides;

(b) ERCOT procedures manual for ERCOT Operators to use during normal and emergency operations of the ERCOT Transmission Grid;

(c) Specific operating procedures and RAPs submitted to ERCOT by individual Transmission Facilities owners or operators to address operating problems on their respective grids that could affect operation of the ERCOT Transmission Grid; and

(d) Guidelines established by the ERCOT Board, which may be more stringent than those established by NERC for the secure operation of the ERCOT Transmission Grid.

6.5.3 Equipment Operating Ratings and Limits

(1) ERCOT shall consider all equipment operating limits when issuing Dispatch Instructions. Except as stated in Section 6.5.9, Emergency Operations, if a Dispatch Instruction conflicts with a restriction that may be placed on equipment from time to time by a TSP, a DSP, or a Generation Resource’s QSE to protect the integrity of equipment, ERCOT shall honor the restriction.

(2) Each TSP shall notify ERCOT of any limitations on the TSP’s system that may affect ERCOT Dispatch Instructions. ERCOT shall continuously maintain a posting on the MIS Secure Area of any TSP limitations that may affect Dispatch Instructions. Examples of such limitations may include: temporary changes to transmission or transformer ratings, temporary changes to range of automatic tap position capabilities on auto-transformers, fixing or blocking tap changer, changes to no-load tap positions or other limitations affecting the delivery of energy across the ERCOT Transmission Grid. Any conflicts that cannot be satisfactorily resolved may be brought to ERCOT by any of the affected Entities for investigation and resolution.

6.5.4 Inadvertent Energy Account

ERCOT shall track any differences between the scheduled energy and the actual metered value at each Direct Current Tie (DC Tie) in an “Inadvertent Energy Account” between ERCOT and each interconnected non-ERCOT Control Area. ERCOT shall coordinate operation of each DC Tie with the DC Tie operator such that the Inadvertent Energy Account is maintained as close to zero as possible. Corrections of inadvertent energy between ERCOT and the other NERC-interconnected non-ERCOT Control Areas must comply with the NERC scheduling protocols and the ERCOT Operating Guides. ERCOT shall establish procedures to correct Inadvertent Energy Accounts with non-ERCOT Control Areas that are not subject to NERC scheduling protocols.

6.5.5 QSE Activities

QSE activities during Real-Time operations are summarized in the table located in Section 6.3.2, Activities for Real-Time Operations. That table is intended to be only a general guide and not controlling language, and any conflict between the table and another section of the Protocols is controlled by the other section.

6.5.5.1 Changes in Resource Status

(1) Each QSE shall notify ERCOT of a change in Resource Status via telemetry and through changes in the Current Operating Plan (COP) as soon as practicable following the change.

(2) Each QSE shall promptly inform ERCOT when the operating mode of its Generation Resource’s Automatic Voltage Regulator (AVR) or Power System Stabilizer (PSS) is changed while the Resource is On-Line. The QSE shall also provide the Resource’s AVR or PSS status logs to ERCOT upon request.

(3) Each QSE shall immediately report to ERCOT and the TSP any inability of the QSE’s Generation Resource required to meet its reactive capability requirements in these Protocols.

6.5.5.2 Operational Data Requirements

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

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

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

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

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

(d) Net Reactive Power (in MVAr);

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

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

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

(h) Generation Resource breaker and switch status;

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

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

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

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

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

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

(m) LSL;

(n) Configuration identification for Combined Cycle Generation Resources;

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

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

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

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

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

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

(3) For each Wind-powered Generation Resource (WGR), the QSE shall set the HSL equal to the current net output capability of the facility. The net output capability should consider the net real power of the WGR, turbine availability, weather conditions, and whether the WGR net output is being affected by compliance with a SCED Dispatch Instruction.

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| [NPRR588: Replace paragraph (3) above with the following upon system implementation:]  (3) For each Intermittent Renewable Resource (IRR), the QSE shall set the HSL equal to the current net output capability of the facility. The net output capability should consider the net real power of the IRR generation equipment, IRR generation equipment availability, weather conditions, and whether the IRR net output is being affected by compliance with a SCED Dispatch Instruction. |

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

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

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

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

(c) Load Resource breaker status;

(d) LPC (in MW);

(e) MPC (in MW);

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

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

(h) The status of the high-set under-frequency relay, if required for qualification;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(a) Combustion turbine inlet air cooling methods;

(b) Duct firing;

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

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

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

6.5.6 TSP and DSP Responsibilities

(1) Each TSP shall notify ERCOT of any changes in status of Transmission Elements as provided in these Protocols and clarified in the ERCOT procedures.

(2) Each TSP shall as soon as practicable report to ERCOT any short-term inability to meet minimum TSP reactive requirements.

(3) Each DSP shall as soon as practicable report to ERCOT any short-term inability to meet minimum DSP reactive requirements.

6.5.7 Energy Dispatch Methodology

This Section outlines the programmatic and manual processes employed by ERCOT to simultaneously achieve power balance (minimizing the use of Regulation Service) and manage congestion while operating within the constraints of the system at economically optimized cost. The Real-Time Sequence describes the key system components and inputs that are required to support the SCED process, which produces the Locational Marginal Prices (LMPs) and Base Points while meeting transmission system constraints. Section 6.5.7.3, Security Constrained Economic Dispatch, provides further details regarding additional components and inputs and ex-ante mitigation.

6.5.7.1 Real-Time Sequence

(1) The Real-Time Sequence consists of multiple interdependent processes that are driven by telemetry data and the network topology. This Section describes the core aspects of the Real-Time Sequence.

(2) The figure below highlights the key computational modules and processes that are used during the Real-Time Sequence:



6.5.7.1.1 SCADA Telemetry

SCADA telemetry provides the actual Real-Time status and output of Resources and the status of observable Transmission Elements of the Network Operations Model.

6.5.7.1.2 Network Topology Builder

The Network Topology Builder creates the Updated Network Model based on the observed topology of the ERCOT Transmission Grid. The Updated Network Model is then used as the basis for the State Estimator solution.

6.5.7.1.3 Bus Load Forecast

Once the Updated Network Model is created, the transmission Electrical Buses in the model will have a Bus Load Forecast applied. The forecasted Load must be denoted with a low State Estimator measurement confidence factor. The State Estimator must use the forecasted Load coupled with the remaining telemetry of line flows and voltages to estimate the actual Load on each Electrical Bus.

6.5.7.1.4 State Estimator

The State Estimator must use the Bus Load Forecast and the remaining telemetry information of line flows and voltages to estimate all the transmission parameters needed to provide, on convergence, a mathematically consistent data set of constrained inputs to the Network Security Analysis (NSA) and the Topology Consistency Analyzer.

6.5.7.1.5 Topology Consistency Analyzer

The Topology Consistency Analyzer identifies possibly erroneous breaker and switch status. The Topology Consistency Analyzer must notify ERCOT of inconsistencies detected and must indicate the correct breaker and switch status(es) when the preponderance of redundant information from the telemetered database indicates true errors in status. For example, such processing would detect flow on lines, flow on devices or network load, shown as disconnected from the transmission system and would indicate to ERCOT that there was a continuity error associated with the flow measurement or status indication. ERCOT may override SCADA telemetry as required to correct erroneous breaker and switch status before that information is processed by the NSA for the next SCED interval. ERCOT shall notify the TSP or QSE, who shall correct the status indications as soon as practicable. The Topology Consistency Analyzer maintains a summary of all incorrect status indicators and provides that information to all TSPs and other Market Participants through the MIS Secure Area.

6.5.7.1.6 Breakers/Switch Status Alarm Processor and Forced Outage Detection Processor

The Real-Time Sequence includes processes that detect and provide alarms to the ERCOT Operator when the status of breakers and switches, Resources, transmission lines and transformers, and Load disconnected from the Updated Network Model changes. Also, the ERCOT Operator must be able to determine if an Outage of Transmission Facilities had been scheduled in the Outage Scheduler or is a Forced Outage.

6.5.7.1.7 Real-Time Weather and Dynamic Rating Processor

(1) The Dynamic Rating Processor provides Dynamic Ratings using the processes described in Section 3.10.8, Dynamic Ratings, for all transmission lines and transformer elements with Dynamic Ratings designated by the TSPs. ERCOT shall obtain Real-Time weather data, where available, from multiple locations and provide it to the Dynamic Rating Processor. Weather conditions must include ambient temperature and may include wind speed when available. ERCOT shall post summaries of dynamically adjusted Transmission Element limits on the MIS Secure Area in a form that allows Market Participants to directly upload Real-Time data into the Common Information Model (CIM).

(2) On a monthly basis, ERCOT shall provide a summary report for each dynamically rated Transmission Element specifying the average change in Normal Rating in MVA that is gained on the element through use of a Dynamic Rating rather than the Normal Rating. ERCOT shall post this report to the MIS Secure Area.

6.5.7.1.8 Overload Alarm Processor

Once transmission line and transformer Dynamic Ratings are retrieved, ERCOT shall compare the actual flow and state estimated flow calculation of MVA to the effective Transmission Element limit and, if an out-of-limit condition exists, ERCOT shall produce an overload notification.

6.5.7.1.9 Contingency List and Contingency Screening

For the Real-Time Sequence, ERCOT may select relevant contingencies from a standard contingency list previously developed by ERCOT under Section 5.5.1, Security Sequence, that are likely to be active in Real-Time. ERCOT may use the information provided by the hour-ahead or Day-Ahead NSA to assist in determining which contingencies are candidates for activation.

6.5.7.1.10 Network Security Analysis Processor and Security Violation Alarm

(1) Using the input provided by the State Estimator, ERCOT shall use the NSA processor to perform analysis of all contingencies in the active list. For each contingency, ERCOT shall use the NSA processor to monitor the elements for limit violations. ERCOT shall use the NSA processor to verify Electrical Bus voltage limits to be within a percentage tolerance as outlined in the Operating Guides. Contingency security violations for transmission lines and transformers occur if:

(a) The predicted post-contingency MVA exceeds 100% of the Emergency Rating after consideration of Dynamic Ratings; and

(b) A RAP or SPS is not defined allowing relief within the time allowed by the security criteria as defined in Operating Guide Section 2.2.2, Security Criteria.

(2) When the NSA processor notifies ERCOT of a security violation, ERCOT shall immediately:

(a) Initiate the process described in Section 6.5.7.1.11, Transmission Network and Power Balance Constraint Management;

(b) Seek to determine what unforeseen change in system condition has arisen that has resulted in the security violation, especially those that were 125% or greater of the Emergency Rating for a single SCED interval or greater than 100% of the Emergency Rating for a duration of 30 minutes or more; and

(c) Where possible, seek to reverse the action (e.g. initiating a transmission clearance that the system was not properly pre-dispatched for) that has led to a security violation until further preventative action(s) can be taken.

(3) If SCED does not resolve a transmission security violation, ERCOT shall attempt to relieve the security violation by:

(a) Confirming that pre-determined RAPs are properly modeled in the system;

(b) Instructing Resources to follow Base Points from SCED if those Resources are not already doing so;

(c) Instructing Resources to update the Resources Status in the COP from ONTEST to ON in order to provide more capacity to SCED;

(d) Deploying Resource-Specific Non-Spin;

(e) Committing additional Generation Resources through the Reliability Unit Commitment (RUC) process;

(f) Removing conflicting non-cascading constraints from the SCED process;

(g) Re-Dispatching generation by over-riding HDLs and LDLs;

(h) Instructing TSPs to utilize Reactive Power devices to manage voltage; and

(i) If all other mechanisms have failed, ERCOT may authorize the expedited use of a Temporary Outage Action Plan (TOAP) or Mitigation Plan.

(4) NSA must be capable of analyzing contingencies, including the effects of SPSs and RAPs. The NSA must fully integrate the evaluation and deployment of SPSs and RAPs and notify the ERCOT Operator of the application of these SPSs and RAPs to the solution.

(5) The Real-Time NSA may employ the use of appropriate ranking and other screening techniques to further reduce computation time by executing one or two iterations of the contingency study to gauge its impact and discard further study if the estimated result is inconsequential.

(6) ERCOT shall report monthly:

(a) All security violations that were 125% or greater of the Emergency Rating for a single SCED interval or greater than 100% of the Emergency Rating for a duration of 30 minutes or more during the prior reporting month and the number of occurrences and congestion cost associated with each of the constraints causing the security violations on a rolling 12 month basis.

(b) Operating conditions on the ERCOT System that contributed to each transmission security violation reported in paragraph (6)(a) above. Analysis should be made to understand the root cause and what steps could be taken to avoid a recurrence in the future.

6.5.7.1.11 Transmission Network and Power Balance Constraint Management

(1) ERCOT may not allow any constraint (contingency and limiting Transmission Element pair) identified by NSA to be activated in SCED until it has verified that the contingency definition in NSA associated with the constraint is accurate and appropriate given the current operating state of the ERCOT Transmission Grid. ERCOT shall continuously post to the MIS Secure Area all constraint contingencies in the NSA. ERCOT shall provide relevant constraint information, including, but not limited to, the contingency name as provided in the standard contingency list, whether or not the constraint is active in SCED, the overloaded Transmission Element name, the Rating of the overloaded Transmission Element including Generic Transmission Limits (GTLs), and pre-contingency or post-contingency flows. For each Operating Day, ERCOT shall post to the MIS Secure Area within five days, a report listing all constraints with pre-contingency or post-contingency flows which exceeded the Rating of the overloaded Transmission Element for at least 15 minutes consecutively that were not activated in SCED and an explanation of why each constraint was not activated.

(2) ERCOT shall establish a maximum Shadow Price for each network constraint as part of the definition of contingencies. The cost calculated by SCED to resolve an additional MW of congestion on the network constraint is limited to the maximum Shadow Price for the network constraint.

(3) ERCOT shall establish a maximum Shadow Price for the power balance constraint. The cost calculated by SCED to resolve either the addition or reduction of one MW of dispatched generation on the power balance constraint is limited to the maximum Shadow Price for the power balance constraint.

(4) ERCOT shall determine the methodology for setting maximum Shadow Prices for network constraints and for the power balance constraint. Following review and recommendation by the Technical Advisory Committee (TAC), the ERCOT Board shall review the recommendation and approve a final methodology.

(5) The process for setting the maximum Shadow Prices as described above shall require ERCOT to obtain ERCOT Board approval of the values assigned to these caps along with the effective date for application of the cap. Within two Business Days following approval by the ERCOT Board, ERCOT shall post the Shadow Price caps and effective dates on the MIS Public Area.

(6) If ERCOT determines that rating(s) in the Network Operations Model or configuration of the Transmission Facilities are not correct, then the TSP will provide the appropriate data submittals to ERCOT to correct the problem upon notification by ERCOT.

6.5.7.1.12 Resource Limits

(1) The following Generation Resource limits are calculated by ERCOT and used as inputs by the SCED process:

(a) HASL;

(b) LASL;

(c) Normal Ramp Rate based on the values telemetered by the QSE to ERCOT;

(d) Emergency Ramp Rate based on the values telemetered by the QSE to ERCOT;

(e) SCED Up Ramp Rate (SURAMP), which represents the ability of a Generation Resource to increase generation output in SCED;

(f) SCED Down Ramp Rate (SDRAMP), which represents the ability of a Generation Resource to decrease generation output in SCED;

(g) HDL, which represents a dynamically calculated MW upper limit on a Resource that describes the maximum capability of the Resource SCED dispatch for the next five minutes (the Resource’s Real-Time generation plus the product of the Normal Ramp Rate, as telemetered by the QSE, multiplied by five), restricted by HASL; and

(h) LDL, which represents a dynamically calculated MW lower limit on a Resource that describes the minimum capability of the Resource SCED dispatch for the next five minutes (the Resource’s Real-Time generation minus the product of the Normal Ramp Rate, as telemetered by the QSE, multiplied by five), restricted by LASL.

(2) The following Load Resource limits are calculated by ERCOT and used in other calculations and as information for ERCOT Operators:

(a) For all Load Resources:

(i) HASL; and

(ii) LASL; and

(b) For Controllable Load Resources qualified to be Dispatched by SCED:

(i) Normal Ramp Rate based on the values telemetered by the QSE to ERCOT;

(ii) Emergency Ramp Rate based on the values telemetered by the QSE to ERCOT;

(iii) SURAMP, which represents the ability of a Load Resource to decrease consumption in SCED;

(iv) SDRAMP, which represents the ability of a Load Resource to increase consumption in SCED;

(v) HDL, which represents a dynamically calculated MW upper limit on a Resource that describes the maximum capability of the Resource SCED dispatch for the next five minutes (the Resource’s Real-Time consumption plus the product of the Normal Ramp Rate, as telemetered by the QSE, multiplied by five), restricted by HASL; and

(vi) LDL, which represents a dynamically calculated MW lower limit on a Resource that describes the minimum capability of the Resource SCED dispatch for the next five minutes (the Resource’s Real-Time consumption minus the product of the Normal Ramp Rate, as telemetered by the QSE, multiplied by five), restricted by LASL.

(3) For a more detailed explanation of all the Resource limits calculated by ERCOT, please reference Section 6.5.7.2, Resource Limit Calculator.

6.5.7.1.13 Data Inputs and Outputs for the Real-Time Sequence and SCED

(1) Inputs: The following information must be provided as inputs to the Real-Time Sequence and SCED. ERCOT may require additional information as required, including:

(a) Real-Time data from TSPs including status indication for each point if that data element is stale for more than 20 seconds;

(i) Transmission Electrical Bus voltages;

(ii) MW and MVAr pairs for all transmission lines, transformers, and reactors;

(iii) Actual breaker and switch status for all modeled devices; and

(iv) Tap position for auto-transformers;

(b) State Estimator results (MW and MVAr pairs and calculated MVA) for all modeled Transmission Elements;

(c) Transmission Element ratings from TSPs;

(i) Data from the Network Operations Model:

(A) Transmission lines – Normal, Emergency, and 15-Minute Ratings (MVA); and

(B) Transformers and Auto-transformers – Normal, Emergency, and 15-Minute Ratings (MVA) and tap position limits;

(ii) Data from QSEs:

(A) Generator Step-Up (GSU) transformers tap position;

(B) Resource HSL (from telemetry); and

(C) Resource LSL (from telemetry); and

(d) Real-Time weather, from WGRs, and where available from TSPs or other sources. ERCOT may elect to obtain other sources of weather data and may utilize such information to calculate the dynamic limit of any Transmission Element.

(2) ERCOT shall validate the inputs of the Resource Limit Calculator as follows:

(a) The calculated SURAMP and SDRAMP are each greater than or equal to zero; and

(b) Other provision specified under Section 3.18, Resource Limits in Providing Ancillary Service.

(3) Outputs for ERCOT Operator information and possible action include:

(a) Operator notification of any change in status of any breaker or switch;

(b) Lists of all breakers and switches not in their normal position;

(c) Operator notification of all Transmission Element overloads detected from telemetered or State-Estimated data;

(d) Operator notification of all Transmission Element security violations; and

(e) Operator summary displays:

(i) Transmission system status changes;

(ii) Overloads;

(iii) System security violations; and

(iv) Base Points.

(4) Every hour, ERCOT shall post on the MIS Secure Area the following information:

(a) Status of all breakers and switches used in the NSA except breakers and switches connecting Resources to the ERCOT Transmission Grid;

(b) All binding transmission constraints and the contingency or overloaded element pairs that caused such constraint; and

(c) Shift Factors by Resource Node.

(5) Sixty days after the applicable Operating Day, ERCOT shall post on the MIS Secure Area, the following information:

(a) Hourly transmission line flows and voltages from the State Estimator, excluding transmission line flows and voltages for Private Use Networks; and

(b) Hourly transformer flows, voltages and tap positions from the State Estimator, excluding transformer flows, voltages, and tap positions for Private Use Networks.

(6) Notwithstanding paragraph (5) above, ERCOT, in its sole discretion, shall release relevant State Estimator data less than 60 days after the Operating Day if it determines the release is necessary to provide complete and timely explanation and analysis of unexpected market operations and results or system events including, but not limited to, pricing anomalies, recurring transmission congestion, and system disturbances. ERCOT’s release of data under this paragraph shall be limited to intervals associated with the unexpected market or system event as determined by ERCOT. The data release shall be made available simultaneously to all Market Participants.

(7) Notwithstanding paragraph (5) above, ERCOT shall develop and post a redacted version of the State Estimator data, as soon as reasonably practicable after collection of the data, so long as a redacted version excludes information (including, but not limited to, voltages, transmission flows and transformer flows) from which resource-specific output levels or offer curves could continually and systematically be derived.

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| ***[NPRR327: Replace paragraph (7) above with the following upon system implementation:]***  (7) Notwithstanding paragraph (5) above, ERCOT shall post a redacted version of the State Estimator data every hour to the MIS Secure Area with a validation check to indicate if the State Estimator does not reach a valid solution. The State Estimator data shall include power flow and voltage information for transmission lines and transformers. ERCOT shall only disclose State Estimator data in Real-Time for elements in the published list as described in Section 3.20, Process for Redacting State Estimator Data for Real-Time Publication. If a Market Participant determines that publishing an element of the State Estimator data, as described in Section 3.20, allows systematic and continual derivation of its Resource-specific output levels and Resource Status or its redacted Load, the Market Participant may request ERCOT remove the element from the published list and the request will be posted on the MIS Secure Area. ERCOT will remove the questionable element from the reports as soon as practicable and the element will be reviewed by TAC according to Section 3.20.1, Methodology for Redaction of State Estimator Data, during the quarterly process described in paragraph (2) of Section 3.20. |

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| ***[NPRR327: Insert paragraph (8) below and renumber accordingly upon system implementation:]***  (8) Every hour, ERCOT shall post on the MIS Secure Area from the State Estimator, individual Load on Electrical Buses utilizing the methodology described in Section 3.20.2, Methodology of Identification of Redacted Load, sum of Load in each Load Zone and total Load on Electrical Buses in the ERCOT System. |

(8) Every hour, ERCOT shall post on the MIS Public Area, the sum of ERCOT generation, and flow on the DC Ties, all from the State Estimator.

(9) After every SCED run, ERCOT shall post to the MIS Public Area the sum of the HDL and the sum of the LDL for all Generation Resources On-Line and Dispatched by SCED.

(10) Sixty days after the applicable Operating Day, ERCOT shall provide the summary LDL and HDL report from paragraph (9) above and include, for any Generation Resource, instances of manual overrides of HDL or LDL, including the name of the Generation Resource and the type of override.

(11) After every SCED run, ERCOT shall post to the MIS Certified Area, for any QSE, instances of a manual override of the HDL or LDL for a Generation Resource, including the original and overridden HDL or LDL.

6.5.7.2 Resource Limit Calculator

(1) ERCOT shall calculate the HASL, LASL, SURAMP, SDRAMP, HDL and LDL within four seconds after a change of the Resource-specific attributes provided as part of the QSE’s SCADA telemetry under Section 6.5.5.2, Operational Data Requirements. The formulas described below define which Resource-specific attributes must be used to calculate each Resource limit. The Resource limits are used as inputs into both the SCED process and the Ancillary Service Capacity Monitor as described in Section 6.5.7.6, Load Frequency Control. These Resource limits help ensure that the deployments produced by the SCED and Load Frequency Control (LFC) processes will respect the commitment of a Resource to provide Ancillary Services as well as individual Resource physical limitations.

(2) The figures below illustrate how the Resource Limit Calculator determines the Resource limits for Generation and Load Resources:

Generation Resources:

LSL

HSL

Time

LSL

-

LASL

-

HASL

-

Generation

Increase

Generation

Decrease

Services

Provided: Reg

Down

Provided: Reg Up,

Responsive, Non-Spin

Current

Telemetry

HDL

LDL

Ramp

Rate

5 Minutes

**Generation**

Quantity

Offer Curve Generation

LSL

HSL

-

-

-

Generation

Increase

Generation

Decrease

Ramp

Rate

5 Minutes

-

0

-

-

Generation

Increase

Generation

Decrease

Ramp

Rate

5 Minutes

Ancillary

Load Resources:

Time

LSL = LPC -

LASL -

HASL -

Ancillary Services Provided: Reg-Down

Current Load

Telemetry

HDL

LDL

5-30 Minutes

**Load**

Quantity

Bid Curve Load

LSL/LPC

HSL/MPC

0

Increasing

Consumption

Decreasing

Consumption

Ramp

Rate

Ancillary Services Provided: Reg-Up, RRS, Non-Spin

HSL = MPC -

Normal Load   
Fluctuation

(3) For Generation Resources, HASL is calculated as follows:

HASL = Max (LASL, (HSLTELEM – (RRSTELEM + RUSTELEM + NSRSTELEM)))

|  |  |
| --- | --- |
| Variable | Description |
| HASL | High Ancillary Service Limit. |
| HSLTELEM | High Sustained Limit provided via telemetry – per Section 6.5.5.2. |
| LASL | Low Ancillary Service Limit. |
| RRSTELEM | Responsive Reserve Ancillary Service Schedule provided by telemetry. |
| RUSTELEM | Reg-Up Ancillary Service Resource Responsibility designation provided by telemetry. |
| NSRSTELEM | Non-Spin Ancillary Service Schedule provided via telemetry. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR710: Replace paragraph (3) above with the following upon system implementation:]***  (3) For Generation Resources, HASL is calculated as follows:  **HASL = Max (LASL, (HSLTELEM – (RRSTELEM + RUSTELEM + NSRSTELEM +NFRCTELEM)))**   |  |  | | --- | --- | | **Variable** | **Description** | | HASL | High Ancillary Service Limit. | | HSLTELEM | High Sustained Limit provided via telemetry – per Section 6.5.5.2. | | LASL | Low Ancillary Service Limit. | | RRSTELEM | Responsive Reserve Ancillary Service Schedule provided by telemetry. | | RUSTELEM | Reg-Up Ancillary Service Resource Responsibility designation provided by telemetry. | | NSRSTELEM | Non-Spin Ancillary Service Schedule provided via telemetry. | | NFRCTELEM | NFRC currently available (unloaded) and included in the HSL of the Generation Resource with non-zero Responsive Reserve Ancillary Service Schedule telemetry. | |

(4) For Generation Resources, LASL is calculated as follows:

LASL = LSLTELEM + RDSTELEM

|  |  |
| --- | --- |
| Variable | Description |
| LASL | Low Ancillary Service Limit. |
| LSLTELEM | Low Sustained Limit provided via telemetry. |
| RDSTELEM | Reg-Down Ancillary Service Resource Responsibility designation provided by telemetry. |

(5) For each Generation Resource, the SURAMP is calculated as follows:

SURAMP = RAMPRATE – (RUSTELEM \* REGP / 5)

|  |  |
| --- | --- |
| Variable | Description |
| SURAMP | SCED Up Ramp Rate. |
| RAMPRATE | Normal Ramp Rate up, as telemetered by the QSE, when RRS is not deployed or when the subject Resource is not providing RRS.  Emergency Ramp Rate up, as telemetered by the QSE, for Resources deploying RRS. |
| RUSTELEM | Reg-Up Ancillary Service Resource Responsibility designation provided by telemetry. |
| REGP | Percentage of Regulation Service for which ramp rate will be reserved in Real-Time. The value will be between one and zero. Market Participants will be notified of the change in this value. |

(6) For each Generation Resource, the SDRAMP is calculated as follows:

SDRAMP = NORMRAMP – (RDSTELEM \* REGP / 5)

| Variable | Description |
| --- | --- |
| SDRAMP | SCED Down Ramp Rate. |
| NORMRAMP | Normal Ramp Rate down, as telemetered by the QSE. |
| RDSTELEM | Reg-Down Ancillary Service Resource Responsibility designation by Resource provided via telemetry. |
| REGP | Percentage of Regulation Service for which ramp rate will be reserved in Real-Time. The value will be between one and zero. Market Participants will be notified of the change in this value. |

(7) For Generation Resources, HDL is calculated as follows:

(a) If the telemetered Resource Status is SHUTDOWN, then

**HDL = POWERTELEM – (SDRAMP \* 5)**

(b) If the telemetered Resource Status is any status code specified in item (5)(b)(i) of Section 3.9.1, Current Operating Plan (COP) Criteria, other than SHUTDOWN, then

**HDL = Min (POWERTELEM + (SURAMP \* 5), HASL)**

|  |  |
| --- | --- |
| Variable | Description |
| HDL | High Dispatch Limit. |
| POWERTELEM | Gross or net real power provided via telemetry. |
| SURAMP | SCED Up Ramp Rate. |
| SDRAMP | SCED Down Ramp Rate. |
| HASL | High Ancillary Service Limit – definition provided in Section 2, Definitions and Acronyms. |

(8) For Generation Resources, LDL is calculated as follows:

(a) If the telemetered Resource Status is STARTUP, then

**LDL = POWERTELEM + (SURAMP \* 5)**

(b) If the telemetered Resource Status is any status code specified in item (5)(b)(i) of Section 3.9.1 other than STARTUP, then

**LDL = Max (POWERTELEM - (SDRAMP \* 5), LASL)**

|  |  |
| --- | --- |
| Variable | Description |
| LDL | Low Dispatch Limit. |
| POWERTELEM | Gross or net real power provided via telemetry. |
| SDRAMP | SCED Down Ramp Rate. |
| LASL | Low Ancillary Service Limit – definition provided in Section 2. |

(9) For Load Resources, HASL is calculated as follows:

HASL = Max (LPCTELEM, (MPCTELEM – RDSTELEM))

|  |  |
| --- | --- |
| Variable | Description |
| HASL | High Ancillary Service Limit. |
| LPCTELEM | Low Power Consumption provided via telemetry. |
| MPCTELEM | Maximum Power Consumption provided via telemetry. |
| RDSTELEM | Reg-Down Ancillary Service Resource Responsibility designation provided by telemetry. |

(10) For Load Resources, LASL is calculated as follows:

LASL = Min (HASL, (LPCTELEM + (RRSTELEM + RUSTELEM + NSRSTELEM)))

|  |  |
| --- | --- |
| Variable | Description |
| LASL | Low Ancillary Service Limit. |
| HASL | High Ancillary Service Limit. |
| LPCTELEM | Low Power Consumption provided via telemetry. |
| RRSTELEM | Responsive Reserve Ancillary Service Schedule provided by telemetry. |
| RUSTELEM | Reg-Up Ancillary Service Resource Responsibility designation provided by telemetry. |
| NSRSTELEM | Non-Spin Ancillary Service Schedule provided via telemetry. |

(11) For each Load Resource, the SURAMP is calculated as follows:

**SURAMP = RAMPRATE – (RUSTELEM \* REGP / 5)**

|  |  |
| --- | --- |
| Variable | Description |
| SURAMP | SCED Up Ramp Rate. |
| RAMPRATE | Normal Ramp Rate up, as telemetered by the QSE, when RRS is not deployed or when the subject Load Resource is not providing RRS.  Emergency Ramp Rate up, as telemetered by the QSE, for Load Resources deploying RRS. |
| RUSTELEM | Reg-Up Ancillary Service Resource Responsibility designation provided by telemetry. |
| REGP | Percentage of Regulation Service for which ramp rate will be reserved in Real-Time. The value will be between one and zero. Market Participants will be notified of the change in this value. |

(12) For each Load Resource, the SDRAMP is calculated as follows:

**SDRAMP = NORMRAMP – (RDSTELEM \* REGP / 5)**

| Variable | Description |
| --- | --- |
| SDRAMP | SCED Down Ramp Rate. |
| NORMRAMP | Normal Ramp Rate down, as telemetered by the QSE. |
| RDSTELEM | Reg-Down Ancillary Service Resource Responsibility designation by Resource provided via telemetry. |
| REGP | Percentage of Regulation Service for which ramp rate will be reserved in Real-Time. The value will be between one and zero. Market Participants will be notified of the change in this value. |

(13) For Load Resources, HDL is calculated as follows:

**HDL = Min (POWERTELEM + (SDRAMP \* 5), HASL)**

|  |  |
| --- | --- |
| Variable | Description |
| HDL | High Dispatch Limit. |
| POWERTELEM | Net real power flow provided via telemetry. |
| SDRAMP | SCED Down Ramp Rate. |
| HASL | High Ancillary Service Limit – definition provided in Section 2. |

(14) For Load Resources, LDL is calculated as follows:

**LDL = Max (POWERTELEM - (SURAMP \* 5), LASL)**

|  |  |
| --- | --- |
| Variable | Description |
| LDL | Low Dispatch Limit. |
| POWERTELEM | Net real power flow provided via telemetry. |
| SURAMP | SCED Up Ramp Rate. |
| LASL | Low Ancillary Service Limit – definition provided in Section 2. |

6.5.7.3 Security Constrained Economic Dispatch

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

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

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

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

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

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

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

(ii) Each DSR that has not submitted Incremental and Decremental Energy Offer Curves.

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

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| [NPRR588: Replace paragraph (a) above with the following upon system implementation:]  (a) Non-IRRs and Dynamically Scheduled Resources (DSRs) without Energy Offer Curves  ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below for:  (i) Each non-IRR for which its QSE has submitted an Output Schedule instead of an Energy Offer Curve; and  (ii) Each DSR that has not submitted Incremental and Decremental Energy Offer Curves.   |  |  | | --- | --- | | MW | Price (per MWh) | | HSL | SWCAP | | Output Schedule MW plus 1 MW | SWCAP minus $0.01 | | Output Schedule MW | -$249.99 | | LSL | -$250.00 | |

(b) DSRs with Energy Offer Curves

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

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

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

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

|  |  |
| --- | --- |
| MW | Price (per MWh) |
| HSL (if more than highest MW in Energy Offer Curve) | SWCAP |
| 1 MW above highest MW in Energy Offer Curve (if less than HSL) | SWCAP minus $0.01 |
| Energy Offer Curve | Energy Offer Curve |
| 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 |
| LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR588 and NPRR662: Replace applicable portions of paragraph (c) above with the following upon system implementation:]  (c) Non-IRRs without full-range Energy Offer Curves  For each non-IRR for which its QSE has submitted an Energy Offer Curve that does not cover the full range of the Resource’s available capacity, ERCOT shall create a proxy Energy Offer Curve that extends the submitted Energy Offer Curve to use the entire available capacity of the Resource above the highest point on the Energy Offer Curve to the Resource’s HSL and the offer floor from the lowest point on the Energy Offer Curve to its LSL, using these points:   |  |  | | --- | --- | | MW | Price (per MWh) | | HSL (if more than highest MW in submitted Energy Offer Curve) | Price associated with highest MW in submitted Energy Offer Curve | | Energy Offer Curve | Energy Offer Curve | | 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 | | LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 | |

(d) WGRs

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

|  |  |
| --- | --- |
| MW | Price (per MWh) |
| HSL | SWCAP |
| HSL minus 1 MW | -$249.99 |
| LSL | -$250.00 |

(ii) For each WGR for which its QSE has submitted an Energy Offer Curve, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| MW | Price (per MWh) |
| HSL (if more than highest MW in Energy Offer Curve) | SWCAP |
| 1 MW above highest MW in Energy Offer Curve (if less than HSL) | SWCAP minus $0.01 |
| Energy Offer Curve | Energy Offer Curve |
| 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 |
| LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR588 and NPRR662: Replace applicable portions of paragraph (d) above with the following upon system implementation:]  (d) IRRs  (i) For each IRR that has not submitted an Energy Offer Curve, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | MW | Price (per MWh) | | HSL | $1,500 | | HSL minus 1 MW | -$249.99 | | LSL | -$250.00 |   (ii) For each IRR for which its QSE has submitted an Energy Offer Curve that does not cover the full range of the IRR’s available capacity, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | MW | Price (per MWh) | | HSL (if more than highest MW in submitted Energy Offer Curve) | Price associated with the highest MW in submitted Energy Offer Curve | | Energy Offer Curve | Energy Offer Curve | | 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 | | LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 | |

(e) RUC-committed Resources

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

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL | RUC price floor, as detailed in paragraph (1) of Section 6.4.4.1, Energy Offer Curve for RUC-Committed Resources |
| Zero | Value of the RUC price floor, as detailed in paragraph (1) of Section 6.4.4.1 |

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

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL (if more than highest MW in Energy Offer Curve) | SWCAP |
| 1 MW above highest MW in QSE submitted Energy Offer Curve (if less than HSL) | SWCAP minus $0.01 |
| Energy Offer Curve | Greater of the RUC price floor, as detailed in paragraph (1) of Section 6.4.4.1, or the QSE submitted Energy Offer Curve |
| Zero | Greater of the value of the RUC price floor, as detailed in paragraph (1) of Section 6.4.4.1, or the first price point of the QSE submitted Energy Offer Curve |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR662: Replace paragraph (e) above with the following upon system implementation:]  (e) RUC-committed Resources  (i) For each RUC-committed Resource that has not submitted an Energy Offer Curve, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL | RUC price floor, as detailed in paragraph (1) of Section 6.4.4.1, Energy Offer Curve for RUC-Committed Resources | | Zero | Value of the RUC price floor, as detailed in paragraph (1) of Section 6.4.4.1 |   (ii) For each RUC-committed Resource that has submitted an Energy Offer Curve, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL (if more than highest MW in Energy Offer Curve) | Higher of RUC price floor or price associated with the highest MW in QSE submitted Energy Offer Curve | | Energy Offer Curve | Greater of the RUC price floor, as detailed in paragraph (1) of Section 6.4.4.1, or the QSE submitted Energy Offer Curve | | Zero | Greater of the value of the RUC price floor, as detailed in paragraph (1) of Section 6.4.4.1, or the first price point of the QSE submitted Energy Offer Curve | |

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

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

|  |  |
| --- | --- |
| MW | Price (per MWh) |
| LPC to MPC minus maximum MW of RTM Energy Bid | SWCAP |
| MPC minus maximum MW of RTM Energy Bid to MPC | RTM Energy Bid curve |
| MPC | Right-most point (lowest price) on RTM Energy Bid curve |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR662: Replace paragraph (6) above with the following upon system implementation:]  (6) For a Controllable Load Resource whose QSE has submitted an RTM Energy Bid that does not cover the full range of the Resource’s available Demand response capability, consistent with the Controllable Load Resource’s telemetered quantities, ERCOT shall create a proxy energy bid as described below:   |  |  | | --- | --- | | MW | Price (per MWh) | | LPC to MPC minus maximum MW of RTM Energy Bid | Price associated with the lowest MW in submitted RTM Energy Bid curve | | MPC minus maximum MW of RTM Energy Bid to MPC | RTM Energy Bid curve | | MPC | Right-most point (lowest price) on RTM Energy Bid curve | |

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

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

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

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

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

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

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

(ii) Use RTM Energy Bid curves for all available Controllable Load Resources, whether submitted by QSEs or created by ERCOT. There is no mitigation of RTM Energy Bids; and

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

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

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

(12) For each SCED process, ERCOT shall calculate a Real-Time On-Line Reserve Price Adder and a Real-Time Off-Line Reserve Price Adder based on the On-Line and Off-Line available reserves in the ERCOT System and the Operating Reserve Demand Curve (ORDC). The Real-Time Off-Line available reserves shall be administratively set to zero when the SCED snapshot of the Physical Responsive Capability (PRC) is equal to or below the PRC MW at which Energy Emergency Alert (EEA) Level 1 is initiated. In addition, for each SCED process, ERCOT shall calculate a Real-Time On-Line Reliability Deployment Price Adder. The sum of the Real-Time Reliability Deployment Price Adder and the Real-Time On-Line Reserve Price Adder shall be averaged over the 15-minute Settlement Interval and added to the Real-Time LMPs to determine the Real-Time Settlement Point Prices. The price after the addition of the sum of the Real-Time On-Line Reliability Deployment Price Adder and the Real-Time On-Line Reserve Price Adder to LMPs approximates the pricing outcome of the impact to energy prices from reliability deployments and the Real-Time energy and Ancillary Service co-optimization since the Real-Time On-Line Reserve Price Adder captures the value of the opportunity cost of reserves based on the defined ORDC. An Ancillary Service imbalance Settlement shall be performed pursuant to Section 6.7.4, Real-Time Ancillary Service Imbalance Payment or Charge, to make Resources indifferent to the utilization of their capacity for energy or Ancillary Service reserves.

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

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

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

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

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

(a) RUC-committed Resources with a telemetry Resource Status of ONRUC;

(b) RMR Resources that are On-Line, including capacity secured to prevent an Emergency Condition pursuant to paragraph (2) of Section 6.5.1.1, ERCOT Control Area Authority;

(c) Deployed Load Resources other than Controllable Load Resources; and

(d) Deployed Emergency Response Service (ERS).

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

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

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

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

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

(c) For all Controllable Load Resources excluding ones with a telemetered status of OUTL:

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

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

(d) Add the deployed MW from Load Resources other than Controllable Load Resources to GTBD linearly ramped over the 10-minute ramp period. The amount of deployed MW is calculated from the Resource telemetry and from applicable deployment instructions in Extensible Markup Language (XML) messages. ERCOT shall generate a linear bid curve defined by a price/quantity pair of $300/MWh for the first MW of Load Resources deployed and a price/quantity pair of $700/MWh for the last MW of Load Resources deployed in each SCED execution. After recall instruction, the amount of MW added to GTBD during the restoration period will be determined by validated telemetry. The TAC shall review the validity of the prices for the bid curve at least annually.

(e) Add the deployed MW from ERS to GTBD. The amount of deployed MW is determined from the XML messages and ERS contracts. After recall, an approximation of the amount of un-restored ERS shall be used. After ERCOT recalls each group, GTBD shall be adjusted to reflect the restoration of load using a linear curve over the ten hour restoration period. The restoration period shall be reviewed by TAC at least annually, and ERCOT may recommend a new restoration period to reflect observed historical restoration patterns.

(f) Perform a SCED with changes to the inputs in items (a), (b), (c), (d), and (e) above, considering only Competitive Constraints and the non-mitigated Energy Offer Curves.

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

(h) Perform a SCED with the changes to the inputs in items (a), (b), (c), (d), and (e) above, considering both Competitive and Non-Competitive Constraints and the mitigated Energy offer Curves.

(i) Determine the positive difference between the System Lambda from item (h) above and the System Lambda of the second step in the two-step SCED process described in paragraph (6)(b) of Section 6.5.7.3, Security Constrained Economic Dispatch.

(j) Determine the amount given by the Value of Lost Load (VOLL) minus the sum of the System Lambda of the second step in the two step SCED process described in paragraph (6)(b) of Section 6.5.7.3 and the Real-Time On-Line Reserve Price Adder.

(k) The Real-Time On-Line Reliability Deployment Price Adder is the minimum of items (i) and (j) above.

6.5.7.4 Base Points

ERCOT shall issue a Base Point for each On-Line Generation Resource and each On-Line Controllable Load Resource on completion of each SCED execution. The Base Point set by SCED must observe a Generation Resource’s and Controllable Load Resource’s HDL and LDL. Base Points are automatically superseded on receipt of a new Base Point from ERCOT regardless of the status of any current ramping activity of a Resource. ERCOT shall provide each Base Point using Dispatch Instructions issued over Inter-Control Center Communications Protocol (ICCP) data link to the QSE representing each Resource that include the following information:

(a) Resource identifier that is the subject of the Dispatch Instruction;

(b) MW output for Generation Resource and MW consumption for Controllable Load Resource;

(c) Time of the Dispatch Instruction;

(d) Flag indicating SCED has dispatched a Generation Resource or Controllable Load Resource below HDL used by SCED;

|  |
| --- |
| [NPRR285: Insert paragraph (e) below upon system implementation and renumber accordingly:]  (e) Flag indicating SCED has dispatched a Generation Resource away from the Output Schedule submitted for that Generation Resource; |

(e) Flag indicating that the Resource is identified for mitigation pursuant to paragraph (7) of Section 3.19.4, Security-Constrained Economic Dispatch Constraint Competitiveness Test, and paragraph (10) of Section 6.5.7.3, Security Constrained Economic Dispatch; and

(f) Other information relevant to that Dispatch Instruction.

6.5.7.5 Ancillary Services Capacity Monitor

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

(a) RRS capacity from Generation Resources;

(b) RRS capacity from Load Resources excluding Controllable Load Resources;

(c) RRS capacity from Controllable Load Resources;

(d) Non-Spin available from On-Line Generation Resources with Energy Offer Curves;

(e) Non-Spin available from undeployed Load Resources;

(f) Non-Spin available from Off-Line Generation Resources;

(g) Non-Spin available from Resources with Output Schedules;

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

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

(j) Available capacity from Controllable Load Resources in the ERCOT System that can be used to increase Base Points (energy consumption) in SCED;

(k) Available capacity with Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;

(l) Available capacity with Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED;

(m) Available capacity without Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;

(n) Available capacity without Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED; and

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

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



where the included On-Line Generation Resources do not include WGRs, nuclear Generation Resources, or Generation Resources with an output less than or equal to 95% of telemetered LSL or with a telemetered status of ONTEST, STARTUP, or SHUTDOWN.



**PRC2 = ((Hydro-synchronous condenser output)i as qualified by item (9) of Operating Guide Section 2.3.1.2, Additional Operational Details for Responsive Reserve Providers))**



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***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***

**PRC3 = (RRS MW supplied from Load Resources controlled by high-set under-frequency relay)i**

**PRC4 = Min(Max((LRDF\_1\*Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_1 \* Actual Net Telemetered Consumption)) from all Controllable Load Resources active in SCED and carrying Ancillary Service Resource Responsibility**

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***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***

**PRC5 = Min(Max((LRDF\_2 \* Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_2 \* Actual Net Telemetered Consumption)) from all Controllable Load Resources active in SCED and not carrying Ancillary Service Resource Responsibility**





***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***

**PRC = PRC1 + PRC2 + PRC3 + PRC4 + PRC5**

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| PRC1 | MW | Generation On-Line greater than 0 MW |
| PRC2 | MW | Hydro-synchronous condenser output |
| PRC3 | MW | RRS supplied from Load Resources controlled by high-set under-frequency relay |
| PRC4 | MW | Capacity from Controllable Load Resources active in SCED and carrying Ancillary Service Resource Responsibility |
| PRC5 | MW | Capacity from Controllable Load Resources active in SCED and not carrying Ancillary Service Resource Responsibility |
| PRC | MW | Physical Responsive Capability |
| RDF |  | The currently approved Reserve Discount Factor |
| LRDF\_1 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources carrying Ancillary Service Resource Responsibility |
| LRDF\_2 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources not carrying Ancillary Service Resource Responsibility |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR495, NPRR573, and NPRR706: Replace applicable portions of paragraph (1) above with the following upon system implementation:]***  (1) ERCOT shall calculate the following every ten seconds and provide Real-Time summaries to ERCOT Operators and all Market Participants using ICCP, giving updates of calculations every ten seconds, and posting on the MIS Public Area, giving updates of calculations every five minutes, which show the Real-Time total system amount of:  (a) RRS capacity from:  (i) Generation Resources;  (ii) Load Resources excluding Controllable Load Resources; and  (iii) Controllable Load Resources;  (b) Ancillary Service Resource Responsibility for RRS from:  (i) Generation Resources;  (ii) Load Resources excluding Controllable Load Resources; and  (iii) Controllable Load Resources;  (c) RRS deployed to Generation and Controllable Load Resources;  (d) Non-Spin available from:  (i) On-Line Generation Resources with Energy Offer Curves;  (ii) Undeployed Load Resources;  (iii) Off-Line Generation Resources; and  (iv) Resources with Output Schedules;  (e) Ancillary Service Resource Responsibility for Non-Spin from:  (i) On-Line Generation Resources with Energy Offer Curves;  (ii) On-Line Generation Resources with Output Schedules;  (iii) Load Resources;  (iv) Off-Line Generation Resources excluding Quick Start Generation Resources (QSGRs); and  (v) QSGRs;  (f) Undeployed Reg-Up and Reg-Down;  (g) Ancillary Service Resource Responsibility for Reg-Up and Reg-Down;  (h) Deployed Reg-Up and Reg-Down;  (i) Available capacity:  (i) With Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;  (ii) With Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED;  (iii) Without Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;  (iv) Without Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED;  (v) With RTM Energy Bid curves from available Controllable Load Resources in the ERCOT System that can be used to decrease Base Points (energy consumption) in SCED; and  (vi) With RTM Energy Bid curves from available Controllable Load Resources in the ERCOT System that can be used to increase Base Points (energy consumption) in SCED;  (j) The ERCOT-wide Physical Responsive Capability (PRC) calculated as follows:  **PRC1 = Min(Max((RDF\*(HSL-NFRC) – Actual Net Telemetered Output)i , 0.0) , 0.2\*RDF\*(HSL-NFRC)i),**  where the included On-Line Generation Resources do not include WGRs, nuclear Generation  Resources, or Generation Resources with an output less than or equal to 95% of telemetered LSL or  with a telemetered status of ONTEST, STARTUP, or SHUTDOWN.      ***WGRs***  ***online***  ***All***  ***WGRs***  ***online***  ***i***  **PRC2 = Min(Max((RDFW\*HSL – Actual Net Telemetered Output)i , 0.0) , 0.2\*RDFW\*HSLi),**  where the included On-Line WGRs only include WGRs that are Primary Frequency Response-capable.  **PRC3 = ((Hydro-synchronous condenser output)i as qualified by item (9) of Operating Guide Section 2.3.1.2, Additional Operational Details for Responsive Reserve Providers))**      ***resources***  ***load***  ***online***  ***All***  ***resource***  ***load***  ***online***  ***i***  **PRC4 = (RRS MW supplied from Load Resources controlled by high-set under-frequency relay)i**  **PRC5 = Min(Max((LRDF\_1\*Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_1 \* Actual Net Telemetered Consumption)) from all Controllable Load Resources active in SCED and carrying Ancillary Service Resource Responsibility**      ***resources***  ***load***  ***online***  ***All***  ***resource***  ***load***  ***online***  ***i***      ***resources***  ***load***  ***online***  ***All***  ***resource***  ***load***  ***online***  ***i***  **PRC6 = Min(Max((LRDF\_2 \* Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_2 \* Actual Net Telemetered Consumption)) from all Controllable Load Resources active in SCED and not carrying Ancillary Service Resource Responsibility**  **PRC = PRC1 + PRC2 + PRC3+ PRC4 + PRC5 + PRC6**  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | Variable | Unit | Description | | PRC1 | MW | Generation On-Line greater than 0 MW | | PRC2 | MW | WGRs On-Line greater than 0 MW | | PRC3 | MW | Hydro-synchronous condenser output | | PRC4 | MW | RRS supplied from Load Resources controlled by high-set under-frequency relay | | PRC5 | MW | Capacity from Controllable Load Resources active in SCED and carrying Ancillary Service Resource Responsibility | | PRC6 | MW | Capacity from Controllable Load Resources active in SCED and not carrying Ancillary Service Resource Responsibility | | PRC | MW | Physical Responsive Capability | | RDF |  | The currently approved Reserve Discount Factor | | RDFW |  | The currently approved Reserve Discount Factor for WGRs | | LRDF\_1 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources carrying Ancillary Service Resource Responsibility | | LRDF\_2 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources not carrying Ancillary Service Resource Responsibility | | NFRC | MW | Non-Frequency Responsive Capacity | |

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

(3) The Load Resource Reserve Discount Factors for Controllable Load Resources (LRDF\_1 and LRDF\_2) shall be subject to review and approval by TAC and shall be posted to the MIS Public Area no later than three Business Days after TAC approval.

6.5.7.6 Load Frequency Control

The function of LFC is to maintain system frequency without a cost optimization function. ERCOT shall execute LFC every four seconds to reduce system frequency deviations from scheduled frequency by providing a control signal to each QSE that represents Resources providing Regulation Service and RRS service.

6.5.7.6.1 LFC Process Description

(1) The LFC system corrects system frequency based on the Area Control Error (ACE) algorithm and Good Utility Practice.

(2) The ACE algorithm subtracts the actual frequency in Hz from the scheduled system frequency (normally 60 Hz), and multiplies the result by the frequency bias constant of MW/0.1 Hz. The ACE algorithm then takes that product and subtracts a configurable portion of the sum of the difference between the Updated Desired Base Point and Real-Time net MW output as appropriate. LFC shall ensure that the total reduction will not exceed the system-wide regulation requirement. This calculation produces an ACE value, which is a MW-equivalent correction needed to control the actual system frequency to the scheduled system frequency value.

(3) The LFC module receives inputs from Real-Time telemetry that includes Resource output and actual system frequency. The LFC uses actual Resource information calculated from SCADA to determine available Resource capacity providing Regulation and RRS services.

(4) Based on the ACE MW correction, the LFC issues a set of control signals every four seconds to each QSE providing Regulation and, if required, each QSE providing RRS. Control must be proportional to the QSE’s share of each of the services that it is providing, respecting the QSE’s Resources’ capability to provide regulation control. Control signals are provided to the QSE using the ICCP data link. QSEs shall receive an Updated Desired Base Point updated every four seconds by LFC. ERCOT will provide an Operations Notice of any methodology change to the determination of the Updated Desired Base Point within 60 minutes of the change.

(5) Each QSE shall allocate its Regulation energy deployment among its Resources to meet a deployment signal, and shall provide ERCOT with the participation factor of each Resource via telemetry in accordance with Section 6.5.7.6.2.1, Deployment of Regulation Service, and Section 6.4.9.1, Evaluation and Maintenance of Ancillary Service Capacity Sufficiency. A QSE may allocate Regulation Service Ancillary Service Resource Responsibility to any Resource telemetering a Resource Status of ONOPTOUT. Each QSE’s allocation of Regulation Service to its Resources must be consistent with the telemetry provided under Section 6.5.5.2, Operational Data Requirements. Each QSE’s allocation of its Regulation energy deployment among its Resources to meet a deployment signal must ensure the participation factors of all its Generation Resources in comparison to all its Controllable Load Resources remains constant.

(6) If all Reg-Up capacity has been deployed, ERCOT shall use the LFC system to deploy Responsive Reserve on Generation Resources and Controllable Load Resources. Such Responsive Reserve deployments by ERCOT must be deployed as specified in Section 6.5.7.6.2.2, Deployment of Responsive Reserve Service.

(7) ERCOT shall settle energy that results from LFC deployment at the Settlement Point Price for the point of injection. When a QSE deploys Responsive Reserve Service, the QSE shall deploy units consistent with the performance criteria for RRS service in Sections 8.1.1.3.2, Responsive Reserve Service Capacity Monitoring Criteria, and 8.1.1.4.2, Responsive Reserve Service Energy Deployment Criteria.

(8) The inputs for LFC include:

(a) Actual system frequency;

(b) Scheduled system frequency;

(c) Capacity available for Regulation by QSE;

(d) Telemetered high and low Regulation availability status indications for each Resource available for Regulation deployments for ERCOT information;

(e) Resource limits calculated by ERCOT as described Section 6.5.7.2, Resource Limit Calculator;

(f) Resource Regulation participation factor;

(g) Capacity available for RRS by QSE;

(h) ERCOT System frequency bias; and

(i) Telemetered Resource output.

(9) If system frequency deviation is greater than an established threshold, ERCOT may issue Dispatch Instructions to those Resources not providing Reg-Up or Reg-Down that have Base Points directionally opposite ACE, to temporarily suspend ramping to their Base Point until frequency deviation returns to zero.

6.5.7.6.2 LFC Deployment

ERCOT may deploy Regulation, Responsive Reserve, and Non-Spin only as prescribed by their respective specific functions to maintain frequency and system security. ERCOT may not substitute one Ancillary Service for another.

6.5.7.6.2.1 Deployment of Regulation Service

(1) ERCOT shall deploy Reg-Up and Reg-Down necessary to maintain ERCOT System frequency to meet NERC Control Area and other Control Area performance criteria as specified in these Protocols and the Operating Guides.

(2) Reg-Up is a deployment or recall of a deployment referenced to the Resource’s Base Point in response to a change (up or down) in ERCOT System frequency to maintain the target ERCOT System frequency within predetermined limits according to the Operating Guides.

(3) Reg-Down is a deployment or recall of a deployment referenced to the Resource’s Base Point in response to a change (up or down) in ERCOT System frequency to maintain the target ERCOT System frequency within predetermined limits according to the Operating Guides.

(4) These requirements also apply to the deployment or recall of a deployment of Reg-Up and Reg-Down:

(a) Deployment or recall of a deployment must be accomplished through use of an automatic signal from ERCOT to each QSE provider of Reg-Up and Reg-Down.

(b) ERCOT shall minimize Reg-Up and Reg-Down energy as much as practicable in each SCED cycle.

(c) ERCOT shall settle energy provided by Reg-Up and Reg-Down at the Resource’s Settlement Point Price.

(d) ERCOT shall integrate the control signal sent to providers of Reg-Up and shall calculate the amount of energy deployed by Reg-Up in each Settlement Interval.

(e) ERCOT shall integrate the control signal sent to providers of Reg-Down and shall calculate the amount of energy deployed by Reg-Down in each Settlement Interval.

(f) ERCOT shall calculate for each LFC cycle the amount of regulation that each Resource is expected to provide at that instant in time. The expected amount must be averaged over each SCED interval. The actual generation from telemetry must also be averaged over each SCED interval.

(5) Every day, ERCOT shall post to the MIS Secure Area the total amount of deployed Reg-Up and Reg-Down energy in each Settlement Interval of the previous day.

(6) For each Resource providing Reg-Up or Reg-Down, the implied ramp rate in MW per minute is the total amount of Regulation Service awarded divided by five.

(7) Each QSE providing Reg-Up or Reg-Down and ERCOT shall meet the deployment performance requirements specified in Section 8, Performance Monitoring.

(8) ERCOT shall issue Reg-Up and Reg-Down deployment Dispatch Instructions over ICCP. Those Dispatch Instructions must contain the change in MW output requested of the QSE assuming all Resources are at their Updated Desired Base Point issued by LFC.

6.5.7.6.2.2 Deployment of Responsive Reserve Service

(1) RRS is intended to:

(a) Help restore the frequency within the first few seconds of a significant frequency deviation of the interconnected transmission system;

(b) Provide energy during the implementation of an EEA; and

(c) Provide backup Reg-Up.

(2) ERCOT shall deploy RRS to meet NERC Control Performance Standards and other performance criteria as specified in these Protocols and the Operating Guides, by one or more of the following:

(a) RRS energy deployment by providing Primary Frequency Response as a result of a significant frequency deviation;

(b) Through use of an automatic Dispatch Instruction signal to deploy RRS capacity from Generation Resources or deploy RRS capacity from Controllable Load Resources;

(c) By Dispatch Instructions for deployment of RRS energy from a Load Resource, excluding Controllable Load Resources, by an electronic Messaging System; and

(d) RRS energy deployment by automatic action of high-set under-frequency relays as a result of a significant frequency deviation.

(3) ERCOT shall deploy RRS to respond to a frequency deviation when the power requirement to restore frequency to normal ACE in ten minutes exceeds the Reg-Up ramping capability. Deployment of RRS on Load Resources, excluding Controllable Load Resources, must be as described in Section 6.5.9.4, Energy Emergency Alert.

(4) ERCOT may deploy RRS in response to system disturbance requirements as specified in the Operating Guides if no additional energy is available to be dispatched from SCED as determined by the Ancillary Service Capacity Monitor.

(5) Energy from RRS Resources may also be deployed by ERCOT under Section 6.5.9, Emergency Operations.

(6) ERCOT shall allocate the deployment of RRS proportionally among QSEs that provide RRS using Resources that are not on high-set under-frequency relays.

(7) ERCOT shall use the SCED and Non-Spin as soon as practicable to minimize the prolonged use of RRS energy.

(8) Once RRS is deployed, the QSE’s obligation to deliver RRS remains in effect until specifically instructed by ERCOT to stop providing RRS. However, except in an Emergency Condition, the QSE’s obligation to deliver RRS may not exceed the period for which the service was committed.

(9) Following the deployment or recall of a deployment by Dispatch Instruction of RRS, QSE shall adjust the telemetered RRS Ancillary Service Schedule of Resources providing the service and ERCOT shall adjust the HASL and LASL based on the QSE’s telemetered Ancillary Service Schedule for RRS as described in Section 6.5.7.2, Resource Limit Calculator, to account for such deployment.

(10) QSEs providing RRS and ERCOT shall meet the deployment performance requirements specified in Section 8, Performance Monitoring.

(11) ERCOT shall issue RRS deployment Dispatch Instructions over ICCP for Generation Resources and Controllable Load Resources and Extensible Markup Language (XML) for all other Load Resources. Those Dispatch Instructions must contain the MW output requested. For Generation Resources and Controllable Load Resources from which RRS capacity was deployed, ERCOT shall use SCED to dispatch RRS energy. The Base Points for those Resources includes RRS energy as well as any other energy dispatched by SCED.

(12) To the extent that ERCOT deploys a Load Resource that is not a Controllable Load Resource and that has chosen a block deployment option, ERCOT shall either deploy the entire responsibility or, if only partial deployment is possible, skip the Load Resource with the block deployment option and proceed to deploy the next available Resource.

(13) The amount of RRS that a QSE can self-arrange using a Load Resource that is not a Controllable Load Resource is limited to the percentage amount of total RRS that the Load Resource can provide as specified by ERCOT. However, a QSE may offer additional Load Resources into the ERCOT RRS Ancillary Service market.

6.5.7.6.2.3 Non-Spinning Reserve Service Deployment

(1) ERCOT shall deploy Non-Spin Service by operator Dispatch Instruction for the portion of On-Line Generation Resources that is only available through power augmentation and participating as Off-Line Non-Spin, Off-Line Generation Resources and Load Resources. ERCOT shall develop a procedure approved by TAC to deploy Resources providing Non-Spin Service. ERCOT Operators shall implement the deployment procedure when a specified threshold(s) in MW of capability available to SCED to increase generation is reached. ERCOT Operators may implement the deployment procedure to recover deployed RRS or when other Emergency Conditions exist. The deployment of Non-Spin must always be 100% of that scheduled on an individual Resource.

(2) Once Non-Spin capacity from Off-Line Generation Resources providing Non-Spin is deployed and the Generation Resources are On-Line, ERCOT shall use SCED to determine the amount of energy to be dispatched from those Resources.

(3) Off-Line Generation Resources providing Non-Spin (OFFNS Resource Status) are required to provide an Energy Offer Curve for use by SCED.

(4) Controllable Load Resources providing Non-Spin shall have an RTM Energy Bid for SCED and shall be capable of being Dispatched to its Non-Spin Ancillary Service Resource Responsibility within 30 minutes of a deployment instruction for capacity, using the Resource’s Normal Ramp Rate curve. An Aggregate Load Resource must comply with all requirements in the document titled “Requirements for Aggregate Load Resource Participation in the ERCOT Markets.”

(5) Subject to the exceptions described in paragraphs (a) and (b) below, On-Line Generation Resources that are assigned Non-Spin Ancillary Service Resource Responsibility during an Operating Hour shall always be deployed in that Operating Hour. This deployment shall be considered as a standing Protocol-directed Non-Spin deployment Dispatch Instruction. Within the 30-second window prior to the top-of-hour clock interval described in paragraph (2) of Section 6.3.2, Activities for Real-Time Operations, the QSE shall respond to the standing Non-Spin deployment Dispatch Instruction for those Generation Resources assigned Non-Spin Ancillary Service Resource Responsibility effective at the top-of-hour by adjusting the Non-Spin Ancillary Service Schedule telemetry. The QSE shall set the Non-Spin Ancillary Service Schedule telemetry equal to the portion of Non-Spin being provided from power augmentation if the portion being provided from power augmentation is participating as Off-Line Non-Spin, otherwise it shall be set to 0. As described in Section 6.5.7.2, Resource Limit Calculator, ERCOT shall adjust the HASL and LASL based on the QSE’s telemetered Non-Spin Ancillary Service Schedule to account for such deployment and to make the energy from the full amount of the Non-Spin Ancillary Service Resource Responsibility available to SCED. A Non-Spin deployment Dispatch Instruction from ERCOT is not required and these Generation Resources must be able to Dispatch their Non-Spin Ancillary Service Resource Responsibility in response to a SCED Base Point deployment instruction. The provisions of this paragraph (5) do not apply to:

(a) Quick Start Generation Resources (QSGRs) assigned Off-Line Non-Spin Ancillary Service Resource Responsibility and provided to SCED for deployment, which must follow the provisions of Section 3.8.3, Quick Start Generation Resources; or

(b) The portion of On-Line Generation Resources that is only available through power augmentation if participating as Off-Line Non-Spin.

(6) Off-Line Generation Resources providing Non-Spin, while Off-Line and before the receipt of any deployment instruction, shall be capable of being dispatched to their Non-Spin Resource Responsibility within 30 minutes of a deployment instruction. Following a deployment instruction, the QSE shall reduce the Non-Spin Ancillary Service Schedule by the amount of the deployment. An Off-Line Generation Resource providing Non-Spin must also be brought On-Line with an Energy Offer Curve at an output level greater than or equal to P1 multiplied by LSL where P1 is defined in the “ERCOT and QSE Operations Business Practices During the Operating Hour.” These actions must be done within a time frame that would allow SCED to fully dispatch the Resource’s Non-Spin Resource Responsibility within the 30 minute period using the Resource’s Normal Ramp Rate curve. The Resource Status indicating that a Generation Resource has come On-Line with an Energy Offer Curve is ON as described in paragraph (5)(b)(i) of Section 3.9.1, Current Operating Plan (COP) Criteria.

(7) For DSRs providing Non-Spin, on deployment of Non-Spin, the DSR’s QSE shall adjust its Resource Output Schedule to reflect the amount of deployment. For non-DSRs with Output Schedules providing Non-Spin, on deployment of Non-Spin, ERCOT shall adjust the Resource Output Schedule for the remainder of the Operating Period to reflect the amount of deployment. ERCOT shall notify the QSEs representing the non-DSR of the adjustment through the MIS Certified Area.

(8) For On-Line Generation Resources providing Non-Spin, Base Points include Non-Spin energy as well as any other energy dispatched as a result of SCED. These Resources’ Non-Spin Ancillary Service Resource Responsibility and Normal Ramp Rate curve should allow SCED to fully Dispatch the Resource’s Non-Spin Resource Responsibility within the 30-minute time frame according to the Resources’ Normal Ramp Rate curve. For the portion of the Non-Spin Ancillary Service Resource Responsibility provided from power augmentation participating as Off-Line, SCED should be able to be dispatch it within 30 minutes of the Non-Spin deployment instruction.

(9) Each QSE providing Non-Spin from a Resource shall inform ERCOT of the Non-Spin Resource availability using the Resource Status and Non-Spin Ancillary Service Resource Responsibility indications for the Operating Hour using telemetry and shall use the COP to inform ERCOT of Non-Spin Resource Status and Non-Spin Ancillary Service Resource Responsibility for hours in the Adjustment Period through the end of the Operating Day.

(10) ERCOT may deploy Non-Spin at any time in a Settlement Interval.

(11) ERCOT’s Non-Spin deployment Dispatch Instructions must include:

(a) The Resource name;

(b) A MW level of capacity deployment for Generation Resources with Energy Offer Curve, a MW level of energy for Generation Resources with Output Schedules, and a Dispatch Instruction for Load Resources equal to their awarded Non-Spin Ancillary Service Resource Responsibility; and

(c) The anticipated duration of deployment.

(12) ERCOT shall provide a signal via ICCP to the QSE of a deployed Generation or Load Resource indicating that its Non-Spin capacity has been deployed.

(13) ERCOT shall, as part of its TAC-approved Non-Spin deployment procedure, provide for the recall of Non-Spin energy including descriptions of changes to Output Schedules and release of energy obligations from On-Line Resources with Output Schedules and from On-Line Resources that were previously Off-Line Resources providing Non-Spin capacity.

(14) ERCOT shall provide a notification to all QSEs via the MIS Public Area when any Non-Spin capacity is deployed on the ERCOT System showing the time, MW quantity and the anticipated duration of the deployment.

6.5.7.7 Voltage Support Service

(1) ERCOT shall coordinate with TSPs the creation and maintenance of Voltage Profiles as described in Section 3.15, Voltage Support.

(2) ERCOT, or TSPs designated by ERCOT, shall instruct QSEs having Generation Resources required to provide Voltage Support Service (VSS), to make adjustments for voltage support within the Unit Reactive Limit (URL) provided by the QSE to ERCOT. A Generation Resource providing VSS may not be requested to reduce MW output so as to provide additional MVAr, nor may they be requested to operate on a voltage schedule outside the URL specified by the QSE without a Dispatch Instruction requesting Resource-specific Dispatch.

(3) ERCOT and TSPs shall develop operating procedures specifying Voltage Profiles of transmission-controlled reactive Resources to minimize the dependence on generation-supplied reactive Resources. For Generation Resources required to provide VSS, GSU transformer tap settings must be managed to maximize the use of the ERCOT System for all Market Participants while maintaining adequate reliability.

(4) Each TSP, under ERCOT’s direction, is responsible for monitoring and ensuring that all Generation Resources required to provide VSS dynamic reactive sources in a local area are deployed in approximate proportion to their respective installed Reactive Power capability requirements.

(5) Each Generation Resource required to provide VSS shall support the transmission voltage at the Point of Interconnection (POI) to the ERCOT Transmission Grid, or at the transmission bus in accordance with paragraph (7) of Section 3.15, Voltage Support, as directed by ERCOT within the operating Reactive Power capability of the Resource.

(6) Each QSE providing VSS shall meet the deployment performance requirements specified in Section 8, Performance Monitoring.

6.5.7.8 Dispatch Procedures

(1) ERCOT shall issue all Resource Dispatch Instructions to the QSE that represents the affected Resource. A QSE may provide a Resource Status of ONTEST for a Generation Resource not providing Ancillary Services to indicate that the Resource is currently undergoing unit testing and is blocked from SCED Dispatch. A QSE may provide a Resource Status of STARTUP for a Generation Resource not providing Ancillary Services to indicate that the Resource is currently undergoing a start-up sequence which requires manual control below or above its telemetered LSL to stabilize the Resource prior to its availability for SCED Dispatch. Generation Resources with a Resource Status of ONTEST will be provided a Base Point equal to the net real power telemetry at the time of the SCED execution. ERCOT may not issue Dispatch Instructions to the QSE for Generation Resources with a Resource Status of ONTEST except:

(a) For Dispatch Instructions that are a part of testing; or

(b) During conditions when the Resource is the only alternative for solving a transmission constraint; or

(c) During Force Majeure Events that threaten the reliability of the ERCOT System.

(2) Each QSE shall immediately forward any valid Dispatch Instruction to the appropriate Resource or group of Resources or identify a reason for non-compliance with the Dispatch Instruction to ERCOT in accordance with Section 6.5.7.9, Compliance with Dispatch Instructions.

(3) If ERCOT believes that a Resource has inadequately responded to a Dispatch Instruction, ERCOT shall notify the QSE representing the Resource as soon as practicable.

(4) The recipient of a Verbal Dispatch Instruction (VDI) shall confirm the Dispatch Instruction by providing the receiving operator’s identification and by repeating the VDI to ERCOT orally.

(5) The recipient of an electronic Dispatch Instruction shall acknowledge receipt of the Dispatch Instruction to ERCOT electronically, within one minute. The electronic acknowledgement must include the receiving operator’s identification.

(6) The recipient of any Dispatch Instruction shall immediately request clarification of the Dispatch Instruction if the recipient fails to understand its responsibility under the Dispatch Instruction.

(7) ERCOT shall record all voice conversations that occur in the communication of Dispatch Instructions.

(8) ERCOT shall record and file all electronic Dispatch Instructions and acknowledgements as soon as practicable after the issuance of the Dispatch Instruction.

(9) By mutual agreement of the TSP and ERCOT, Dispatch Instructions to the TSP may be provided to the TSP’s designated agent. In that case, issuance of the Dispatch Instruction to the designated agent is considered issuance to the TSP, and the TSP must comply with the Dispatch Instruction exactly as if it had been issued directly to the TSP, whether or not the designated agent accurately conveys the Dispatch Instruction to the TSP.

(10) ERCOT shall direct VDIs to the Master QSE of a Generation Resource that has been split to function as two or more Split Generation Resources as deemed necessary by ERCOT to effectuate actions for the total Generation Resource for instances in which electronic Dispatch Instructions are not feasible.

6.5.7.9 Compliance with Dispatch Instructions

(1) Except as otherwise specified in this Section, each TSP and each QSE shall comply fully and promptly with a Dispatch Instruction issued to it, unless in the sole and reasonable judgment of the TSP or QSE, such compliance would create an undue threat to safety, undue risk of bodily harm or undue damage to equipment, or the Dispatch Instruction is otherwise not in compliance with these Protocols.

(2) If the recipient of a Dispatch Instruction does not comply because in the sole and reasonable judgment of the TSP or QSE, such compliance would create an undue threat to safety, undue risk of bodily harm, or undue damage to equipment, then the TSP or QSE must immediately notify ERCOT and provide the reason for non-compliance.

(3) If the recipient of a Dispatch Instruction recognizes that the Dispatch Instruction conflicts with other valid instructions or is invalid, the recipient shall immediately notify ERCOT of the conflict and request resolution. ERCOT shall resolve the conflict by issuing another Dispatch Instruction.

(4) ERCOT’s final Dispatch Instruction to a QSE in effect applies for all Protocol-related processes. If the QSE does not comply after receiving the final Dispatch Instruction, the QSE remains liable for failure to meet its obligations under the Protocols and remains liable for any charges resulting from such failure.

(5) ERCOT’s final Dispatch Instruction to a TSP in effect applies for all Protocol-related processes. If the TSP does not comply after receiving the final Dispatch Instruction, the TSP remains liable for such failure under these Protocols under the TSP’s Agreement with ERCOT.

(6) In all cases in which compliance with a Dispatch Instruction is disputed, both ERCOT and the QSE or TSP shall document their communications, agreements, disagreements, and reasons for their actions, to enable resolution of the dispute through the Alternative Dispute Resolution (ADR) process in Section 20, Alternative Dispute Resolution Procedure.

(7) An Intermittent Renewable Resource (IRR) must comply with Dispatch Instructions when receiving a flag signifying that the IRR has received a Base Point below the HDL used by SCED.

6.5.7.10 WGR Ramp Rate Limitations

(1) Each WGR that is part of a Standard Generation Interconnection Agreement (SGIA) signed on or after January 1, 2009 shall limit its ramp rate to 20% per minute of its nameplate rating (MWs) as registered with ERCOT when responding to or released from an ERCOT deployment.

(2) The requirement of paragraph (1) above does not apply during a Force Majeure Event or during intervals in which a decremental deployment instruction coincides with a demonstrated decrease in the available WGR.

(3) Each WGR that is part of an SGIA signed on or before December 31, 2008 and that controls power output by means other than turbine stoppage shall limit its ramp rate to 20% per minute of its nameplate rating (MWs) as registered with ERCOT when responding to or released from an ERCOT deployment.

(4) The requirement of paragraph (3) above does not apply during a Force Majeure Event, during intervals in which a decremental deployment instruction coincides with a demonstrated decrease in the available WGR, or during unit start up and shut down mode.

(5) The ramp rate requirement of paragraph (3) above shall not apply to a WGR during a limited compliance transition period if the WGR:

(a) Meets the technical specifications of paragraph (3) above but does not comply with the ramp rate requirement; and

(b) Submitted a compliance plan to ERCOT on or before June 1, 2009 that details the technical limitations leading to non-compliance, a work plan to achieve compliance by a reasonable date, and a ramp rate mitigation plan describing the WGR’s best efforts to adhere to the WGR ramp rate limitation during the applicable compliance transition period.

(6) The ramp rate requirement of paragraph (3) above shall not apply to a WGR that:

(a) Does not meet the technical specifications of paragraph (3) above; and

(b) Submitted an operations plan to ERCOT on or before June 1, 2009 describing the WGR’s best efforts to adhere to the WGR ramp rate limitation.

(7) WGRs subject to the ramp rate limitations of paragraphs (1) and (3) above are exempt from the requirements of the applicable paragraph upon receipt of a valid Dispatch Instruction from ERCOT to exceed the applicable ramp rate limitation when necessary to protect ERCOT System reliability.

(8) WGRs that operate under an SPS are exempt from the ramp rate limitations of paragraphs (1) and (3) above when decreasing unit output to avoid SPS activation.

(9) WGRs that meet the requirements of paragraphs (1) and (3) above are compliant with the ramp rate limitation requirements when the number of eligible one-minute intervals with an average ramp rate of 25% or less of nameplate capacity is equal to or greater than 90% of the eligible one-minute intervals in any one of three consecutive months. Intervals where paragraphs (2), (4), (7) or (8) above apply shall be excluded as eligible intervals for this performance metric. ERCOT shall initiate a review process with the WGR where the WGR’s score is less than 90%.

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| [NPRR588: Replace Section 6.5.7.10 above with the following upon system implementation:]  6.5.7.10 IRR Ramp Rate Limitations  (1) Each IRR that is part of a Standard Generation Interconnection Agreement (SGIA) signed on or after January 1, 2009 shall limit its ramp rate to 20% per minute of its nameplate rating (MWs) as registered with ERCOT when responding to or released from an ERCOT deployment.  (2) The requirement of paragraph (1) above does not apply during a Force Majeure Event or during intervals in which a decremental deployment instruction coincides with a demonstrated decrease in the available IRR.  (3) Each IRR that is part of an SGIA signed on or before December 31, 2008 and that controls power output by means other than turbine stoppage shall limit its ramp rate to 20% per minute of its nameplate rating (MWs) as registered with ERCOT when responding to or released from an ERCOT deployment.  (4) The requirement of paragraph (3) above does not apply during a Force Majeure Event, during intervals in which a decremental deployment instruction coincides with a demonstrated decrease in the available IRR, or during unit start up and shut down mode.  (5) The ramp rate requirement of paragraph (3) above shall not apply to an IRR during a limited compliance transition period if the IRR:  (a) Meets the technical specifications of paragraph (3) above but does not comply with the ramp rate requirement; and  (b) Submitted a compliance plan to ERCOT on or before June 1, 2009 that details the technical limitations leading to non-compliance, a work plan to achieve compliance by a reasonable date, and a ramp rate mitigation plan describing the IRR’s best efforts to adhere to the IRR ramp rate limitation during the applicable compliance transition period.  (6) The ramp rate requirement of paragraph (3) above shall not apply to an IRR that:  (a) Does not meet the technical specifications of paragraph (3) above; and  (b) Submitted an operations plan to ERCOT on or before June 1, 2009 describing the IRR’s best efforts to adhere to the IRR ramp rate limitation.  (7) IRRs subject to the ramp rate limitations of paragraphs (1) and (3) above are exempt from the requirements of the applicable paragraph upon receipt of a valid Dispatch Instruction from ERCOT to exceed the applicable ramp rate limitation when necessary to protect ERCOT System reliability.  (8) IRRs that operate under an SPS are exempt from the ramp rate limitations of paragraphs (1) and (3) above when decreasing unit output to avoid SPS activation.  (9) IRRs that meet the requirements of paragraphs (1) and (3) above are compliant with the ramp rate limitation requirements when the number of eligible one-minute intervals with an average ramp rate of 25% or less of nameplate capacity is equal to or greater than 90% of the eligible one-minute intervals in any one of three consecutive months. Intervals where paragraphs (2), (4), (7) or (8) above apply shall be excluded as eligible intervals for this performance metric. ERCOT shall initiate a review process with the IRR where the IRR’s score is less than 90%. |

6.5.8 Verbal Dispatch Instructions

A VDI must contain the following information:

(a) Identification of the responsible Entity and instructing authority (to include ERCOT Operator’s and receiving operator’s names);

(b) Specific Resources or TSP facilities that are the subject of the Dispatch Instruction;

(c) Specific action required;

(d) Current operating level or state of the Resources or TSP facilities that are the subject of the Dispatch Instruction;

(e) Operating level or state to which such Resources or facilities will be dispatched;

(f) Time of notification of the Dispatch Instruction;

(g) Time at which the QSE or TSP is required to initiate the Dispatch Instruction;

(h) Time within which the QSE or TSP is required to complete the Dispatch Instruction;

(i) VDI reference number; and

(j) Other information relevant to that Dispatch Instruction.

6.5.9 Emergency Operations

(1) ERCOT, based on ERCOT System reliability needs, may issue a Dispatch Instruction requiring a Resource to move to a specific output level (“Emergency Base Point”).

(2) A QF may only be ordered Off-Line in the case of an ERCOT-declared Emergency Condition with imminent threat to the reliability of the ERCOT System. ERCOT may only Dispatch a QF below its LSL when ERCOT has declared an Emergency Condition and the QF is the only Resource that can provide the necessary relief.

(3) ERCOT shall honor all Resource operating parameters in Dispatch Instructions under normal conditions and Emergency Conditions. During Emergency Conditions, ERCOT may verbally request QSEs to operate its Resources outside normal operating parameters. If such request is received by a QSE, the QSE shall discuss the request with ERCOT in good faith and may choose to comply with the request.

(4) A QSE may not self-arrange for Ancillary Services procured in response to Emergency Conditions.

6.5.9.1 Emergency and Short Supply Operation

(1) ERCOT, as the single CAO, is responsible for maintaining reliability in normal and Emergency Conditions. The Operating Guides are intended to ensure that minimum standards for reliability are maintained. Minimum standards for reliability are defined by the Operating Guides and the NERC Reliability Standards and include, but are not limited to:

(a) Minimum operating reserve levels;

(b) Criteria for determining acceptable operation of the frequency control system;

(c) Criteria for determining and maintaining system voltages within acceptable limits;

(d) Criteria for maximum acceptable transmission equipment loading levels; and

(e) Criteria for determining when ERCOT is subject to unacceptable risk of widespread cascading Outages.

(2) ERCOT shall, to the fullest extent practicable, utilize the Day-Ahead process, the Adjustment Period process, and the Real-Time process before ordering Resources to specific output levels with Emergency Base Point instructions. It is anticipated that, with effective and timely communication, the market-based tools available to ERCOT will avert most threats to the reliability of the ERCOT System. However, these Protocols do not preclude ERCOT from taking any action to preserve the integrity of the ERCOT System.

6.5.9.2 Failure of the SCED Process

(1) When the SCED process is not able to reach a solution, ERCOT shall issue a Watch.

(2) For intervals that the SCED process fails to reach a solution, then the LMPs, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders for the interval for which no solution was reached are equal to the LMPs, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders in the most recently solved interval. For Settlement Intervals that the Real-Time Settlement Point Prices are identified as erroneous and ERCOT sets the SCED intervals as failed in accordance with Section 6.3, Adjustment Period and Real-Time Operations Timeline, then the LMPs, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders for the failed SCED intervals are equal to the LMPs, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders in the most recently solved SCED interval that is not set as failed. ERCOT shall notify the market of the failure by posting on the MIS Public Area.

(3) Once ERCOT issues a Watch for a SCED process failure, ERCOT may use any of the following measures:

(a) ERCOT may direct the SCED process to relax the active transmission constraints and/or the HASLs and LASLs for specific Resources and resume calculation of LMPs, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders by reducing the Ancillary Service Schedules for the affected Resource, if sufficient supply exists to manage total system needs. LMPs, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders calculated for the affected interval must be used for Settlement;

(b) ERCOT may issue Emergency Base Points for Resources;

(c) ERCOT may manually issue Emergency Base Points for a Resource and must communicate the Resource name, MW output requested, and start time and duration of the Dispatch Instruction to the QSE representing the Resource;

(d) ERCOT may issue an instruction to hold the previous interval; and

(e) A QF, a hydro Generation Resource, or a nuclear-powered Resource may be instructed by ERCOT to operate below its LSL only after all other Resource options have been exhausted.

(4) The Watch continues until the SCED process can reach a solution without using the measures in paragraph (3) above.

6.5.9.3 Communication under Emergency Conditions

(1) Effective, accurate, and timely communication between ERCOT, TSPs, and QSEs is essential. Each QSE must be provided adequate information to make informed decisions and must receive the information with sufficient advance notice to facilitate Resource and Load responses.

(2) The type of communication ERCOT issues is determined primarily on the basis of the time available for the market to respond before an Emergency Condition occurs. The timing of these communications could range from days in advance to immediate. If there is insufficient time to allow the market to react, ERCOT may bypass one or more of the communication steps.

(3) ERCOT shall consider the severity of the potential Emergency Condition as it determines which of the communications set forth in Section 6.5.9.1, Emergency and Short Supply Operation, to use. The severity of the Emergency Condition could be limited to an isolated local area, or the condition might cover large areas affecting several entities, or the condition might be an ERCOT-wide condition potentially affecting the entire ERCOT System.

(4) The following Sections describe the types of communications that will be issued by ERCOT to inform all QSEs and TSPs of the operating situation. These communications may relate to transmission, distribution, or Generation or Load Resources. The communications must specify the severity of the situation, the area affected, the areas potentially affected, and the anticipated duration of the Emergency Condition.

6.5.9.3.1 Operating Condition Notice

(1) ERCOT will issue an Operating Condition Notice (OCN) to inform all QSEs of a possible future need for more Resources due to conditions that could affect ERCOT System reliability. OCNs are for informational purposes only, and ERCOT exercises no additional operational authority with the issuance of this type of notice, but may solicit additional information from QSEs in order to determine whether the issuance of an Advisory, Watch, or Emergency Notice is warranted. The OCN is the first of four levels of communication issued by ERCOT in anticipation of a possible Emergency Condition.

(2) When time permits, ERCOT will issue an OCN before issuing an Advisory, Watch, or Emergency Notice. However, issuance of an OCN may not require action on the part of any Market Participant, but rather serves as a reminder to QSEs and TSPs that some attention to the changing conditions may be warranted. OCNs serve to communicate to QSEs the need to take extra precautions to be prepared to serve the Load during times when contingencies are most likely to arise.

(3) Reasons for OCNs include, but are not limited to, unplanned transmission Outages, and weather-related concerns such as anticipated freezing temperatures, hurricanes, wet weather, and ice storms.

(4) ERCOT will monitor actual and forecasted weather for the ERCOT Region and adjacent NERC regions. When adverse weather conditions are expected, ERCOT may confer with TSPs and QSEs regarding the potential for adverse reliability impacts and contingency preparedness. Based on its assessment of the potential for adverse conditions, ERCOT may require information from QSEs representing Resources regarding the Resources’ fuel capabilities. Requests for this type of information shall be for a time period of no more than seven days from the date of the request. The specific information that may be requested shall be defined in the Operating Guides. QSEs representing Resources shall provide the requested information in a timely manner, as defined by ERCOT at the time of the request.

(5) QSEs and TSPs are expected to establish and maintain internal procedures for monitoring actual and forecasted weather and for implementing appropriate measures when the potential for adverse weather or other conditions (which could threaten ERCOT System reliability) arise.

6.5.9.3.2 Advisory

(1) An Advisory is the second of four levels of communication issued by ERCOT in anticipation of a possible Emergency Condition.

(2) ERCOT shall issue an Advisory for reasons such as, but not limited to, the following:

(a) When it recognizes that conditions are developing or have changed and more Ancillary Services will be needed to maintain current or near-term operating reliability;

(b) When weather or ERCOT System conditions require more lead-time than the normal DAM allows;

(c) When communications or other controls are significantly limited; or

(d) When ERCOT Transmission Grid conditions are such that operations within security criteria as defined in the Operating Guides are not likely or possible because of Forced Outages or other conditions unless a Constraint Management Plan (CMP) exists.

(3) The Advisory must communicate existing constraints. ERCOT shall notify TSPs and QSEs of the Advisory, and QSEs shall notify appropriate Resources and Load Serving Entities (LSEs). ERCOT shall communicate with TSPs as needed to confirm their understanding of the condition and to determine the availability of Transmission Facilities. For the purposes of verifying submitted information, ERCOT may communicate with QSEs.

(4) Although an Advisory is for information purposes, ERCOT may exercise its authority, in such circumstances, to increase Ancillary Service requirements above the quantities originally specified in the Day-Ahead in accordance with procedures. ERCOT may require information from QSEs representing Resources regarding the Resources’ fuel capabilities. Requests for this type of information shall be for a time period of no more than seven days from the date of the request. The specific information that may be requested shall be defined in the Operating Guide. QSEs representing Resources shall provide the requested information in a timely manner, as defined by ERCOT at the time of the request.

(5) When an Advisory is issued for PRC below 3,000 MW and ERCOT expects system conditions to deteriorate to the extent that an EEA Level 2 or 3 may be experienced, ERCOT shall evaluate constraints active in SCED and determine which constraints have the potential to limit generation output.

(a) Upon identification of such constraints, ERCOT shall coordinate with the TSPs that own or operate the overloaded Transmission Facilities associated with those constraints, as well as the Resource Entities whose generation output may be limited, to determine whether:

(i) A 15-Minute Rating is available to allow for additional transmission capacity for use in congestion management, if an EEA Level 2 or 3 is declared, and post-contingency actions can be taken within 15 minutes to return the flow to within the Emergency Rating. Such actions may include, but are not limited to, reducing the generation that increased output as a result of enforcing the 15-Minute Rating rather than the Emergency Rating;

(ii) Post-contingency loading of the Transmission Facilities is expected to be at or below Normal Rating within two hours; or

(iii) Additional transmission capacity could allow for additional output from a limited Generation Resource by taking one of the following actions:

(A) Restoring Transmission Elements that are out of service;

(B) Reconfiguring the transmission system; or

(C) Making adjustments to phase angle regulator tap positions.

If ERCOT determines that one of the above-mentioned actions allows for additional output from a limited Generation Resource, ERCOT may instruct the TSPs to take the action(s) during the Advisory to allow for additional output from the limited Generation Resource.

(b) ERCOT shall also coordinate with TSPs who own and operate the Transmission Facilities associated with the double-circuit contingencies for the constraints identified above to determine whether the double-circuit failures are at a high risk of occurring due to system conditions, which may include: severe weather conditions forecasted by ERCOT in the vicinity of the double circuit, weather conditions that indicate a high risk of insulator flashover on the double circuit, repeated Forced Outages of the individual circuits that are part of the double circuit in the preceding 48 hours, or fire in progress in the right of way of the double circuit.

(c) The actions detailed in this Section shall be supplemental to the development and maintenance of Constraint Management Plans (CMPs) as otherwise directed by the Protocols or Operating Guides.

6.5.9.3.3 Watch

(1) A Watch is the third of four levels of communication issued by ERCOT in anticipation of a possible Emergency Condition.

(2) ERCOT shall issue a Watch when ERCOT determines that:

(a) Conditions have developed such that additional Ancillary Services are needed in the current Operating Period;

(b) There are insufficient Ancillary Services or Energy Offers in the DAM;

(c) Market-based congestion management techniques embedded in SCED as specified in these Protocols will not be adequate to resolve transmission security violations;

(d) Forced Outages or other abnormal operating conditions have occurred, or may occur that require operations with active violations of security criteria as defined in the Operating Guides unless a CMP exists;

(e) ERCOT varies from timing requirements or omits one or more Day-Ahead or Adjustment Period and Real-Time procedures;

(f) ERCOT varies from timing requirements or omits one or more scheduling procedures in the Real-Time process; or

(g) The SCED process fails to reach a solution, whether or not ERCOT is using one of the measures specified in paragraph (3) of Section 6.5.9.2, Failure of the SCED Process.

(3) With the issuance of a Watch pursuant to paragraph (2)(a) above, ERCOT may exercise its authority to immediately procure the following services from existing offers:

(a) Regulation Services;

(b) RRS services; and

(c) Non-Spin services.

(4) If the actions in paragraph (3) above do not relieve the insufficiency described in paragraph (2)(a) above, then ERCOT may issue Dispatch Instructions to Resources certified to provide the insufficient service, even though there is not an existing Ancillary Service Offer for that Resource.

(5) If ERCOT issues a Watch because insufficient Ancillary Service Offers were received in the DAM, and if the Watch does not result in sufficient offer and the DAM is executed with insufficient offers, then ERCOT may acquire the insufficient amount of Ancillary Services in the Day-Ahead Reliability Unit Commitment (DRUC) and shall issue Dispatch Instructions to the QSEs for Resources that were RUC-committed to provide Ancillary Services, informing them of the requirement that the Resources be prepared to provide those Ancillary Services.

(6) ERCOT shall post the Watch message electronically to the MIS Public Area and shall provide verbal notice to all TSPs and QSEs via the Hotline. Corrective actions identified by ERCOT must be communicated through Dispatch Instructions to all TSPs, DSPs and QSEs required to implement the corrective action. Each QSE shall immediately notify the Market Participants that it represents of the Watch. To minimize the effects on the ERCOT System, each TSP or DSP shall identify and prepare to implement actions, including restoration of transmission lines as appropriate and preparing for Load shedding. ERCOT may instruct TSPs or DSPs to reconfigure ERCOT System elements as necessary to improve the reliability of the ERCOT System. On notice of a Watch, each QSE, TSP, and DSP shall prepare for an Emergency Condition in case conditions worsen. ERCOT may require information from QSEs representing Resources regarding the Resources’ fuel capabilities. Requests for this type of information shall be for a time period of no more than seven days from the date of the request. The specific information that may be requested shall be defined in the Operating Guides. QSEs representing Resources shall provide the requested information in a timely manner, as defined by ERCOT at the time of the request.

6.5.9.3.4 Emergency Notice

(1) Emergency Notice is the fourth of four levels of communication issued by ERCOT when operating in an Emergency Condition.

(2) ERCOT shall issue an Emergency Notice for one or both of the following reasons:

(a) ERCOT cannot maintain minimum reliability standards (for reasons including fuel shortages) during the Operating Period using every Resource practicably obtainable from the market; or

(b) Immediate action cannot be taken to avoid or relieve a Transmission Element operating above its Emergency Rating.

(3) The actions ERCOT takes during an Emergency Condition depend on the nature and severity of the situation.

(4) ERCOT is considered to be in an Emergency Condition whenever ERCOT Transmission Grid status is such that a violation of security criteria, as defined in the Operating Guides, presents the threat of uncontrolled separation or cascading Outages and/or large-scale service disruption to Load (other than Load being served from a radial transmission line) and/or overload of a Transmission Element, and no timely solution is obtainable through SCED or CMPs.

(5) If the Emergency Condition is the result of a transmission problem, ERCOT shall act immediately to return the ERCOT System to a reliable condition, including instructing Resources to change output, curtailing DC Tie Load and instructing TSPs or DSPs to drop Load.

(6) If the Emergency Condition is the result of an Ancillary Service insufficiency, then ERCOT shall follow the EEA procedures.

6.5.9.4 Energy Emergency Alert

(1) At times it may be necessary to reduce ERCOT System Demand because of a temporary decrease in available electricity supply. To provide orderly, predetermined procedures for curtailing Demand during such emergencies, ERCOT shall initiate and coordinate the implementation of the EEA following the steps set forth below in Section 6.5.9.4.2, EEA Levels.

(2) The goal of the EEA is to provide for maximum possible continuity of service while maintaining the integrity of the ERCOT System to reduce the chance of cascading Outages.

(3) ERCOT’s operating procedures must meet the following goals:

(a) Use of market processes to the fullest extent practicable without jeopardizing the reliability of the ERCOT System;

(b) Use of RRS, other Ancillary Services, and Emergency Response Service (ERS) to the extent permitted by ERCOT System conditions;

(c) Maximum use of ERCOT System capability;

(d) Maintenance of station service for nuclear-powered Generation Resources;

(e) Securing startup power for Generation Resources;

(f) Operation of Generation Resources during loss of communication with ERCOT;

(g) Restoration of service to Loads in the manner defined in the Operating Guides; and

(h) Management of Interconnection Reliability Operating Limits (IROLs) shall not change.

(4) ERCOT is responsible for coordinating with QSEs, TSPs, and DSPs to monitor ERCOT System conditions, initiating the EEA levels, notifying all QSEs, and coordinating the implementation of the EEA levels while maintaining transmission security limits.

(5) ERCOT, at management’s discretion, may at any time issue an ERCOT-wide appeal through the public news media for voluntary energy conservation.

(6) During the EEA, ERCOT has the authority to obtain energy from non-ERCOT Control Areas using the DC Ties or by using Block Load Transfers (BLTs) to move load to non-ERCOT Control Areas. ERCOT maintains the authority to curtail energy schedules flowing into or out of the ERCOT System across the DC Ties in accordance with NERC scheduling guidelines.

(7) Some of the EEA steps are not applicable if transmission security violations exist. There may be insufficient time to implement all EEA levels in sequence, however, to the extent practicable, ERCOT shall use Ancillary Services that QSEs have made available in the market to maintain or restore reliability.

(8) ERCOT may immediately implement EEA Level 3 any time the steady-state system frequency is below 59.8 Hz and shall immediately implement EEA Level 3 any time the steady-state frequency is below 59.5 Hz.

(9) Percentages for EEA Level 3 Load shedding will be based on the previous year’s TSP peak Loads, as reported to ERCOT, and must be reviewed by ERCOT and modified annually as required.

(10) During EEA Level 2 or 3, for those constraints that meet the criteria identified in paragraph (5)(a) of Section 6.5.9.3.2, Advisory, ERCOT may control the post-contingency flow to within the 15-Minute Rating in SCED. After PRC is restored to at least 3,000 MW or the emergency condition has ended, whichever is later, and ERCOT has determined that system conditions have improved such that the chance of re-entering into an EEA Level 2 or 3 is low, ERCOT shall restore control to the post-contingency flow to within the Emergency Rating for these constraints that utilized the 15-Minute Rating in SCED.

(11) During EEA Level 2 or 3, for those constraints that meet the criteria identified in paragraph (5)(b) of Section 6.5.9.3.2, ERCOT shall continue to enforce constraints associated with double-circuit contingencies throughout an EEA if the double-circuit failures are determined to be at high risk of occurring, due to system conditions. For all other double-circuit contingencies identified in paragraph (5)(b) of Section 6.5.9.3.2, ERCOT will enforce only the associated single-circuit contingencies during EEA Level 2 or 3. ERCOT shall resume enforcing such constraints as a double-circuit contingency after PRC is restored to at least 3,000 MW or the Emergency Condition has ended, whichever is later, and ERCOT has determined that system conditions have improved such that the chance of re-entering into an EEA Level 2 or 3 is low. For constraints related to stability limits that are not IROLs, ERCOT may elect not to enforce double-circuit contingencies during EEA Level 3 only.

6.5.9.4.1 General Procedures Prior to EEA Operations

Prior to declaring EEA Level 1 detailed in Section 6.5.9.4.2, EEA Levels, ERCOT may perform the following operations consistent with Good Utility Practice:

(a) Provide Dispatch Instructions to QSEs for specific Resources to operate at an Emergency Base Point to maximize Resource deployment so as to increase Responsive Reserve levels on other Resources;

(b) Commit specific available Resources as necessary that can respond in the timeframe of the emergency. Such commitments will be settled using the HRUC process;

(c) Start RMR Units available in the time frame of the emergency. RMR Units should be loaded to full capability;

(d) Utilize available Resources providing Non-Spin services as required; and

(e) ERCOT shall use the PRC to determine the appropriate Emergency Notice and EEA levels.

6.5.9.4.2 EEA Levels

(1) EEA Level 1 - Maintain a total of 2,300 MW of PRC (Section 6.5.7.5, Ancillary Services Capacity Monitor).

(a) ERCOT shall:

(i) Notify the Southwest Power Pool Reliability Coordinator;

(ii) Request available Generation Resources that can perform within the expected timeframe of the emergency to come On-Line by initiating manual HRUC or through Dispatch Instruction;

(iii) Use available DC Tie import capacity not already being used;

(iv) Issue a Dispatch Instruction for Resources to remain On-Line which, before start of emergency, were scheduled to come Off-Line; and

(v) At ERCOT’s discretion, deploy available contracted ERS-30 via an XML message followed by a VDI to the all-QSE Hotline. The ERS-30 ramp period shall begin at the completion of the VDI.

(A) If less than 500 MW of ERS-30 is available for deployment, ERCOT shall deploy it as a single block.

(B) If the amount of ERS-30 available for deployment equals or exceeds 500 MW, ERCOT, at its discretion, may deploy ERS-30 as a single block or by group designation. ERCOT shall develop a random selection methodology for determining how to place ERS Resources in ERS-30 into groups, and shall describe the methodology in a document posted to the MIS Public Area. Prior to the start of an ERS Contract Period for ERS-30, ERCOT shall notify QSEs representing ERS Resources in ERS-30 of their ERS Resources’ group assignments.

(C) ERS-30 may be deployed at any time in a Settlement Interval.

(D) Upon deployment, QSEs shall instruct their ERS Resources in ERS-30 to perform at contracted levels consistent with the criteria described in Section 8.1.3.1.4, Event Performance Criteria for Emergency Response Service Resources, until either ERCOT releases the ERS-30 deployment or the ERS-30 Resources have reached their maximum deployment time.

(E) ERCOT shall notify QSEs of the release of ERS-30 via an XML message followed by VDI to the all-QSE Hotline. The VDI shall represent the official notice of ERS-30 release. ERCOT may release ERS-30 as a block or by group designation.

(F) Upon release, an ERS Resource in ERS-30 shall return to a condition such that it is capable of meeting its ERS performance requirements as soon as practical, but no later than ten hours following the release.

(b) QSEs shall:

(i) Ensure COPs and telemetered HSLs are updated and reflect all Resource delays and limitations; and

(ii) Suspend any ongoing ERCOT required Resource performing testing.

(2) EEA Level 2 - Maintain system frequency at 60 Hz or maintain a total of 1,750 MW of PRC.

(a) In addition to the measures associated with EEA Level 1, ERCOT shall take the following steps:

(i) Instruct TSPs and DSPs or their agents to reduce Customers’ Load by using distribution voltage reduction measures, if deemed beneficial by the TSP, DSP, or their agents.

(ii) Instruct QSEs to deploy available contracted ERS-10 Resources, undeployed ERS-30 and/or deploy RRS supplied from Load Resources (controlled by high-set under-frequency relays). ERCOT may deploy ERS-10, ERS-30, or RRS simultaneously or separately, and in any order. ERCOT shall issue such Dispatch Instructions in accordance with the deployment methodologies described in paragraphs (iii) and (iv) below and, if deploying ERS-30, the methodologies described in paragraph (1)(a)(v) above.

(iii) ERCOT shall deploy ERS-10 via an XML message followed by a VDI to the all-QSE Hotline. The ERS-10 ramp period shall begin at the completion of the VDI.

(A) If less than 500 MW of ERS-10 is available for deployment, ERCOT shall deploy all ERS-10 Resources as a single block.

(B) If the amount of ERS-10 available for deployment equals or exceeds 500 MW, ERCOT, at its discretion, may deploy ERS-10 Resources as a single block or by group designation. ERCOT shall develop a random selection methodology for determining how to place ERS-10 Resources into groups, and shall describe the methodology in a document posted to the MIS Public Area. Prior to the start of an ERS-10 Contract Period, ERCOT shall notify QSEs representing ERS-10 Resources of their ERS-10 Resources’ group assignments.

(C) ERS-10 may be deployed at any time in a Settlement Interval.

(D) Upon deployment, QSEs shall instruct ERS-10 Resources to perform at contracted levels consistent with the criteria described in Section 8.1.3.1.4 until ERCOT releases the ERS-10 deployment or the ERS-10 Resources have reached their maximum deployment times.

(E) ERCOT shall notify QSEs of the release of ERS-10 via an XML message followed by VDI to the all-QSE Hotline. The VDI shall represent the official notice of ERS-10 release. ERCOT may release ERS-10 as a block or by group designation.

(F) Upon release, an ERS-10 Resource shall return to a condition such that it is capable of meeting its ERS performance requirements as soon as practical, but no later than ten hours following the release.

(iv) ERCOT shall deploy RRS capacity supplied by Load Resources (controlled by high-set under-frequency relays) in accordance with the following:

(A) Instruct QSEs to deploy half of the RRS that is supplied from Load Resources (controlled by high-set under-frequency relays) by instructing the QSE representing the specific Load Resource to interrupt Group 1 Load Resources providing Responsive Reserve. QSEs shall deploy Load Resources according to the group designation and will be given some discretion to deploy additional Load Resources from Group 2 if Load Resource operational considerations require such. ERCOT shall issue notification of the deployment via XML message. ERCOT shall follow this XML notification with a Hotline VDI, which shall initiate the ten-minute deployment period;

(B) At the discretion of the ERCOT Operator, instruct QSEs to deploy the remaining Responsive Reserve that is supplied from Load Resources (controlled by high-set under-frequency relays) by instructing the QSE representing the specific Load Resource to interrupt Group 2 Load Resources providing Responsive Reserve. ERCOT shall issue notification of the deployment via XML message. ERCOT shall follow this XML notification with a Hotline VDI, which shall initiate the ten-minute deployment period;

(C) The ERCOT Operator may deploy both of the groups of Load Resources providing Responsive Reserves at the same time. ERCOT shall issue notification of the deployment via XML message. ERCOT shall follow this XML notification with a Hotline VDI, which shall initiate the ten-minute deployment period; and

(D) ERCOT shall post a list of Load Resources on the MIS Certified Area immediately following the DRUC for each QSE with a Load Resource obligation which may be deployed to interrupt under paragraph (A), Group 1 and paragraph (B), Group 2. ERCOT shall develop a process for determining which individual Load Resource to place in Group 1 and which to place in Group 2. ERCOT procedures shall select Group 1 and Group 2 based on a random sampling of individual Load Resources. At ERCOT’s discretion, ERCOT may deploy all Load Resources at any given time during EEA Level 2.

(v) Unless a media appeal is already in effect, ERCOT shall issue an appeal through the public news media for voluntary energy conservation.

(vi) With the approval of the affected non-ERCOT Control Area, TSPs, DSPs, or their agents may implement BLTs, which transfer Load from the ERCOT Control Area to non-ERCOT Control Areas in accordance with BLTs as defined in the Operating Guides.

(b) Confidentiality requirements regarding transmission operations and system capacity information will be lifted, as needed to restore reliability.

(3) EEA Level 3 - Maintain system frequency at 59.8 Hz or greater.

(a) In addition to measures associated with EEA Levels 1 and 2, ERCOT will direct all TSPs and DSPs or their agents to shed firm Load, in 100 MW blocks, as documented in the Operating Guides in order to maintain a steady state system frequency of 59.8 Hz.

(b) In addition to measures associated with EEA Levels 1 and 2, TSPs and DSPs or their agents will keep in mind the need to protect the safety and health of the community and the essential human needs of the citizens. Whenever possible, TSPs and DSPs or their agents shall not manually drop Load connected to under-frequency relays during the implementation of the EEA.

6.5.9.4.3 Restoration of Market Operations

ERCOT shall continue the EEA until sufficient offers are received and deployed by ERCOT to eliminate the conditions requiring the EEA and normal SCED operations are restored. After restoring RRS, ERCOT shall release ERS Resources and then restore curtailed DC Tie Load. Intermittent solutions of SCED do not set new LMPs until ERCOT declares that the EEA is no longer needed.

6.5.9.5 Block Load Transfers between ERCOT and Non-ERCOT Control Areas

BLTs are procedures that transfer Loads normally located in the ERCOT Control Area to a non-ERCOT Control Area. Similarly, when a non-ERCOT Control Area experiences certain transmission contingencies or short-supply conditions, ERCOT may agree to the implementation of BLT procedures that transfer Loads normally located in a non-ERCOT Control Area to the ERCOT Control Area. BLTs are restricted to the following conditions:

(a) BLTs shall occur only with approval from ERCOT for Planned or Forced Outages, unless a governmental order is issued requiring the BLT.

(i) BLTs shall be registered with ERCOT. Such registration shall be subject to ERCOT approval.

(ii) For all BLTs, the TSP in the ERCOT Control Area responsible for implementing the BLT shall coordinate with ERCOT in the implementation and execution of BLTs to ensure the reliability of the ERCOT System is not jeopardized and to ensure sufficient generation capacity is available prior to serving additional Load.

(b) BLTs that are comprised of looped systems may be tied to the non-ERCOT Control Area’s electrical system(s) through multiple interconnection points at the same time. Transfers of looped configurations are permitted only if all interconnection points are registered and netted under a single Electric Service Identifier (ESI ID) and represented by a singled TSP or DSP or netted behind the Non-Opt-In Entity (NOIE) metering points.

(c) BLTs of Load to the ERCOT Control Area are:

(i) Treated as non-competitive wholesale Load in the Load Zone containing the ERCOT breaker or switch that initiated the BLT;

(ii) Registered in accordance with Section 6.5.9.5.1, Registration and Posting of BLT Points, by the TSP in the ERCOT Control Area responsible for implementing the BLT;

(iii) Responsible for Unaccounted For Energy (UFE) allocations and Transmission Losses consistent with similarly situated NOIE metering points; and

(iv) Permitted only if the BLT will not jeopardize the reliability of the ERCOT System. Under an Emergency Notice, BLTs that have been implemented may be curtailed or terminated by ERCOT to maintain the reliability of the ERCOT System.

(d) BLTs of Load from the ERCOT Control Area are:

(i) Treated as Resources in the ERCOT Settlement system and may only be instructed with the permission of the affected non-ERCOT Control Area. Under an Emergency Condition, BLTs that have been implemented may be curtailed or terminated by the non-ERCOT Control Area to maintain the reliability of the non-ERCOT system;

(ii) Registered in accordance with Section 6.5.9.5.1 by the TSP in the ERCOT Control Area responsible for implementing the BLT; and

(iii) Permitted only if the BLT will not jeopardize the reliability of the ERCOT System.

(e) BLTs specifically exclude transfers of Load between ERCOT and non-ERCOT Control Areas that occur behind a retail Settlement Meter.

(f) BLTs may be used in the restoration of service to Customers if the transfers will not jeopardize the reliability of the ERCOT System.

(g) BLT metering points connected to the ERCOT Transmission Grid and registered according to Section 6.5.9.5.1 and used five or more times per year, as monitored by the TSP, must conform to ERCOT-Polled Settlement (EPS) Metering requirements as defined in Section 10, Metering, and the Settlement Metering Operating Guide. All other BLT metering points must be revenue quality, four channel bi-directional kWh/kVArh, 15-minute Interval Data Recorder (IDR) metering with remote interrogation. ERCOT may impose additional metering requirements it considers necessary to ensure ERCOT System reliability and integrity.

(h) SCADA telemetry on switching devices at BLT points that are deemed necessary by ERCOT to be modeled in the Network Operations Model must be provided by the TSP registering the BLT.

6.5.9.5.1 Registration and Posting of BLT Points

(1) The necessary Market Participant registration, agreements, metering, and ERCOT Settlement systems, as applicable, must be in place before implementation of any BLT. At its sole discretion, ERCOT may exclude a BLT of ten MW or less from the Network Operations Model and associated telemetry requirements.

(2) ERCOT may require any size of BLT that has been deployed in accordance with Section 6.5.9.5.2, Scheduling and Operation of BLTs, to be in the Network Operations Model with required telemetry if ERCOT determines it is warranted due to the length of time deployed.

(3) BLTs that transfer Load from the ERCOT Control Area to a non-ERCOT Control Area are treated as a Resource by ERCOT and assigned a Resource ID unless otherwise specified by a NOIE during registration. The ERCOT Control Area TSP or DSP associated with the BLT Point has the responsibility for registering the BLT and the creation and maintenance of BLT Resource IDs for Settlement purposes. For BLTs occurring on NOIE TSP or DSP systems, the NOIE may designate NOIE metering point(s), a Resource Entity, and a QSE for Settlement purposes. For BLTs occurring on TSP or DSP systems open to Customer Choice, the non-ERCOT Control Area Entity receiving the transferred Load shall designate a registered Resource Entity and acknowledge a QSE for Settlement purposes in accordance with Section 16.5, Registration of a Resource Entity. The ERCOT Control Area TSP or DSP must complete the applicable BLT registration form. This BLT registration form along with the metering design and data documentation is the basis for establishing the ERCOT data model of the BLT and associated metering points for Settlement as applicable.

(4) BLTs that transfer Load from a non-ERCOT Control Area to the ERCOT Control Area are treated as a non-competitive wholesale Load by ERCOT and assigned an ESI ID unless otherwise specified by a NOIE during registration. The ERCOT Control Area TSP or DSP associated with the BLT Point has the responsibility for registering the BLT and the creation and maintenance of BLT ESI IDs. Customers connected to the ERCOT System do not require an ESI ID separated from the assigned BLT ESI ID. The TSP or DSP that registers the BLT Point shall provide the ESI ID associated with the BLT to ERCOT. For BLTs occurring on NOIE TSP or DSP systems, the NOIE may designate NOIE metering point(s), an LSE, and a QSE for Settlement purposes. Load associated with NOIE BLTs that do not have an LSE or QSE for Settlement purposes will be reflected in the NOIE’s 4-Coincident Peak (4-CP) calculation. For BLTs occurring on TSP or DSP systems open to Customer Choice, the non-ERCOT Control Area Entity shall designate a registered ERCOT LSE and acknowledge a QSE for Settlement purposes in accordance with Section 16.3, Registration of Load Serving Entities.

(5) A “BLT Point” is the metering point for a BLT Resource ID or for a BLT ESI ID.

(6) ERCOT shall post the registration details of all registered BLTs to the MIS Secure Area.

6.5.9.5.2 Scheduling and Operation of BLTs

(1) For BLTs that transfer Load to a non-ERCOT Control Area, a verbal instructed Base Point shall be issued to the QSE for Settlement purposes for any energy associated with BLTs modeled in the Network Operations Model and registered as a Resource in accordance with Section 6.5.9.5.1, Registration and Posting of BLT Points. ERCOT shall confirm the BLT’s availability with the non-ERCOT Control Area before any BLT implementation. For BLTs that are deployed in an emergency and are not modeled in the Network Operations Model, the responsible TSP shall notify ERCOT as soon as practicable after deployment.

(2) Any energy associated with the non-ERCOT Control Area Load BLT Point is treated as a Load obligation of the QSE representing the LSE with the BLT ESI ID as registered for Settlement purposes in accordance with Section 6.5.9.5.1.

(3) ERCOT shall continue to include the BLT Point Load in the Settlement of the LSE Load obligations.

6.5.9.6 Black Start

(1) Black Start Service (BSS) is obtained by ERCOT through Black Start Agreements with QSEs for Generation Resources capable of self-starting or Generation Resources within close proximity of a non-ERCOT Control Area that are capable of starting from that non-ERCOT Control Area under a firm standby power supply contract, without support from the ERCOT System, or transmission equipment in the ERCOT System. Generation Resources that can be started with a minimum of pre-coordinated switching operations using ERCOT transmission equipment within the ERCOT System may be considered for BSS only where switching may be accomplished within one hour or less.

(2) ERCOT may Dispatch BSS pursuant to an emergency restoration plan to begin restoration of the ERCOT System to a secure operating state after a Blackout. General restoration actions for all Market Participants are described in the Operating Guides.

6.6 Settlement Calculations for the Real-Time Energy Operations

***6.6.1 Real-Time Settlement Point Prices***

(1) Real-Time energy Settlements use Real-Time Settlement Point Prices that are calculated for Resource Nodes, Load Zones, and Hubs. For each Security-Constrained Economic Dispatch (SCED) Locational Marginal Price (LMP) calculated at each Settlement Point in the SCED process, an administrative price floor of -$251/MWh will be applied to Real-Time Settlement Point Prices after adding the sum of the Real-Time On-Line Reliability Deployment Price Adders and the Real-Time On-Line Reserve Price Adder. ERCOT shall assign an LMP to de-energized Electrical Buses for use in the calculation of the Real-Time Settlement Point Prices by using heuristic rules applied in the following order:

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

(b) Use the following rules in order:

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

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

(iii) Use System Lambda.

6.6.1.1 Real-Time Settlement Point Price for a Resource Node

(1) Except for a logical Resource Node for a Combined Cycle Train, the Real-Time Settlement Point Price for a Resource Node Settlement Point is the time-weighted average of the sum of the Real-Time LMPs, Real-Time On-Line Reliability Deployment Price Adders, and the Real-Time On-Line Reserve Price Adders. The Real-Time Settlement Point Price for a 15-minute Settlement Interval is calculated as follows:

RTSPP = Max (-$251, (((RNWF*y* \* (RTLMP*y* + RTORPA *y* + RTORDPA *y*))))

Where the Resource Node weighting factor is:

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

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RTSPP | $/MWh | *Real-Time Settlement Point Price*⎯The Real-Time Settlement Point Price at the Settlement Point for the 15-minute Settlement Interval. |
| RTORPA *y* | $/MWh | *Real-Time On-Line Reserve Price Adder per interval*⎯The Real-Time On-Line Reserve Price Adder for the SCED interval *y*. |
| RTLMP *y* | $/MWh | *Real-Time Locational Marginal Price per interval*⎯The Real-Time LMP at the Settlement Point for the SCED interval *y*. |
| 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 Settlement Interval. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. |
| *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. |

(2) The Real-Time Settlement Point Price at the logical Resource Node for the On-Line Combined Cycle Generation Resource shall be determined in accordance with paragraph (1) above using a Real-Time LMP calculated for the logical Resource Node in each SCED Interval as follows:

(a) The Real-Time LMP for the logical Resource Node for each SCED interval shall be the sum of the Real-Time LMP in each SCED interval at each of the Resource Nodes of the generation units registered in the On-Line (as determined by Real-Time telemetry) Combined Cycle Generation Resource times a weight factor determined as set forth in paragraph (b) below.

Where:

**RTLMP = ∑*CCGR\_PhyR* RTLMP*CCGR\_PhyR* \* RTCCGRWF*CCGR\_PhyR***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Definition** |
| RTLMP | $/MWh | *Real-Time Locational Marginal Price at a logical Resource Node for a Combined Cycle Train*⎯The Real-Time LMP at the Combined Cycle Generation Resource logical Resource Node for a SCED Interval. |
| RTLMP*CCGR\_PhyR* | $/MWh | *Real-Time Locational Marginal Price at a generation unit Resource Node registered to the Combined Cycle Generation Resource*⎯The Real-Time LMP at the Resource Node of an On-Line generation unit designated in a Combined Cycle Train registration for the Combine Cycle Generation Resource for each SCED interval. |
| RTCCGRWF*CCGR\_PhyR* | none | *Real-Time Combined Cycle Generation Resource Weighting Factor*⎯The Real Time Combined Cycle Generation Resource weighting factor for a generation unit designated in a Combined Cycle Train registration for the Combined Cycle Generation Resource. |
| *CCGR\_PhyR* | none | A generation unit designated in a Combine Cycle Train registration for a Combined Cycle Generation Resource. |

(b) The weight factor for each generation unit registered in a Combined Cycle Generation Resource shall be the Real-Time net power output telemetry in each SCED interval for each generation unit registered in the Combined Cycle Generation Resource divided by the total Real-Time net power output telemetry for all of the generation units registered in the Combined Cycle Generation Resource.

Where:

**RTCCGRWF*CCGR\_PhyR* = TG*CCGR\_PhyR* / ∑*CCGR\_PhyR* TG*CCGR\_PhyR***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Definition** |
| RTCCGRWF*CCGR\_PhyR* | none | *Real-Time Combined Cycle Generation Resource Weighting Factor*⎯The Real Time Combined Cycle Generation Resource weighting factor for a generation unit designated in a Combined Cycle Train registration for the Combined Cycle Generation Resource. |
| TG*CCGR\_PhyR* | MW | *Telemetered Generation for a Combined Cycle Generation Resource generation unit*⎯The telemetered generation of a generation unit designated in a Combined Cycle Train registration for the Combined Cycle Generation Resource at the time of each SCED run. |
| *CCGR\_PhyR* | none | A generation unit designated in a Combine Cycle Train registration for a Combined Cycle Generation Resource. |

6.6.1.2 Real-Time Settlement Point Price for a Load Zone

(1) The Real-Time Settlement Point Price for a Load Zone Settlement Point is based on the state-estimated Load in MW and the time-weighted average Real-Time LMPs at Electrical Buses that are included in the Load Zone. The Real-Time Settlement Point Price for a Load Zone Settlement Point for a 15-minute Settlement Interval is calculated as follows:

RTSPP = Max (-$251, ((TLMP *y* \* LZLMP*y*) / TLMP*y*) + RTRSVPOR + RTRDP)

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

LZLMP*y* =  (RTLMP *b, y* \* SEL *b, y*) / SEL*b, y*

For a DC Tie Load Zone:

LZLMP*y* = RTLMP *b, y*

Where:

RTRSVPOR = image010(RNWF  *y* \* RTORPA *y*)

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

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

(2) For all Settlement calculations in which a 15-minute Real-Time Settlement Point Price for a Load Zone is required in order to perform Settlement for a 15-minute quantity that is represented as one value (the integrated value for the 15-minute interval) but varies with each SCED interval within the 15-minute Settlement Interval, an energy-weighted Real-Time Settlement Point Price shall be used and is calculated as follows:

**RTSPPEW = Max [-$251, ((RTLMP*b, y* \* LZWF *b, y*) + RTRSVPOR + RTRDP)]**

For all Load Zones except DC Tie Load Zones:

LZWF *b, y* = (SEL*b, y* \* TLMP *y*) **/** [(SEL*b, y* \* TLMP*y*)]

For a DC Tie Load Zone:

LZWF *b, y* = (SEL*b, y* \* TLMP *y*) **/** [(SEL*b, y* \* TLMP*y*)]

SEL*b, y* = 1

Where:

RTRSVPOR = image010(RNWF  *y* \* RTORPA *y*)

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

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

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RTSPP | $/MWh | *Real-Time Settlement Point Price*⎯The Real-Time Settlement Point Price at the Settlement Point, for the 15-minute Settlement Interval. |
| RTSPPEW | $/MWh | *Real-Time Settlement Point Price Energy-Weighted*⎯The Real-Time Settlement Point Price at the Settlement Point *p*, for the 15-minute Settlement Interval that is weighted by the state-estimated Load of the Load Zone of each SCED interval within the 15-minute Settlement Interval. |
| RTLMP *b, y* | $/MWh | *Real-Time Locational Marginal Price at bus per interval*⎯The Real-Time LMP at Electrical Bus *b* in the Load Zone, for the SCED interval *y*. |
| 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. |
| 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*. |
| 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 Settlement Interval. |
| LZWF *b, y* | none | *Load Zone Weighting Factor per bus per interval*⎯The weight used in the Load Zone Settlement Point Price calculation for Electrical Bus *b*, for the portion of the SCED interval *y* within the 15-minute Settlement Interval. |
| LZLMP *y* | $/MWh | *Load Zone Locational Marginal Price*⎯The Load Zone LMP for the Load Zone for the SCED Interval *y*. |
| SEL *b, y* | MW | *State Estimator Load at bus per interval*⎯The Load from State Estimator excluding Wholesale Storage Load (WSL) for Electrical Bus *b* in the Load Zone, for the SCED interval *y*. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. |
| *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. |
| *b* | none | An Electrical Bus in the Load Zone. The summation is over all of the Electrical Buses in the Load Zone. |

6.6.1.3 Real-Time Settlement Point Price for a Hub

The Real-Time SPP at a Hub is determined according to the methodology included in the definition of that Hub in Section 3.5.2, Hub Definitions.

6.6.1.4 Load Zone LMPs

The Load Zone LMPs shall be posted on the Market Information System (MIS) Public Area. The Load Zone LMP is based on the state-estimated Loads in MW and the Real-Time LMPs at the Electrical Buses included in the Load Zone. The Load Zone LMP for a Load Zone for a SCED Interval is calculated as follows:

LZLMP *y* =  (RTLMP*b, y* \* LZWF *b, y*)

For all Load Zones except DC Tie Load Zones:

LZWF *b, y* = SEL*b, y* / (SEL*b, y*)

For a DC Tie Load Zone:

LZWF *b, y* = [Max (0.001, SEL b, y)] / [Max (0.001, SEL b, y)]

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| LZLMP *y* | $/MWh | *Load Zone Locational Marginal Price*⎯The Load Zone LMP for the Load Zone for the SCED Interval *y*. |
| RTLMP *b, y* | $/MWh | *Real-Time Locational Marginal Price at bus per SCED interval*⎯The Real-Time LMP at Electrical Bus *b* in the Load Zone, for the SCED interval *y*. |
| LZWF *b, y* | None | *Load Zone State Estimator Load Weighting Factor per bus per SCED interval*⎯The weight used in the Load Zone LMP calculation for Electrical Bus *b* for the SCED interval *y*. |
| SEL *b, y* | MW | *State Estimator Load at bus per SCED interval*⎯The Load from the State Estimator for Electrical Bus *b* in the Load Zone, for the SCED interval *y*. |
| *y* | None | A SCED interval. |
| *b* | None | An Electrical Bus in the Load Zone. The summation is over all of the Electrical Buses in the Load Zone. |

6.6.1.5 Hub LMPs

The Hub LMPs shall be posted on the MIS Public Area.

For each defined Hub except for the ERCOT Hub Average 345 kV Hub, the Hub LMP is the arithmetic average of the Real-Time LMPs of the Hub Buses included in the Hub. The Hub LMP for a SCED Interval is calculated as follows:

HUBLMP *Hub, y* = (HUBDF *hb, Hub* \* RTHBP *hb, Hub, y*), if HB*Hub* ≠ 0

HUBLMP *Hub, y* = HUBLMP*ERCOT345Bus*, if HB*Hub* = 0

Where:

RTHBP *hb, Hub, y* = (HBDF *b, hb, Hub* \* RTLMP *b, hb, Hub, y*)

HUBDF *hb, Hub* = 1 **/** HB *Hub*, if HB*Hub* ≠ 0

HUBDF *hb, Hub*  = 0, if HB*Hub* = 0

HBDF *b, hb, Hub*  = 1 **/** B *hb, Hub*, if B *hb, Hub* ≠ 0

HBDF *b, hb, Hub*  = 0, if B *hb, Hub* = 0

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| HUBLMP*Hub, y* | $/MWh | *Hub Locational Marginal Price*⎯The Hub LMP for the Hub for the SCED Interval *y*. |
| RTHBP *hb, Hub, y* | $/MWh | *Real-Time Hub Bus Price at Hub Bus per SCED interval*⎯The Real-Time energy price at Hub Bus *hb* for the SCED interval *y*. |
| RTLMP *b, hb, Hub, y* | $/MWh | *Real-Time Locational Marginal Price at Electrical Bus of Hub Bus per interval*⎯The Real-Time LMP at Electrical Bus *b* that is a component of Hub Bus *hb*, for the SCED interval *y*. |
| HUBDF *hb, Hub* | none | *Hub Distribution Factor per Hub Bus*⎯The distribution factor of Hub Bus *hb*. |
| HBDF *b, hb, Hub* | none | *Hub Bus Distribution Factor per Electrical Bus of Hub Bus*⎯The distribution factor of Electrical Bus *b* that is a component of Hub Bus *hb*. |
| B *hb, Hub* | none | The total number of energized Electrical Buses in Hub Bus *hb*. |
| HB*Hub* | none | The total number of Hub Buses in the Hub with at least one energized component in each Hub Bus. |
| *Hub* | none | One of the following Hubs: ERCOT Bus Average 345 kV Hub, North 345 kV Hub, South 345 kV Hub, Houston 345 kV Hub, or the West 345 kV Hub |
| *hb* | none | A Hub Bus that is a component of the Hub. |
| *y* | none | A SCED interval. |
| *b* | none | An energized Electrical Bus that is a component of a Hub Bus. |

The Hub LMP for the ERCOT Hub Average 345 kV Hub (ERCOT 345) for a SCED Interval is calculated as follows:

HUBLMP *ERCOT345, y* = (HUBLMP*NORTH345, y* + HUBLMP*SOUTH345, y +* HUBLMP*HOUSTON345, y +* HUBLMP*WEST345, y*) / 4

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| HUBLMP*ERCOT345, y* | $/MWh | *Hub Locational Marginal Price for the ERCOT345*⎯The Hub LMP for the ERCOT Hub Average 345 kV Hub (ERCOT 345), for the SCED Interval *y*. |
| HUBLMP*NORTH345, y* | $/MWh | *Hub Locational Marginal Price for the NORTH345*⎯The Hub LMP for the North 345 kV Hub (NORTH 345), for the SCED Interval *y*. |
| HUBLMP*SOUTH345, y* | $/MWh | *Hub Locational Marginal Price for the SOUTH345*⎯The Hub LMP for the South 345 kV Hub (SOUTH 345), for the SCED Interval *y*. |
| HUBLMP*HOUSTON345, y* | $/MWh | *Hub Locational Marginal Price for the HOUSTON345*⎯The Hub LMP for the Houston 345 kV Hub (HOUSTON 345), for the SCED Interval *y*. |
| HUBLMP*WEST345, y* | $/MWh | *Hub Locational Marginal Price for the WEST345*⎯The Hub LMP for the West 345 kV Hub (WEST 345), for the SCED Interval *y*. |

6.6.2 Load Ratio Share

6.6.2.1 ERCOT Total Adjusted Metered Load

ERCOT total Adjusted Metered Load (AML) (excluding the DC Tie export associated with the Qualified Scheduling Entities (QSEs) under the “Oklaunion Exemption”) for a 15-minute Settlement Interval is calculated as follows:

RTAMLTOT = RTAML *q, p*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RTAMLTOT | MWh | *Real-Time Adjusted Metered Load Total*—The total Adjusted Metered Load in ERCOT, for the 15-minute Settlement Interval. |
| RTAML *q, p* | MWh | *Real-Time Adjusted Metered Load per QSE per Settlement Point*—The sum of the Adjusted Metered Load at the Electrical Buses that are included in Settlement Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. The summation is over all of the QSEs with metered readings in that interval. |
| *p* | none | A Settlement Point. The summation is over all of the Settlement Points. |

6.6.2.2 QSE Load Ratio Share for a 15-Minute Settlement Interval

Each QSE’s Load Ratio Share (LRS) for a 15-minute Settlement Interval is calculated as follows:

LRS *q* = (RTAML *q, p*) / RTAMLTOT

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| LRS *q* | none | *Load Ratio Share per QSE*—The LRS as defined in Section 2, Definitions and Acronyms, for QSE *q*, for the 15-minute Settlement Interval. |
| RTAML *q, p* | MWh | *Real-Time Adjusted Metered Load per Settlement Point per QSE*—The sum of the Adjusted Metered Load at the Electrical Buses that are included in Settlement Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval. |
| RTAMLTOT | MWh | *Real-Time Adjusted Metered Load Total*—The total Adjusted Metered Load in ERCOT, for the 15-minute Settlement Interval. |
| *p* | none | A Settlement Point. The summation is over all of the Settlement Points. |

6.6.2.3 QSE Load Ratio Share for an Operating Hour

Each QSE’s LRS for an Operating Hour is calculated as follows:

HLRS *q* = (RTAML *q, p, i*) / (RTAMLTOT *i*)

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| HLRS *q* | none | *Hourly Load Ratio Share per QSE*—The LRS as defined in Section 2, Definitions and Acronyms, for QSE *q*, for the hour. |
| RTAML *q, p, i* | MWh | *Real-Time Adjusted Metered Load per Settlement Point per QSE by interval*—The sum of the Adjusted Metered Load at the Electrical Buses that are included in the Settlement Point *p*, represented by QSE *q* for the 15-minute Settlement Interval *i*. |
| RTAMLTOT *i* | MWh | *Real-Time Adjusted Metered Load Total by interval*—The total Adjusted Metered Load in ERCOT, for the 15-minute Settlement Interval *i*. |
| *p* | none | A Settlement Point. The summation is over all of the Settlement Points. |
| *i* | none | A 15-minute Settlement Interval in the Operating Hour. The summation over all of the Settlement Intervals of the Operating Hour. |

6.6.3 Real-Time Energy Charges and Payments

6.6.3.1 Real-Time Energy Imbalance Payment or Charge at a Resource Node

(1) The payment or charge to each QSE for Energy Imbalance Service is calculated based on the Real-Time Settlement Point Price for the following amounts at a particular Resource Node Settlement Point:

(a) The energy produced by all its Generation Resources or consumed as WSL at the Settlement Point; plus

(b) The amount of its Self-Schedules with sink specified at the Settlement Point; plus

(c) The amount of its Day-Ahead Market (DAM) Energy Bids cleared in the DAM at the Settlement Point; plus

(d) The amount of its Energy Trades at the Settlement Point where the QSE is the buyer; minus

(e) The amount of its Self-Schedules with source specified at the Settlement Point; minus

(f) The amount of its energy offers cleared in the DAM at the Settlement Point; minus

(g) The amount of its Energy Trades at the Settlement Point where the QSE is the seller.

(2) The payment or charge to each QSE for Energy Imbalance Service at a Resource Node Settlement Point for a given 15-minute Settlement Interval is calculated as follows:

RTEIAMT *q, p* = (-1) \* {((GSPLITPER *q, r, gsc, p* \* NMSAMTTOT *gsc*) + (WSLAMTTOT *q, r, p*) + RTSPP *p* \* [(SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)]}

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTEIAMT *q, p* | $ | *Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. |
| SSSK *q, p* | MW | *Self-Schedule with Sink at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval. |
| DAEP *q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point*—The QSE *q*’s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. |
| RTQQEP *q, p* | MW | *Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point*⎯The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. |
| SSSR *q, p* | MW | *Self-Schedule with Source at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval. |
| DAES *q, p* | MW | *Day-Ahead Energy Sale per QSE per Settlement Point*—The QSE *q*’s energy offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. |
| RTQQES *q, p* | MW | *Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point*⎯The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. |
| NMSAMTTOT *gsc* | $ | *Net Metering Settlement*—The total payment or charge to a generation site with a net metering arrangement. |
| WSLAMTTOT*q, r, p* | $ | *Wholesale Storage Load Settlement*—The total payment or charge to QSE *q*, Resource *r,* at Settlement Point *p*, for WSL for each 15-minute Settlement Interval. |
| GSPLITPER *q, r, gsc, p* | none | *Generation Resource SCADA Splitting Percentage*—The generation allocation percentage for Resource *r* that is part of a net metering arrangement. GSPLITPER is calculated by taking the Supervisory Control and Data Acquisition (SCADA) values (GSSPLITSCA) for a particular Generation Resource *r* that is part of a net metering configuration and dividing by the sum of all SCADA values for all Resources that are included in the net metering configuration for each interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *p* | none | A Resource Node Settlement Point. |
| *r* | none | A Generation Resource or an energy storage Load Resource that is located at the Facility with net metering. |
| *gsc* | none | A generation site code. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR419: Replace paragraph (2) above with the following upon system implementation:]***  (2) The payment or charge to each QSE for Energy Imbalance Service at a Resource Node Settlement Point for a given 15-minute Settlement Interval is calculated as follows:  RTEIAMT *q, p* = (-1) \* {((RESREV *q, r, gsc, p*)) + (WSLAMTTOT *q, r, p*) + RTSPP *p* \* [(SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)]}  Where:  RESREV *q, r, gsc, p* = GSPLITPER *q, r, gsc, p* \* NMSAMTTOT *gsc*  RESMEB *q, r, gsc, p* = GSPLITPER *q, r, gsc, p* \* NMRTETOT *gsc*  **WSLTOT *q, p*****=**  ( **MEBL *q,r,b***)  RNIMBAL *q, p =* (RESMEB *q, r, gsc, p*) + WSLTOT *q, p* + (SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTEIAMT *q, p* | $ | *Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. | | RNIMBAL *q, p* | MWh | *Resource Node Energy Imbalance per QSE per Settlement Point*—The Resource Node volumetric imbalance for QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. | | RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. | | SSSK *q, p* | MW | *Self-Schedule with Sink at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval. | | DAEP *q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point*—The QSE *q*’s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. | | RTQQEP *q, p* | MW | *Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point*⎯The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. | | SSSR *q, p* | MW | *Self-Schedule with Source at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval. | | DAES *q, p* | MW | *Day-Ahead Energy Sale per QSE per Settlement Point*—The QSE *q*’s energy offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. | | RTQQES *q, p* | MW | *Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point*⎯The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. | | RESREV *q, r, gsc, p* | $ | *Resource Share Revenue Settlement Payment*—The Resource share of the total payment to the entire Facility with a net metering arrangement attributed to Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*. | | RESMEB *q, r, gsc, p* | MWh | *Resource Share Net Meter Real-Time Energy Total*—The Resource share of the net sum for all Settlement Meters attributed to Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*. | | WSLTOT *q, p* | MWh | *WSL Total*—The total WSL energy metered by the Settlement Meters which measure WSL for the QSE *q* at Settlement Point *p*. | | MEBL *q,r,b* | MWh | *Metered Energy for Wholesale Storage Load at bus*⎯The WSL energy metered by the Settlement Meter which measures WSL for the 15-minute Settlement Interval represented as a negative value, for the QSE *q*, Resource *r*, at bus *b*. | | NMSAMTTOT *gsc* | $ | *Net Metering Settlement*—The total payment or charge to a generation site with a net metering arrangement. | | WSLAMTTOT*q, r, p* | $ | *Wholesale Storage Load Settlement*—The total payment or charge to QSE *q*, Resource *r*, at Settlement Point *p*, for WSL for each 15-minute Settlement Interval. | | NMRTETOT *gsc* | MWh | *Net Meter Real-Time Energy Total*—The net sum for all Settlement Meters included in generation site code *gsc*. A positive value indicates an injection of power to the ERCOT System. | | GSPLITPER *q, r, gsc, p* | none | *Generation Resource SCADA Splitting Percentage*—The generation allocation percentage for Resource *r* that is part of a net metering arrangement. GSPLITPER is calculated by taking the Supervisory Control and Data Acquisition (SCADA) values (GSSPLITSCA) for a particular Generation Resource *r* that is part of a net metering configuration and dividing by the sum of all SCADA values for all Resources that are included in the net metering configuration for each interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *q* | none | A QSE. | | *p* | none | A Resource Node Settlement Point. | | *r* | none | A Generation Resource or an energy storage Load Resource that is located at the Facility with net metering. | | *gsc* | none | A generation site code. | | *b* | none | An Electrical Bus. | |

(3) For a facility with Settlement Meters that measure WSL, the total payment or charge for WSL is calculated for a QSE, energy storage Load Resource, and Settlement Point for each 15-minute Settlement Interval.

The WSL is settled as follows:

**WSLAMTTOT *q, r, p* =**  **(RTRMPRWSL *b* \* MEBL** ***q, r, b*)**

Where the price for Settlement Meter is determined as follows:

**RTRMPRWSL *b* = Max [-$251, (image010(RNWFL *b, y* \* RTLMP *b, y*) + RTRSVPOR + RTRDP)]**

Where the weighting factor for the Electrical Bus associated with the meter is:

**RNWFL *b, y* = [Max (0.001,** image001 **TL *r, y*)) \* TLMP *y*] /**

**[image010Max (0.001,** image001 **TL *r, y*)) \* TLMP *y*]**

Where:

RTRSVPOR = image010(RNWF  *y* \* RTORPA *y*)

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

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

The summation is over all WSL *r* associated to the individual meter. The determination of which Resources are associated to an individual meter is static and based on the normal system configuration of the generation site code, *gsc*.

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTLMP *b, y* | $/MWh | *Real-Time Locational Marginal Price at bus per interval*⎯The Real-Time LMP for the meter at Electrical Bus *b*, for the SCED interval *y*. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y*. |
| 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. |
| RTORPA*y* | $/MWh | *Real-Time On-Line Reserve Price Adder per interval*⎯The Real-Time On-Line Reserve Price Adder for 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 Settlement Interval. |
| MEBL*q,r,b* | MWh | *Metered Energy for Wholesale Storage Load at bus*⎯The WSL energy metered by the Settlement Meter which measures WSL for the 15-minute Settlement Interval represented as a negative value, for the QSE *q*, Resource *r*, at bus *b*. |
| WSLAMTTOT*q, r, p* | $ | *Wholesale Storage Load Settlement*—The total payment or charge to QSE *q*, Resource *r*, at Settlement Point *p*, for WSL for each 15-minute Settlement Interval. |
| RNWFL*b, y* | none | *Net meter Weighting Factor per interval for the Energy Metered as Wholesale Storage Load*The weight factor used in net meter price calculation for meters in Electrical Bus *b*, for the SCED interval *y*, for the WSL associated with an energy storage Load Resource. The weighting factor used in the net meter price calculation shall not be recalculated after the fact due to revisions in the association of Resources to Settlement Meters. |
| RTRMPRWSL*b* | $/MWh | *Real-Time Price for the Energy Metered as Wholesale Storage Load at bus*⎯The Real-Time price for the Settlement Meter which measures WSL at Electrical Bus *b*, for the 15-minute Settlement Interval. |
| TL *r, y* | MW | *Telemetered WSL charging per interval*⎯The telemetered Load associated with the energy storage Load Resource *r* for the SCED interval *y*. |
| *gsc* | none | A generation site code. |
| *r* | none | An energy storage 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. |
| *b* | none | An Electrical Bus. |

(4) The total payment or charge to a Facility with a net metering arrangement for each 15-minute Settlement Interval shall be calculated as follows:

**NMRTETOT *gsc* = Max (0, ( (MEB *gsc, b +* MEBC *gsc, b*)))**

If NMRTETOT *gsc* = 0 for a 15-minute Settlement Interval, then

The Load that is not WSL is included in the Real-Time AML per QSE and is included in the Real-Time energy imbalance payment or charge at a Load Zone.

Otherwise, when NMRTETOT *gsc* **>** 0 for a 15-minute Settlement Interval, then

NMSAMTTOT *gsc* =  [(RTRMPR *b* \* MEB *gsc, b*) + (RTRMPR *b* \* MEBC *gsc, b*)]

Where the price for Settlement Meter is determined as follows:

RTRMPR *b* = Max [-$251, (image010(RNWF *b, y* \* RTLMP *b, y*) + RTRSVPOR + RTRDP)]

Where the weighting factor for the Electrical Bus associated with the meter is:

**RNWF *b, y* = [Max (0.001,** **BP *r, y*) \* TLMP *y*] /**

**[image010Max (0.001,** **BP *r, y*) \* TLMP *y*]**

Where:

RTRSVPOR = image010(RNWF  *y* \* RTORPA *y*)

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

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

The summation is over all Resources *r* associated to the individual meter. The determination of which Resources are associated to an individual meter is static and based on the normal system configuration of the generation site code, *gsc*.

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| NMRTETOT *gsc* | MWh | *Net Meter Real-Time Energy Total*—The net sum for all Settlement Meters included in generation site code *gsc*. A positive value indicates an injection of power to the ERCOT System. |
| NMSAMTTOT*gsc* | $ | *Net Metering Settlement*—The total payment or charge to a generation site with a net metering arrangement. |
| RTRMPR *b* | $/MWh | *Real-Time Price for the Energy Metered for each Resource meter at bus*⎯The Real-Time price for the Settlement Meter at Electrical Bus *b*, for the 15-minute Settlement Interval. |
| MEB *gsc, b* | MWh | *Metered Energy at bus*⎯The metered energy by the Settlement Meter which is not upstream from another Settlement Meter which measures WSL for the 15-minute Settlement Interval. A positive value represents energy produced, and a negative value represents energy consumed. |
| 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. |
| RTORPA*y* | $/MWh | *Real-Time On-Line Reserve Price Adder per interval*⎯The Real-Time On-Line Reserve Price Adder for 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 Settlement Interval. |
| RTLMP *b, y* | $/MWh | *Real-Time Locational Marginal Price at bus per interval*⎯The Real-Time LMP for the meter at Electrical Bus *b*, for the SCED interval *y*. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y*. |
| RNWF *b, y* | none | *Net meter Weighting Factor per interval*The weight factor used in net meter price calculation for meters in Electrical Bus *b*, for the SCED interval *y*. The weighting factor used in the net meter price calculation shall not be recalculated after the fact due to revisions in the association of Resources to Settlement Meters. |
| BP *r, y* | MW | *Base Point per Resource per interval*The Base Point of Resource *r,* for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MEBC*gsc, b* | MWh | *Metered Energy at bus (Calculated)*⎯The calculated energy for the 15-minute Settlement Interval for a Settlement Meter which is upstream from another Settlement Meter which measures WSL. A positive value represents energy produced, and a negative value represents energy consumed. |
| *gsc* | none | A generation site code. |
| *r* | none | A Generation Resource that is located at the Facility with net metering. |
| *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. |
| *b* | none | An Electrical Bus. |

(5) The Generation Resource SCADA Splitting Percentage for each Resource within a net metering arrangement for the 15-minute Settlement Interval is calculated as follows:

**GSPLITPER *q, r, gsc, p* = GSSPLITSCA *r* /** **GSSPLITSCA *r***

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| GSPLITPER *q, r, gsc, p* | none | *Generation Resource SCADA Splitting Percentage*—The generation allocation percentage for Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*. GSPLITPER is calculated by taking the SCADA values (GSSPLITSCA) for a particular Generation Resource *r* that is part of a net metering configuration and dividing by the sum of all SCADA values for all Resources that are included in the net metering configuration for each interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| GSSPLITSCA *r* | MWh | *Generation Resource SCADA Net Real Power provided via Telemetry*—The net real power provided via telemetry per Resource within the net metering arrangement, integrated for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *gsc* | none | A generation site code. |
| *r* | none | A Generation Resource that is located at the Facility with net metering. |
| *q* | none | A QSE. |
| *p* | none | A Resource Node Settlement Point. |

(6) The total net payments and charges to each QSE for Energy Imbalance Service at all Resource Node Settlement Points for the 15-minute Settlement Interval is calculated as follows:

RTEIAMTQSETOT *q* =  RTEIAMT *q, p*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RTEIAMTQSETOT *q* | $ | *Real-Time Energy Imbalance Amount QSE Total per QSE*⎯The total net payments and charges to QSE *q* for Real-Time Energy Imbalance Service at all Resource Node Settlement Points for the 15-minute Settlement Interval. |
| RTEIAMT *q, p* | $ | *Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Resource Node Settlement Point. |

6.6.3.2 Real-Time Energy Imbalance Payment or Charge at a Load Zone

(1) The payment or charge to each QSE for Energy Imbalance Service is calculated based on the Real-Time Settlement Point Price for the following amounts at a particular Load Zone Settlement Point:

(a) The amount of its Self-Schedules with sink specified at the Settlement Point; plus

(b) The amount of its DAM Energy Bids cleared in the DAM at the Settlement Point; plus

(c) The amount of its Energy Trades at the Settlement Point where the QSE is the buyer; minus

(d) The amount of its Self-Schedules with source specified at the Settlement Point; minus

(e) The amount of its energy offers cleared in the DAM at the Settlement Point; minus

(f) The amount of its Energy Trades at the Settlement Point where the QSE is the seller; minus

(g) Its AML at the Settlement Point; plus

(h) The aggregated generation of its Non-Modeled Generators in the Load Zone.

(2) The payment or charge to each QSE for Energy Imbalance Service at a Load Zone for a given 15-minute Settlement Interval is calculated as follows:

RTEIAMT *q, p* = (-1) \* {[RTSPP *p* \* [(SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)]] + [RTSPPEW *p* \* (RTMGNM *q, p* – RTAML *q, p*)]}

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTEIAMT *q, p* | $ | *Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTSPPEW *p* | $/MWh | *Real-Time Settlement Point Price Energy-Weighted*⎯The Real-Time Settlement Point Price at the Settlement Point *p*, for the 15-minute Settlement Interval that is weighted by the State Estimated Load for the Load Zone of each SCED interval within the 15-minute Settlement Interval. |
| RTAML *q, p* | MWh | *Real-Time Adjusted Metered Load per QSE per Settlement Point*—The sum of the AML at the Electrical Buses that are included in Settlement Point *p* represented by QSE *q* for the 15-minute Settlement Interval. |
| SSSK *q, p* | MW | *Self-Schedule with Sink at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval. |
| DAEP *q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point*—The QSE *q*’s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. |
| RTQQEP *q, p* | MW | *Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point*⎯The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. |
| SSSR *q, p* | MW | *Self-Schedule with Source at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval. |
| DAES *q, p* | MW | *Day-Ahead Energy Sale per QSE per Settlement Point*—The QSE *q*’s energy offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. |
| RTQQES *q, p* | MW | *Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point*⎯The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTMGNM *q, p* | MWh | *Real-Time Metered Generation from Non-Modeled generators per QSE per Settlement Point*—The total Real-Time energy produced by Non-Modeled Generators represented by QSE *q* in Load Zone Settlement Point *p*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Load Zone Settlement Point. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| ***[NPRR419: Replace paragraph (2) above with the following upon system implementation:]***  (2) The payment or charge to each QSE for Energy Imbalance Service at a Load Zone for a given 15-minute Settlement Interval is calculated as follows:  RTEIAMT *q, p* = (-1) \* {[RTSPP *p* \* [(SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)]] + [RTSPPEW *p* \* (RTMGNM *q, p* – RTAML *q, p*)]}  And  LZIMBAL *q, p =* (SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼) – RTAML *q, p* + RTMGNM *q, p*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTEIAMT *q, p* | $ | *Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. | | RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. | | LZIMBAL *q, p* | MWh | *Load Zone Energy Imbalance per QSE per Settlement Point*—The Load Zone volumetric imbalance for QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. | | RTSPPEW *p* | $/MWh | *Real-Time Settlement Point Price Energy-Weighted*⎯The Real-Time Settlement Point Price at the Settlement Point *p*, for the 15-minute Settlement Interval that is weighted by the State Estimated Load for the Load Zone of each SCED interval within the 15-minute Settlement Interval. | | RTAML *q, p* | MWh | *Real-Time Adjusted Metered Load per QSE per Settlement Point*—The sum of the AML at the Electrical Buses that are included in Settlement Point *p* represented by QSE *q* for the 15-minute Settlement Interval. | | SSSK *q, p* | MW | *Self-Schedule with Sink at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval. | | DAEP *q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point*—The QSE *q*’s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. | | RTQQEP *q, p* | MW | *Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point*⎯The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. | | SSSR *q, p* | MW | *Self-Schedule with Source at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval. | | DAES *q, p* | MW | *Day-Ahead Energy Sale per QSE per Settlement Point*—The QSE *q*’s energy offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. | | RTQQES *q, p* | MW | *Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point*⎯The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. | | RTMGNM *q, p* | MWh | *Real-Time Metered Generation from Non-Modeled generators per QSE per Settlement Point*—The total Real-Time energy produced by Non-Modeled Generators represented by QSE *q* in Load Zone Settlement Point *p*, for the 15-minute Settlement Interval. | | *q* | none | A QSE. | | *p* | none | A Load Zone Settlement Point. | |

(3) The total net payments and charges to each QSE for Energy Imbalance Service at all Load Zones for the 15-minute Settlement Interval is calculated as follows:

RTEIAMTQSETOT *q* = RTEIAMT *q, p*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| RTEIAMTQSETOT *q* | $ | *Real-Time Energy Imbalance Amount QSE Total per QSE*⎯The total net payments and charges to QSE *q* for Real-Time Energy Imbalance Service at all Load Zone Settlement Points for the 15-minute Settlement Interval. |
| RTEIAMT *q, p* | $ | *Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Load Zone Settlement Point. |

6.6.3.3 Real-Time Energy Imbalance Payment or Charge at a Hub

(1) The payment or charge to each QSE for Energy Imbalance Service is calculated based on the Real-Time Settlement Point Price for the following amounts at a particular Hub Settlement Point:

(a) The amount of its Self-Schedules with sink specified at the Settlement Point; plus

(b) The amount of its DAM Energy Bids cleared in the DAM at the Settlement Point; plus

(c) The amount of its Energy Trades at the Settlement Point where the QSE is the buyer; minus

(d) The amount of its Self-Schedules with source specified at the Settlement Point; minus

(e) The amount of its energy offers cleared in the DAM at the Settlement Point; minus

(f) The amount of its Energy Trades at the Settlement Point where the QSE is the seller.

(2) The payment or charge to each QSE for Energy Imbalance Service at a Hub for a given 15-minute Settlement Interval is calculated as follows:

RTEIAMT *q, p* = (-1) \* RTSPP *p* \* {(SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)}

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTEIAMT *q, p* | $ | *Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. |
| SSSK *q, p* | MW | *Self-Schedule with Sink at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval. |
| DAEP *q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point*—The QSE *q*’s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. |
| RTQQEP *q, p* | MW | *Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point*⎯The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. |
| SSSR *q, p* | MW | *Self-Schedule with Source at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval. |
| DAES *q, p* | MW | *Day-Ahead Energy Sale per QSE per Settlement Point*—The QSE *q*’s Energy Offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. |
| RTQQES *q, p* | MW | *Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point*⎯The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Hub Settlement Point. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR419: Replace paragraph (2) above with the following upon system implementation:]***  (2) The payment or charge to each QSE for Energy Imbalance Service at a Hub for a given 15-minute Settlement Interval is calculated as follows:  RTEIAMT *q, p* = (-1) \* RTSPP *p* \* {(SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)}  And  HBIMBAL *q, p =* (SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTEIAMT *q, p* | $ | *Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. | | HBIMBAL *q, p* | MWh | *Hub Energy Imbalance per QSE per Settlement Point*—The Hub volumetric imbalance for QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. | | RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. | | SSSK *q, p* | MW | *Self-Schedule with Sink at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval. | | DAEP *q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point*—The QSE *q*’s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. | | RTQQEP *q, p* | MW | *Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point*⎯The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. | | SSSR *q, p* | MW | *Self-Schedule with Source at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval. | | DAES *q, p* | MW | *Day-Ahead Energy Sale per QSE per Settlement Point*—The QSE *q*’s Energy Offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. | | RTQQES *q, p* | MW | *Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point*⎯The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. | | *q* | none | A QSE. | | *p* | none | A Hub Settlement Point. | |

(3) The total net payments and charges to each QSE for Energy Imbalance Service at all Hubs for the 15-minute Settlement Interval is calculated as follows:

**RTEIAMTQSETOT *q* = RTEIAMT *q, p***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| RTEIAMTQSETOT *q* | $ | *Real-Time Energy Imbalance Amount QSE Total per QSE*⎯The total net payments and charges to QSE *q* for Real-Time Energy Imbalance at all Hub Settlement Points for the 15-minute Settlement Interval. |
| RTEIAMT *q, p* | $ | *Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The charge to QSE *q* for the Real-Time Energy Imbalance at Settlement Point *p*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Hub Settlement Point. |

6.6.3.4 Real-Time Energy Payment for DC Tie Import

(1) The payment to each QSE for energy imported into the ERCOT System through each DC Tie is calculated based on the Real-Time Settlement Point Price at the DC Tie Settlement Point. The payment for a given 15-minute Settlement Interval is calculated as follows:

RTDCIMPAMT *q, p* = (-1) \* RTSPP *p* \* (RTDCIMP *q, p* \* ¼)

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RTDCIMPAMT *q, p* | $ | *Real-Time DC Import Amount per QSE per Settlement Point*—The payment to QSE *q* for DC Tie import through DC Tie *p*, for the 15-minute Settlement Interval. |
| RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTDCIMP *q, p* | MW | *Real-Time DC Import per QSE per Settlement Point*—The aggregated DC Tie Schedule submitted by QSE *q* as an importer into the ERCOT System through DC Tie *p*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A DC Tie Settlement Point. |

(2) ERCOT shall pay each QSE for energy imported into the ERCOT System during a declared Emergency Condition through each DC Tie in response to an ERCOT Dispatch Instruction. The payment for a given 15-minute Settlement Interval is calculated as follows:

RTEDCIMPAMT *q, p* = (-1) \* Max {RTSPP *p*, (VEEPDCTP *q, p*\* CAEDCT)}\* (RTEDCIMP *q, p* \* ¼)

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RTEDCIMPAMT *q, p* | $ | *Real-Time Emergency DC Import Amount per QSE per Settlement Point*—The payment to QSE *q* for emergency DC Tie import through DC Tie *p*, for the 15-minute Settlement Interval. |
| RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time SPP at Settlement Point *p*, for the 15-minute Settlement Interval. |
| FIP | $/MMBtu | *Fuel Index Price*—As defined in Section 2, Definitions and Acronyms. |
| RTEDCIMP *q, p* | MW | *Real-Time Emergency DC Import per QSE per Settlement Point*—The aggregated DC Tie Schedule for emergency energy imported by QSE *q* into the ERCOT System during Emergency Conditions through DC Tie *p*, for the 15-minute Settlement Interval. |
| VEEPDCTP *q, p* | $/MWh | *Verified Emergency Energy Price at DC Tie Point*—The ERCOT verified cost for the energy imported by QSE *q* into the ERCOT System during declared Emergency Condition through a DC Tie *p* as instructed by a Dispatch Instruction. |
| CAEDCT | # | *Cost Adder for Emergency DC Tie Import*—A multiplier of 1.10. |
| *q* | none | A QSE. |
| *p* | none | A DC Tie Settlement Point. |

(3) The total of the payments to each QSE for all energy imported into the ERCOT System through DC Ties for the 15-minute Settlement Interval is calculated as follows:

RTDCIMPAMTQSETOT *q, p* = (RTDCIMPAMT *q, p*+ RTEDCIMPAMT *q, p*)

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RTDCIMPAMTQSETOT *q, p* | $ | *Real-Time DC Import Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for energy imported into the ERCOT System through DC Ties *p,* for the 15-minute Settlement Interval. |
| RTDCIMPAMT *q, p* | $ | *Real-Time DC Import Amount per QSE per Settlement Point*—The payment to QSE *q* for DC Tie import through DC Tie *p*, for the 15-minute Settlement Interval. |
| RTEDCIMPAMT *q, p* | $ | *Real-Time Emergency DC Import Amount per QSE per Settlement Point*⎯The payment to QSE *q* for emergency DC Tie import through DC Tie *p*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A DC Tie Settlement Point. |

6.6.3.5 Real-Time Payment for a Block Load Transfer Point

(1) ERCOT shall pay each QSE for the energy delivered to an ERCOT Load through a Block Load Transfer (BLT) Point that is moved in response to an ERCOT Verbal Dispatch Instruction (VDI) during a declared Emergency Condition, from the ERCOT Control Area to a non-ERCOT Control Area. The payment for a given 15-minute Settlement Interval is calculated as follows:

BLTRAMT *q, bltp, p* = (-1) \* MAX {RTSPPEW *p*, (VEEPBLTP *q, bltp*) *\** CABLT} \* BLTR *q, p, bltp*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| BLTRAMT *q, bltp, p* | $ | *Block Load Transfer Resource Amount per QSE per Settlement Point per BLT Point*⎯The payment to QSE *q* for the BLT Resource that delivers energy to Load Zone *p* through BLT Point *bltp*, for the 15-minute Settlement Interval. |
| RTSPPEW *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point Energy-Weighted*⎯The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval, that is weighted by the state estimated Load of the Load Zone of each SCED interval within the 15-minute Settlement Internal. |
| VEEPBLTP *q, bltp* | $/MWh | *Verified Emergency Energy Price at BLT Point*⎯The ERCOT verified cost for the energy delivered to an ERCOT Load through BLT Point *bltp* during a declared Emergency Condition in ERCOT as determined by an ERCOT VDI. |
| CABLT | # | *Cost Adder for Block Load Transfer*⎯A multiplier of 1.10. |
| BLTR *q, p, bltp* | MWh | *Block Load Transfer Resource per QSE per Settlement Point per BLT Point*⎯The energy delivered to an ERCOT Load in Load Zone *p* through BLT Point *bltp* represented by QSE *q*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Load Zone Settlement Point. |
| *bltp* | none | A BLT Point. |

(2) The total of the payments to each QSE for all energy delivered to ERCOT Loads through BLT Points for the 15-minute Settlement Interval is calculated as follows:

BLTRAMTQSETOT *q* = BLTRAMT *q, bltp, p*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| BLTRAMTQSETOT *q* | $ | *Block Load Transfer Resource Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for energy delivered into the ERCOT System through BLT Points for the 15-minute Settlement Interval. |
| BLTRAMT *q, bltp , p* | $ | *Block Load Transfer Resource Amount per QSE per Settlement Point per BLT Point*—The payment to QSE *q* for the BLT Resource at BLT Point *bltp*, which delivers energy to Load Zone *p*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Load Zone Settlement Point. |
| *bltp* | none | A BLT Point. |

(3) For the purpose of Settlement, ERCOT shall treat the energy associated with the Presidio Exception like energy delivered to an ERCOT Load through a BLT Point that is moved from the ERCOT Control Area to a non-ERCOT Control Area in response to a VDI during a declared Emergency Condition, by allowing for compensation of verified costs associated with the energy. After receipt and verification of the invoiced cost associated with the Presidio Exception, ERCOT shall compensate for the energy associated with the Presidio Exception using the monthly verified cost multiplied by the Cost Adder for Block Load Transfer defined in paragraph (1) above. ERCOT shall uplift the cost to QSEs representing Load using the monthly LRS per QSE as defined in Section 7.5.7, Method for Distributing CRR Auction Revenues. Costs associated with the Presidio Exception must be submitted to ERCOT within 90 days of the last day of the month that the costs were incurred.

(a) The monthly payment to be calculated as follows:

**MBLTAMT *q, p* = (-1) \* VMEBLTP *q, p*  *\** CABLT**

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Definition** |
| MBLTAMT *q, p* | $ | *Monthly Block Load Transfer Amount per QSE per Settlement Point*⎯The payment to QSE *q* for the delivered energy to Load Zone *p* for the month. |
| VMEBLTP *q, p* | $/MWh | *Verified Monthly Energy Cost*⎯The ERCOT verified monthly cost for the energy delivered to an ERCOT Load as determined by an invoice submitted to ERCOT. |
| CABLT | # | *Cost Adder for Block Load Transfer*⎯A multiplier of 1.10. |
| *q* | none | A QSE. |
| *p* | none | A Load Zone Settlement Point. |

(b) The total of the payments to each QSE for all energy delivered to ERCOT Loads through BLT Points for the 15-minute Settlement Interval is calculated as follows:

**MBLTAMTQSETOT *q* =  MBLTAMT *q, p***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Definition** |
| MBLTAMTQSETOT *q* | $ | *Monthly Block Load Transfer Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for energy delivered into the ERCOT System for the month. |
| MBLTAMT *q, p* | $ | *Monthly Block Load Transfer Amount per QSE per Settlement Point*⎯The payment to QSE *q* for the delivered energy to Load Zone *p* for the month. |
| *q* | none | A QSE. |
| *p* | none | A Load Zone Settlement Point. |

(c) ERCOT shall calculate each QSE’s monthly BLT charge as follows:

LAMBLTAMT *q* = MLRS *q*\* MBLTAMTTOT

MBLTAMTTOT =  MBLTAMTQSETOT *q*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| MLRS *q* | none | *Monthly Load Ratio Share per QSE*—The LRS calculated for QSE *q* for the peak-Load 15-minute Settlement Interval in the month. See Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval. |
| MBLTAMTQSETOT *q* | $ | *Monthly Block Load Transfer Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for energy delivered into the ERCOT System for the month. |
| LAMBLTAMT *q* | $ | *Load-Allocated Monthly BLT Amount* *per QSE*—Monthly BLT charge for QSE *q*. |
| MBLTAMTTOT | $ | *Monthly BLT Amount ERCOT wide Total*—The total monthly BLT charge for all QSEs. |
| *q* | none | A QSE. |

6.6.3.6 Real-Time Energy Charge for DC Tie Export Represented by the QSE Under the Oklaunion Exemption

(1) The charge to a QSE that is exporting energy from the ERCOT System under the “Oklaunion Exemption” through a DC Tie associated with the exemption is calculated based on the Real-Time SPP at the DC Tie Settlement Point. This charge for a given 15-minute Settlement Interval is calculated as follows:

RTDCEXPAMT *q, p* = RTSPP *p* \* (RTDCEXP *q, p* \* ¼)

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| RTDCEXPAMT *q, p* | $ | *Real-Time DC Export Amount per QSE per Settlement Point*—The charge to QSE *q* for the DC Tie exports through DC Tie *p*, for the 15-minute Settlement Interval. |
| RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time SPP at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTDCEXP *q, p* | MW | *Real-Time DC Export per QSE per Settlement Point*—The aggregated DC Tie Schedule through DC Tie *p* submitted by QSE *q* that is under the “Oklaunion Exemption” as an exporter from the ERCOT area, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A DC Tie Settlement Point. |

(2) The total of the charges to each QSE for all energy exported from the ERCOT System through DC Ties for the 15-minute Settlement Interval is calculated as follows:

RTDCEXPAMTQSETOT *q* = RTDCEXPAMT *q, p*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RTDCEXPAMTQSETOT *q* | $ | *Real-Time DC Export Amount QSE Total per QSE*⎯The total of the charges to QSE *q* for energy exported from the ERCOT System through DC Ties for the 15-minute Settlement Interval. |
| RTDCEXPAMT *q, p* | $ | *Real-Time DC Export Amount per QSE per Settlement Point*—The charge to QSE *q* for the DC Tie exports through DC Tie *p*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | None | A DC Tie Settlement Point. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR664: Insert Section 6.6.3.7 below upon system implementation:]  **6.6.3.7 Real-Time Make-Whole Payment for Exceptional Fuel Cost**  (1) Natural Gas or Fuel Oil Generation Resources that have approved verifiable costs and received at least one Base Point on their Mitigated Offer Cap during a 15-minute Settlement Interval may be eligible to receive a Real-Time Make-Whole Payment for exceptional fuel cost. ERCOT shall deem a Generation Resource eligible for this payment if the QSE for the Resource submits the actual price paid for delivered fuel for the specific Resource and it is greater than the sum of the fuel price (e.g. Fuel Index Price for Resource (FIPRr), Fuel Oil Price (FOP)) used by ERCOT for the Resource, the fuel adder, and a threshold fuel price, as defined in the Verifiable Cost Manual. For eligible Resources, calculation for Real-Time Make-Whole Payment for exceptional fuel costs shall be determined as follows:  **EFCMWAMT *q, p, r, i* = (-1) \* EFCPR *q, p, r, i* \* EFCQTY *q, p, r, i***  Where:  EFCPR *q, p, r, i* = Max[0, MOCFLAG \* (Min(EOCPR *q, p, r, i* , ADMOCPR *q, p, r, i* ) - RTSPP *p, i* ) - EBPWAPR *q, r, p*]  MOCFLAG *q,p,r,i* = 1 or 0  And:  EFCQTY *q, p, r, i* = Min(AGBP*q, r, p,i* , RTMG *q, r, p, i*)  AGBP*q, r, p,i*  = (BP *q, r, p, y* \* TLMP*y* / 3600)  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | EFCMWAMT *q, p, r, i* | $ | *Exceptional Fuel Cost Make-Whole Payment Amount per QSE per Settlement Point per Generation Resource*—The exceptional fuel cost Make-Whole Payment to QSE *q* at Resource Node *p* as a result of Generation Resource *r* receiving a Base Point at the Mitigated Offer Cap during a 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | EFCPR *q, p, r, i* | $/MWh | *Exceptional Fuel Cost Base Point Average Price per QSE per Settlement Point per Generation Resource*—The price used to compensate an eligible Generation Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | EFCQTY *q, p, r, i* | MWh | *Exceptional Fuel Cost Energy per QSE per Settlement Point per Generation Resource*—The quantity used to compensate an eligible Generation Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during an exceptional fuel cost event, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | EOCPR *q, p, r, i* | $/MWh | *Energy Offer Curve Price per QSE per Settlement Interval per Generation* Resource—For Resources that receive a Reliability Unit Commitment (RUC) and qualify for additional compensation per paragraph (1) of Section 9.14.7, Disputes for RUC Make-Whole Payment for Exceptional Fuel Costs, or Section 6.6.3.7, the EOCPR is the average incremental energy price corresponding to the output levels between the average five-minute clock interval Base Points (AVGBP) over the 15-minute Settlement Interval i and the minimum of the Lowest Sustained Limit (LSL) and the Real-Time Metered Generation (RTMG). For all other Resources that qualify for additional compensation under 6.6.3.7, the EOCPR is the average incremental energy price corresponding to the output levels between the average five-minute clock interval Base Points (AVGBP) over the 15-minute Settlement Interval i and a zero base point. The calculation of EOCPR shall follow the methodology as described in Section 4.6.5, Calculation of “Average Incremental Energy Cost” (AIEC), but with inputs as described herein, for Resource r at Resource Node p represented by QSE q. Where for a Combined Cycle Train, the Resource r is a Combined Cycle Generation Resource within the Combined Cycle Train. | | BP *q, r, p, y* | MW | *Base Point per QSE per Settlement Point per Generation Resource*—The SCED Base Point *y* of Resource *r* at Resource Node *p* represented by QSE *q*. For a Combined Cycle Train, the Resource *r* must be one of the registered Combined Cycle Generation Resources within the Combined Cycle Train. | | ADMOCPR *q, p, r, i* | $/MWh | *Adjusted Mitigated Offer Cap Price per QSE per Settlement Interval per Generation Resource*—The mitigated offer curve price adjusted by the verified actual fuel cost for the Generation Resource *r* at Resource Node *p* represented by QSE *q* over the 15-minute Settlement Interval *i*. Notwithstanding the above, the multiplier, pursuant to item (e) of Section 4.4.9.4.1, shall be set to 1 for all capacity factors. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price*—The Real-Time Settlement Point Price at the Resource Node *p* for the Settlement Interval *i*. | | RTMG *q, r, p, i* | MWh | *Real-Time Metered Generation per QSE per Settlement Point per Generation Resource*—The metered generation, of Resource *r,* at Resource Node *p* represented by QSE *q* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. The RTMG used in the calculation of EFCQTY shall correspond to the value available for the Initial Settlement and shall not change with additional Resettlements. | | MOCFLAG *q,p,r,i* | none | *Mitigated Offer Cap Flag per QSE per Settlement Point per Settlement Interval per Generation Resource*—The Mitigated Offer Cap flag for the Generation Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time, for the corresponding 15-minute Settlement Interval *i*. For any 15-minute Settlement Interval that has at least one mitigated SCED Base Point, the MOCFLAG shall have a value of 1 for the Settlement Interval; otherwise, the value shall be 0. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | AGBP*q, r, p,i* | MWh | *Aggregated Base Point*—The Generation Resource’s aggregated Base Point, of Resource *r,* at Resource Node *p,* represented by QSE *q,* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | AVGBP *q, r, p, i* | MW | *Average Base Point per QSE per Settlement Point per Generation Resource*—The average of the five-minute clock interval Base Points (pursuant to Section 6.6.5.1, Resource Base Point Deviation Charge) over the 15-minute Settlement Interval *i* for Generation Resource *r* represented by QSE *q* at Settlement Point *p*. | | EBPWAPR *q, r, p* | $/MWh | *Emergency Base Point Weighted Average Price per QSE per Settlement Point per Resource*—The weighted average of the energy prices corresponding with the Emergency Base Points on the Energy Offer Curve for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. The EBPWAPR used in EFCPR, per Section 6.6.3.7, shall be the price calculated for Resources that receive manual overrides and qualify for additional payments per section (4) Nodal Protocols 6.6.9 Emergency Operations Settlement. | | LSL *q,r,i* | MW | *Low Sustained Limit Generation per QSE per Settlement Point per Resource*—The LSL of Generation Resource *r* represented by QSE *q* at Resource Node p for the hour that includes the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Generation Resource. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y*. | | *q* | none | A QSE. | | *r* | none | A Generation Resource. | | *p* | none | A Resource Node Settlement Point. | | *i* | none | A 15-minute Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval in which the Generation Resource was mitigated. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. | | 3600 | second | The number of seconds in one hour. |   (2) The total compensation to each QSE for Real-Time Make-Whole Payment for exceptional fuel costs for the 15-minute Settlement Interval is calculated as follows:  **EMWAMTQSETOT *q, i* =  EFCMWAMT *q, p, r, i***  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | EFCMWAMT *q, p, r, i* | $ | *Exceptional Fuel Cost Make-Whole Payment Amount per QSE per Settlement Point per Generation Resource*—The exceptional fuel cost Make-Whole Payment to QSE *q* at Resource Node *p* as a result of Generation Resource *r* receiving a Base Point at the Mitigated Offer Cap during a 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | EMWAMTQSETOT*q, i* | $ | *Exceptional Fuel Cost Make-Whole Payment Amount per QSE*—The total payment to QSE *q* for Real-Time exceptional fuel cost Make-Whole Payment during a 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | *q* | none | A QSE. | | *p* | none | A Resource Node Settlement Point. | | *r* | none | A Generation Resource. | | *i* | none | A 15-minute Settlement Interval. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR664: Insert Section 6.6.3.8 below upon system implementation:]  **6.6.3.8 Real-Time Make-Whole Charge for Exceptional Fuel Cost**  ERCOT shall charge each QSE representing Load Serving Entities (LSEs) the total payment for Exceptional Fuel costs as specified in Section 6.6.3.7, Real-Time Make-Whole Payment for Exceptional Fuel Cost, based on LRS. The charge to each QSE for a given 15-minute Settlement Interval is calculated as follows:  LAEFCAMT *q, i*  = (-1) \* EMWAMTTOT *i \** LRS *q,* ***i***  Where:  EMWAMTTOT *i* =  EMWAMTQSETOT*q, i*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | LAEFCAMT *q, i* | $ | *Real-Time Make-Whole Charge for Exceptional Fuel Cost per QSE*—The charge to QSE *q* for Real-Time exceptional fuel cost Make-Whole Payments, for the 15-minute Settlement Interval *i*. | | EMWAMTTOT *i* | $ | *Exceptional Fuel Cost Make-Whole Payment Amount —*The total payment to all QSEs for Real-Time exceptional fuel cost Make-Whole Payment during a 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | EMWAMTQSETOT*q, i* | $ | *Exceptional Fuel Cost Make-Whole Payment Amount per QSE* —The total payment to QSE *q* for Real-Time exceptional fuel cost Make-Whole Payment during a 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | LRS *q, i* | none | *The Load Ratio Share* calculated for QSE *q* for the 15-minute Settlement Interval *i*. See Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval. | | *q* | none | A QSE. | | *i* | none | A 15-minute Settlement Interval. | |

6.6.4 Real-Time Congestion Payment or Charge for Self-Schedules

(1) The congestion payment or charge to each QSE submitting a Self-Schedule calculated based on the difference in Real-Time SPPs at the specified sink and the source of the Self-Schedule multiplied by the amount of the Self-Schedule. The congestion charge to each QSE for each of its Self-Schedule for a given 15-minute Settlement Interval is calculated as follows:

RTCCAMT *q, s*  = (RTSPP *sink, s* – RTSPP *source, s*) \* (SSQ *q, s* \* ¼)

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RTCCAMT *q, s* | $ | *Real-Time Congestion Cost Amount per QSE per Self-Schedule*—The congestion charge to QSE *q* for its Self-Schedule *s*, for the 15-minute Settlement Interval. |
| RTSPP *sink, s* | $/MWh | *Real-Time Settlement Point Price at the Sink of Self-Schedule*—The Real-Time SPP at the sink of the Self-Schedule *s*, for the 15-minute Settlement Interval. |
| RTSPP *source, s* | $/MWh | *Real-Time Settlement Point Price at the Source of Self-Schedule*—The Real-Time SPP at the source of the Self-Schedule *s*, for the 15-minute Settlement Interval. |
| SSQ *q,s* | MW | *Self-Schedule Quantity per Self-Schedule*—The QSE *q*’s Self Schedule MW quantity for Self-Schedule *s*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *s* | none | A Self-Schedule. |
| *sink* | none | Sink Settlement Point |
| *source* | none | Source Settlement Point |

(2) The total net congestion payments and charges to each QSE for all its Self-Schedules for the 15-minute Settlement Interval is calculated as follows:

RTCCAMTQSETOT *q* = RTCCAMT *q, s*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RTCCAMTQSETOT *q* | $ | *Real-Time Congestion Cost Amount QSE Total per QSE*⎯The total net congestion payments and charges to QSE *q* for its Self-Schedules for the 15-minute Settlement Interval. |
| RTCCAMT *q, s* | $ | *Real-Time Congestion Cost Amount per QSE per Self-Schedule*—The congestion payment or charge to QSE *q* for its Self-Schedule *s*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *s* | none | A Self-Schedule. |

6.6.5 Base Point Deviation Charge

6.6.5.1 Resource Base Point Deviation Charge

A QSE for a Generation Resource or Controllable Load Resource shall pay a Base Point Deviation Charge if the Resource did not follow Dispatch Instructions and Ancillary Service deployments within defined tolerances, except when the Dispatch Instructions and Ancillary Service deployments violate the Resource Parameters. The Base Point Deviation Charge does not apply to Generation Resources when Adjusted Aggregated Base Point (AABP) is less than the Resource’s average telemetered Low Sustained Limit (LSL), the QSE’s Generation Resources are operating in Constant Frequency Control (CFC) mode, or any time during the Settlement Interval when the telemetered Resource Status is set to ONTEST or STARTUP. The Base Point Deviation Charge does not apply to a Controllable Load Resource if the computed Base Point is equal to the snapshot of its telemetered power consumption for all SCED runs during the Settlement Interval or any time during the Settlement Interval when the telemetered Resource Status is set to OUTL. The desired output from a Generation Resource or desired consumption from a Controllable Load Resource during a 15-minute Settlement Interval is calculated as follows:

AABP*q, r, p, i* = AVGBP*q, r, p, i* + AVGREG*q, r, p, i*

AVGBP*q, r, p, i* =  (AVGBP5M *q, r, p, i, y*) / 3

AVGREG*q, r, p, i* =  (AVGREG5M *q, r, p, i, y*) / 3

Where:

AVGREG5M *q, r, p, i, y*=(AVGREGUP5M*q, r, p, i, y* - AVGREGDN5M*q, r, p, i, y*)

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| AABP *q, r, p, i* | MW | *Adjusted Aggregated Base Point per QSE per Settlement Point per Resource*—The aggregated Base Point adjusted for Ancillary Service deployments of Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, AABP is calculated for the Combined Cycle Train considering all SCED Dispatch Instructions to any Combined Cycle Generation Resources within the Combined Cycle Train. |
| AVGBP *q, r, p, i* | MW | *Average Base Point per QSE per Settlement Point per Resource*—The average of the five-minute clock interval Base Points over the 15-minute Settlement Interval *i* for Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*. |
| AVGBP5M *q, r, p, i, y* | MW | *Average five-minute clock interval Base Point per QSE per Settlement Point per Resource*—The average Base Point for the Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the five-minute clock interval *y* within the 15-minute Settlement Interval *i*. The time-weighted average of the linearly ramped Base Points in a five-minute clock interval *y*. The linearly ramped Base Point is calculated every four seconds such that it ramps from its initial value to the SCED Base Point over a five-minute clock interval *y*. The initial value of the linearly ramped Base Point will be the four second value of the previous linearly ramped Base Point at the time the new SCED Base Point is received into the ERCOT Energy Management System (EMS).  The linear ramp is recalculated each time that a new Base Point is received from SCED. AVGBP5M is equal to the ABP value calculated for use in Generation Resource Energy Deployment Performance (GREDP) or the ABP value calculated for use in the Controllable Load Resource Energy Deployment Performance (CLREDP), as described in Section 8.1.1.4.1, Regulation Service and Generation Resource/Controllable Load Resource Energy Deployment Performance. |
| AVGREG *q, r, p, i* | MW | *Average Regulation Instruction per QSE per Settlement Point per Resource* —The average of the five-minute clock interval *y* Regulation Instruction Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* over the 15-minute Settlement Interval *i*. |
| AVGREG5M *q, r, p, i, y* | MW | *Total Average five-minute clock interval Regulation Instruction per QSE per Settlement Point per Resource*—The total amount of regulation that the Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* should have produced based on Load Frequency Control (LFC) deployment signals over the five-minute clock interval *y* within the 15-minute Settlement Interval *i*. |
| AVGREGUP5M *q, r, p, i, y* | MW | *Average Regulation Instruction Up per QSE per Settlement Point per Resource*—The amount of Regulation Up (Reg-Up) that the Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* should have produced based on LFC deployment signals over the five-minute clock interval *y* within the 15-minute Settlement Interval *i*. |
| AVGREGDN5M *q, r, p, i, y* | MW | *Average Regulation Instruction Down per QSE per Settlement Point per Resource*—The amount of Regulation Down (Reg-Down) that the Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* should have produced based on LFC deployment signals over the five-minute clock interval *y* within the 15-minute Settlement Interval *i*. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *r* | none | A Generation Resource or Controllable Load Resource. |
| *i* | None | A 15-minute Settlement Interval |
| *y* | none | A five-minute clock interval in the Settlement Interval. |

*6.6.5.1.1 General Generation Resource and Controllable Load Resource Base Point Deviation Charge*

(1) Unless one of the exceptions specified in paragraphs (2) and (3) below applies, ERCOT shall charge a Base Point Deviation Charge for a Resource other than those described in Section 6.6.5.2, IRR Generation Resource Base Point Deviation Charge, and Section 6.6.5.3, Generators Exempt from Deviation Charges, when the telemetered generation of the Generation Resource or telemetered power consumption of the Controllable Load Resource over the 15-minute Settlement Interval is outside the tolerances defined later in this Section 6.6.5.1.1.

(2) ERCOT may not charge a QSE a Base Point Deviation Charge under paragraph (1) above when both of the following apply:

(a) The deviation of the Resource over the 15-minute Settlement Interval is in a direction that contributes to frequency corrections that resolve an ERCOT System frequency deviation; and

(b) The ERCOT System frequency deviation is greater than +/-0.05 Hz at any time during the 15-minute Settlement Interval.

(3) ERCOT may not charge a QSE a Base Point Deviation Charge under paragraph (1) above for any 15-minute Settlement Interval during which Responsive Reserve (RRS) is deployed.

6.6.5.1.1.1 Base Point Deviation Charge for Over Generation

(1) ERCOT shall charge a QSE for a Generation Resource for over-generation that exceeds the following tolerance. The tolerance is the greater of:

(a) 5% of the average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments; or

(b) Five MW for metered generation above the average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments.

(2) The over-generation charge to each QSE for each Generation Resource at each Resource Node Settlement Point is calculated as follows:

BPDAMT *q, r, p, i*  = Max (PR1, RTSPP *p, i*) \* OGEN *q, r, p, i*

Where:

OGEN *q, r, p, i*  = Max [0, (TWTG*q, r, p, i*  – ¼ \* Max (((1 + K1) \* AABP *q, r, p, i*), (AABP *q, r, p, i* + Q1)))]

TWTG *q, r, p, i =* ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| BPDAMT *q, r, p, i* | $ | *Base Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource *r* at Resource Node *p*, for its deviation from Base Point, for the 15-minute Settlement Interval *i*. The Base Point Deviation Charge is charged to the Combined Cycle Train for all Combined Cycle Generation Resources. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
| TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| AABP *q, r, p, i* | MW | *Adjusted Aggregated Base Point per QSE per Settlement Point per Resource*—The aggregated Base Point adjusted for Ancillary Service deployments, of Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p,* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, AABP is calculated for the Combined Cycle Train considering all SCED Dispatch Instructions to any Combined Cycle Generation Resources within the Combined Cycle Train. |
| AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes*—The average telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. |
| OGEN *q, r, p, i* | MW | *Over Generation Volumes per QSE per Settlement Point per Resource*—The amount over-generated by the Generation Resource *r* represented by QSE *q* at Resource Node *p* for the 15- minute Settlement Interval *i*. |
| PR1 | $/MWh | The price to use for the Base Point Deviation Charge for over-generation when RTSPP is less than $20/MWh, $20/MWh. |
| K1 | none | The percentage tolerance for over-generation, 5%. |
| Q1 | MW | The MW tolerance for over-generation, five MW. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *r* | none | A non-exempt, non-Intermittent Renewable Resource (IRR). |
| *y* | none | A five-minute clock interval in the Settlement Interval. |
| *i* | none | A 15-minute Settlement Interval. |

6.6.5.1.1.2 Base Point Deviation Charge for Under Generation

(1) ERCOT shall charge a QSE for a Generation Resource for under generation if the metered generation is below the lesser of:

(a) 95% of the average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments; or

(b) The average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments minus five MW.

(2) The under-generation charge to each QSE for each Generation Resource at each Resource Node Settlement Point for a given 15-minute Settlement Interval is calculated as follows:

**BPDAMT *q, r, p, i* = -1 \* Min (PR2, RTSPP*p,i*) \* Min (1, KP) \* UGEN *q, r, p, i***

Where:

UGEN *q, r, p, i* = Max [0, [Min ((1 - K2) \* ¼\* AABP *q, r, p, i* ,

¼ \* (AABP *q, r, p, i* - Q2)) - TWTG*q, r, p, i*]]

TWTG *q, r, p, i =* ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| BPDAMT *q, r, p, i* | $ | *Base Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource *r* at Resource Node *p*, for its deviation from Base Point, for the 15-minute Settlement Interval *i*. A Base Point Deviation Charge is charged to the Combined Cycle Train for all Combined Cycle Generation Resources. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
| TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| AABP*q, r, p, i* | MW | *Adjusted Aggregated Base Point*—The aggregated Base Point adjusted for Ancillary Service deployments of Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, AABP is calculated for the Combined Cycle Train considering all SCED Dispatch Instructions to any Combined Cycle Generation Resources within the Combined Cycle Train. |
| AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes* —The average telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. |
| UGEN *q, r, p, i* | 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 *i*. |
| KP | None | The coefficient applied to the Settlement Point Price for under-generation charge, 1.0. |
| PR2 | $/MWh | The price to use for the Base Point Deviation Charge for under-generation calculation when RTSPP is greater than -$20/MWh, -$20/MWh. |
| K2 | None | The percentage tolerance for under-generation, 5%. |
| Q2 | MW | The MW tolerance for under-generation, five MW. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *r* | none | A non-exempt, non-IRR. |
| *y* | none | A five-minute clock interval in the Settlement Interval. |
| *i* | none | A 15-minute Settlement Interval. |

6.6.5.1.1.3 Controllable Load Resource Base Point Deviation Charge for Over Consumption

(1) ERCOT shall charge a QSE for a Controllable Load Resource for over-consumption that exceeds the following tolerance. The tolerance is the greater of:

(a) XO% of the average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments; or

(b) YO MW for power consumption above the average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments.

(2) The Controllable Load Resource Base Point Deviation Charge for over-consumption variables XO and YO shall be subject to review and approval by the Technical Advisory Committee (TAC) and shall be posted to the MIS Public Area no later than three Business Days after TAC approval.

(3) The charge to each QSE for non-excused over-consumption for each Controllable Load Resource during a 15-minute Settlement Interval in which the Controllable Load Resource has received a Base Point is calculated as follows:

BPDAMT *q, r, p, i* = -1 \* Min (PRZ1, RTSPP*p,i*) \* Min (1, KP1) \* OCONSM*q, r, p, i*

Where:

OCONSM *q, r, p, i*  = Max [0, (ATPC*q, r, p, i* - ¼\* Max (((1 + KLR1) \* AABP *q, r, p, i*), (AABP *q, r, p, i* + QLR1)))]

ATPC *q, r, p, i* = ( (AVGTPC5M *q, r, p i ,y*) / 3) \* ¼

The above variables are defined as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Unit | Definition | |
| BPDAMT *q, r, p, i* | $ | *Base Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource or Controllable Load Resource *r* at Settlement Point *p*, for its deviation from Base Point, for the 15-minute Settlement Interval *i*. | |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | |
| ATPC *q, r, p, i* | MWh | *Average Telemetered Power Consumption per QSE per Settlement Point per Controllable Load Resource*—The average telemetered power consumption of the Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i.* |
| AABP *q, r, p, i* | MW | *Adjusted Aggregated Base Point per QSE per Settlement Point per Resource*—The aggregated Base Point adjusted for Ancillary Service deployments of Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
| AVGTPC5M *q, r, p, i, y* | MW | *Average Telemetered Power Consumption for the 5 Minutes*—The average telemetered power consumption of Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | |
| OCONSM *q, r, p, i* | MW | *Over-Consumption Volumes per QSE per Settlement Point per Controllable Load Resource*—The amount over-consumed by the Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* for the 15-minute Settlement Interval *i*. | |
| KP1 | None | The coefficient applied to the Settlement Point Price for over-consumption charge, 1.0. | |
| PRZ1 | $/MWh | The price to use for the charge calculation when RTSPP is greater than -$20, -$20/MWh. | |
| KLR1 |  | The percentage tolerance for over-consumption of a Controllable Load Resource, XO%. | |
| QLR1 | MW | The MW tolerance for over-consumption of a Controllable Load Resource, YO MW. | |
| *q* | none | A QSE. | |
| *p* | none | A Settlement Point. | |
| *r* | None | A Controllable Load Resource. | |
| *i* | none | A 15-minute Settlement Interval. | |
| *y* | none | A five-minute clock interval in the Settlement Interval. | |

6.6.5.1.1.4 Controllable Load Resource Base Point Deviation Charge for Under Consumption

(1) ERCOT shall charge a QSE for a Controllable Load Resource for under-consumption if the average telemetered power consumption is below than the lesser of:

(a) [100-XU]% of the average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments; or

(b) The average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments minus YU MW.

(2) The Controllable Load Resource Base Point Deviation Charge for under-consumption variables XU and YU shall be subject to review and approval by TAC and shall be posted to the MIS Public Area no later than three Business Days after TAC approval.

(3) The charge to each QSE for non-excused under-consumption of each Controllable Load Resource during a 15-minute Settlement Interval in which the Controllable Load Resource has received a Base Point is calculated as follows:

BPDAMT *q, r, p, i* = Max (PRZ2, RTSPP *p, i*) \* UCONSM*q, r, p, i*

Where:

UCONSM *q, r, p, i*  = Max [0, [Min ((1 – KLR2) \* ¼\* AABP *q, r, p, i* ,¼ \* (AABP *q, r, p, i* – QLR2)) – ATPC*q, r, p, i*]]

ATPC *q, r, p, i =*  ( (AVGTPC5M *q, r, p i ,y,*) / 3) \* ¼

The above variables are defined as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Unit | Definition | |
| BPDAMT *q, r, p, i* | $ | *Base Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource or Controllable Load Resource *r* at Settlement Point *p*, for its deviation from Base Point, for the 15-minute Settlement Interval *i*. | |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | |
| ATPC *q, r, p, i* | MWh | *Average Telemetered Power Consumption per QSE per Settlement Point per Controllable Load Resource*—The average telemetered power consumption of the Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i.* |
| AABP *q, r, p, i* | MW | *Adjusted Aggregated Base Point per QSE per Settlement Point per Resource*—The aggregated Base Point adjusted for Ancillary Service deployments of Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
| AVGTPC5M *q, r, p, i, y* | MW | *Average Telemetered Power Consumption for the 5 Minutes*—The average telemetered power consumption of Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | |
| UCONSM *q, r, p, i* | MW | *Under Consumption Volumes per QSE per Settlement Point per Controllable Load Resource*—The amount under-consumed by the Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* for the 15-minute Settlement Interval *i*. | |
| PRZ2 | $/MWh | The price to use for the Base Point Deviation Charge for under-consumption calculation when RTSPP is less than $20/MWh, $20/MWh. | |
| KLR2 |  | The percentage tolerance for under-consumption of a Controllable Load Resource, XU%. | |
| QLR2 | MW | The MW tolerance for under-consumption of a Controllable Load Resource, YU MW. | |
| *q* | none | A QSE. | |
| *p* | none | A Settlement Point. | |
| *r* | None | A Controllable Load Resource. | |
| *i* | none | A 15-minute Settlement Interval. | |
| *y* | none | A five-minute clock interval in the Settlement Interval. | |

**6.6.5.2 IRR Generation Resource Base Point Deviation Charge**

(1) ERCOT shall charge a QSE for an IRR a Base Point Deviation Charge if the IRR metered generation is more than 10% above its Adjusted Aggregated Base Point and the flag signifying that the IRR has received a Base Point below the High Dispatch Limit (HDL) used by SCED has been received.

(2) The charge to each QSE for non-excused over-generation of each IRR that is not included in a Wind-powered Generation Resource (WGR) Group at each Resource Node Settlement Point during a 15-minute Settlement Interval, is calculated as follows:

If the flag signifying that the IRR has received a Base Point below the HDL used by SCED is not set in all SCED intervals within the 15-minute Settlement Interval:

BPDAMT *q, r, p, i* = 0

Otherwise, if the flag signifying that the IRR has received a Base Point below the HDL used by SCED is set in all SCED intervals within the 15-minute Settlement Interval:

BPDAMT *q, r, p, i* = Max (PR1, RTSPP *p, i*) \* OGENIRR*q, r, p, i*

Where:

OGENIRR *q, r, p, i*  = Max [0, TWTG *q, r, p, i*  – ¼ \* AABP *q, r, p, i \**  (1 + KIRR)]

TWTG *q, r, p, i =*  ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼

|  |
| --- |
| [NPRR588: Replace paragraph (2) above with the following upon system implementation:]  (2) The charge to each QSE for non-excused over-generation of each IRR that is not included in an IRR Group at each Resource Node Settlement Point during a 15-minute Settlement Interval, is calculated as follows:  If the flag signifying that the IRR has received a Base Point below the HDL used by SCED is not set in all SCED intervals within the 15-minute Settlement Interval:  BPDAMT *q, r, p, i* = 0  Otherwise, if the flag signifying that the IRR has received a Base Point below the HDL used by SCED is set in all SCED intervals within the 15-minute Settlement Interval:  BPDAMT *q, r, p, i* = Max (PR1, RTSPP *p, i*) \* OGENIRR*q, r, p, i*  Where:  OGENIRR *q, r, p, i*  = Max [0, TWTG *q, r, p, i*  – ¼ \* AABP *q, r, p, i \**  (1 + KIRR)]  TWTG *q, r, p, i =*  ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼ |

(3) The charge to each QSE for non-excused over-generation of each WGR that is included in a WGR Group, at each Resource Node Settlement Point, if the Real-Time metered generation is greater than the upper tolerance during a 15-minute Settlement Interval, is calculated as follows:

If the flag signifying that the IRR has received a Base Point below the HDL used by SCED is not set in all SCED intervals within the 15-minute Settlement Interval for any of the WGRs within a WGR Group, then for all WGRs within a WGR Group:

**BPDAMT *q, r, p* = 0**

If the flag signifying that the WGR has received a Base Point below the HDL used by SCED is set in all SCED intervals within the 15-minute Settlement Interval for any of the WGRs within a WGR Group, then the deviation penalty is determined for the WGR Group and evenly allocated and charged to each WGR within that WGR Group:

**BPDAMT *q, r, p* = [Max (PR1, RTSPP*p*) \* OGENIRR *q, wg, i* ] / N**

Where:

OGENIRR *q, wg, i*  = Max [0, TWTG *q, wg, i*  – ¼ \* AABP *q, wg, i \**  (1 + KIRR)]

TWTG *q, wg, i =*  (TWTG *q, r, p, i*)

AABP *q,wg, i* = (AABP *q, r, p, i*)

The above variables are defined as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Unit | Definition | |
| BPDAMT *q, r, p, i* | $ | *Base Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource *r* at Resource Node *p*, for its deviation from Base Point, for the 15-minute Settlement Interval *i*. | |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Resource Node *p*, for the 15-minute Settlement Interval *i*. | |
| TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i.* |
| AABP *q, r, p, i* | MW | *Adjusted Aggregated Base Point Generation per QSE per Settlement Point per Resource*—The aggregated Base Point adjusted for Ancillary Service deployments, of Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i.* |
| AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes*—The average telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | |
| OGENIRR *q, r, p, i* | MW | *Over Generation Volumes per QSE per Settlement Point per IRR Generation Resource*—The amount over generated by the IRR *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval *i*. | |
| PR1 | $/MWh | The price to use for the charge calculation when RTSPP is less than $20/MWh, $20/MWh. | |
| KIRR |  | The percentage tolerance for over-generation of an IRR, 10%. | |
| N | none | The number of WGRs within a WGR Group. | |
| *q* | none | A QSE. | |
| *p* | none | A Settlement Point. | |
| *r* | none | An IRR Generation Resource or a WGR within a WGR Group. | |
| *i* | none | A 15-minute Settlement Interval. | |
| *y* | none | A five-minute clock interval in the Settlement Interval. | |
| *wg* | none | A WGR Group. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR588: Replace paragraph (3) above with the following upon system implementation:]  (3) The charge to each QSE for non-excused over-generation of each IRR that is included in an IRR Group, at each Resource Node Settlement Point, if the Real-Time metered generation is greater than the upper tolerance during a 15-minute Settlement Interval, is calculated as follows:  If the flag signifying that the IRR has received a Base Point below the HDL used by SCED is not set in all SCED intervals within the 15-minute Settlement Interval for any of the IRRs within an IRR Group, then for all IRRs within an IRR Group:  **BPDAMT *q, r, p* = 0**  If the flag signifying that the IRR has received a Base Point below the HDL used by SCED is set in all SCED intervals within the 15-minute Settlement Interval for any of the IRRs within an IRR Group, then the deviation penalty is determined for the IRR Group and evenly allocated and charged to each IRR within that IRR Group:  **BPDAMT *q, r, p* = [Max (PR1, RTSPP*p*) \* OGENIRR *q, wg, i* ] / N**  Where:  OGENIRR *q, wg, i*  = Max [0, TWTG *q, wg, i*  – ¼ \* AABP *q, wg, i \**  (1 + KIRR)]  TWTG *q, wg, i =*  (TWTG *q, r, p, i*)  AABP *q,wg, i* = (AABP *q, r, p, i*)  The above variables are defined as follows:   |  |  |  |  | | --- | --- | --- | --- | | Variable | Unit | Definition | | | BPDAMT *q, r, p, i* | $ | *Base Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource *r* at Resource Node *p*, for its deviation from Base Point, for the 15-minute Settlement Interval *i*. | | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Resource Node *p*, for the 15-minute Settlement Interval *i*. | | | TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i.* | | AABP *q, r, p, i* | MW | *Adjusted Aggregated Base Point Generation per QSE per Settlement Point per Resource*—The aggregated Base Point adjusted for Ancillary Service deployments, of Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i.* | | AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes*—The average telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | | | OGENIRR *q, r, p, i* | MW | *Over Generation Volumes per QSE per Settlement Point per IRR Generation Resource*—The amount over generated by the IRR *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval *i*. | | | PR1 | $/MWh | The price to use for the charge calculation when RTSPP is less than $20/MWh, $20/MWh. | | | KIRR |  | The percentage tolerance for over-generation of an IRR, 10%. | | | N | none | The number of IRRs within an IRR Group. | | | *q* | none | A QSE. | | | *p* | none | A Settlement Point. | | | *r* | none | An IRR Generation Resource or an IRR within an IRR Group. | | | *i* | none | A 15-minute Settlement Interval. | | | *y* | none | A five-minute clock interval in the Settlement Interval. | | | *wg* | none | An IRR Group. | | |

6.6.5.3 Generators Exempt from Deviation Charges

(1) Generation Resource Base Point Deviation Charges do not apply to the following:

(a) Reliability Must-Run (RMR) Units;

(b) Dynamically Scheduled Resources (DSRs) (except as described in Section 6.4.2.2, Output Schedules for Dynamically Scheduled Resources);

(c) Qualifying Facilities (QFs) that do not submit an Energy Offer Curve for the Settlement Interval; or

(d) Quick Start Generation Resources (QSGRs) during the 15-minute Settlement Interval after the start of the first SCED interval in which the QSGR is deployed.

6.6.5.4 Base Point Deviation Payment

ERCOT shall pay the Base Point Deviation Charges collected from the QSEs representing Resources to the QSEs representing Load based on LRS. The payment to each QSE for a given 15-minute Settlement Interval is calculated as follows:

LABPDAMT *q* = (-1) \* BPDAMTTOT \* LRS *q*

Where:

BPDAMTTOT = BPDAMTQSETOT *q*

BPDAMTQSETOT *q* = BPDAMT *q, r, p*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| LABPDAMT *q* | $ | *Load-Allocated Base Point Deviation Amount per QSE*—QSE *q*’s share of the total charge for all Resources’ Base Point deviations, based on LRS for the 15-minute Settlement Interval. |
| BPDAMTTOT | $ | *Base Point Deviation Amount Total*—The total of Base Point Deviation Charges to all QSEs for all Resources, for the 15-minute Settlement Interval. |
| BPDAMTQSETOT *q* | $ | *Base Point Deviation Amount QSE Total per QSE*—The total of Base Point Deviation Charges to QSE *q* for all Resources represented by this QSE, for the 15-minute Settlement Interval. |
| BPDAMT *q, r, p* | $ | *Base Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource or Controllable Load Resource *r* at Settlement Node *p*, for its deviation from Base Point, for the 15-minute Settlement Interval. A Base Point Deviation Charge is charged to the Combined Cycle Train for all Combined Cycle Generation Resources. |
| LRS *q* | none | The LRS calculated for QSE *q* for the 15-minute Settlement Interval. See Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *r* | none | A Generation Resource or Controllable Load Resource. |

6.6.6 Reliability Must-Run Settlement

6.6.6.1 RMR Standby Payment

(1) The Standby Payment for RMR Service is paid to each QSE representing an RMR Unit for each RMR Unit for each contracted hour under performance requirements set forth in Section 22, Attachment B, Standard Form Reliability Must-Run Agreement, and other performance requirements in these Protocols. For Initial Settlement, the Standby Payment is the “Estimated Standby Cost” stated in the RMR Agreement. For Final and True-Up Settlements, the Standby Payment is based on the RMR Unit’s actual Eligible Cost.

(2) The Standby Payment to each QSE for each RMR Unit for each hour is calculated as follows:

RMRSBAMT *q, r* = (-1) \* RMRSBPR *q, r*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMRSBAMT *q, r* | $ | *Reliability Must Run Standby Payment per QSE per Resource by hour*—The Standby Payment to QSE *q* for RMR Unit *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRSBPR *q, r* | $ per hour | *Reliability Must Run Standby Price per QSE per Resource by hour*—The hourly standby cost for RMR Unit *r* represented by QSE *q*, for the hour. See item (3) below. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |

(3) For the Initial Settlement and resettlements executed before true-up and before actual cost data is submitted, the standby price of an RMR Unit is the “Estimated Standby Cost” stated in the RMR Agreement. For other resettlements, the standby price of an RMR Unit for each hour is calculated as follows:

RMRSBPR *q, r* = RMRMNFC *q, r* / MH *q, r* \* (1 + RMRIF \* RMRCRF *q, r* \* RMRARF *q, r*)

Where:

RMR Capacity Reduction Factor

If (RMRTCAPA *q, r* + RMRTCAP *q, r* ≥ RMRCCAP *q, r*), then RMRCRF *q, r* = 1

Otherwise

RMRCRF *q, r* = Max (0, 1 – 2 \* (RMRCCAP *q, r* – RMRTCAP *q, r*) **/** RMRCCAP *q, r*)

RMR Availability Reduction Factor

If (RMRHREAF *q, r* ≥ RMRTA *q, r*), then RMRARF *q, r* = 1

Otherwise

RMRARF *q, r* = Max (0, 1 - (RMRTA *q, r* – RMRHREAF *q, r*) \* 2)

RMR Hourly Rolling Equivalent Availability Factor

If (RMREH *q, r* < 4380)

RMRHREAF *q, r* = 1

Otherwise

RMRHREAF *q, r* = ( RMRAFLAG *q, r, hr*) / 4380

Availability for a Combined Cycle Train will be determined pursuant to contractual terms but no more than once per hour.

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMRSBPR *q, r* | $ per hour | *Reliability Must-Run Standby Price per QSE per Resource by hour*—The hourly standby cost for RMR Unit *r* represented by QSE *q,* for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRARF *q, r* | none | *Reliability Must-Run Availability Reduction Factor per QSE per Resource by hour*—The availability reduction factor of RMR Unit *r* represented by QSE *q*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRCRF *q, r* | none | *Reliability Must-Run Capacity Reduction Factor per QSE per Resource by hour*—The capacity reduction factor of the RMR Unit, for the hour. See paragraph (2) of Section 3.14.1.13, Incentive Factor. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRCCAP *q, r* | MW | *Reliability Must-Run Contractual Capacity per QSE per Resource*—The capacity of RMR Unit *r* represented by QSE *q* as specified in the RMR Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRTCAP *q, r* | MW | *Reliability Must-Run Testing Capacity by hour*—The testing capacity of RMR Unit *r* represented by QSE *q*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRTA *q, r* | none | *Reliability Must-Run Target Availability per QSE per Resource*—The Target Availability of RMR Unit *r* represented by QSE *q*, as specified in the RMR Agreement and divided by 100 to convert a percentage to a fraction. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRHREAF *q, r* | none | *Reliability Must-Run Hourly Rolling Equivalent Availability Factor per QSE per Resource by hour*—The equivalent availability factor of RMR Unit *r* represented by QSE *q* over 4380 hours, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMREH *q, r* | none | *Reliability Must-Run Elapsed number of Hours per QSE per Resource by hour*—The number of the elapsed hours of the term of the RMR Agreement for RMR Unit *r* represented by QSE *q*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRMNFC *q, r* | $ | *Reliability Must-Run Monthly Non-Fuel Cost per QSE per Resource*—The actual non-fuel eligible cost of RMR Unit *r* represented by QSE *q*, for the month. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MH *q, r* | hour | *Number of Hours in the Month per QSE per Resource*—The total number of hours of the month, when RMR Unit *r* represented by QSE *q* is under an RMR Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRIF | none | *Reliability Must Run Incentive Factor*—The Incentive Factor of RMR Units under RMR Agreement. |
| RMRARF *q, r* | none | *Reliability Must-Run Availability Reduction Factor per QSE per Resource by hour*—The availability reduction factor of RMR Unit *r* represented by QSE *q*, as calculated for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRAFLAG *q, r, hr* | none | *RMR Availability Flag per QSE per Resource by hour*—The flag of the availability of RMR Resource *r* represented by QSE *q*, 1 for available and 0 for unavailable, for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RMRTCAPA*q, r* | MW | *Reliability Must-Run Testing Capacity Adjustment by hour*—The testing capacity adjustment factor, in the event an ERCOT Operator has deemed that a RMR Unit’s Tested Capacity did not materially affect the reliability of the ERCOT System, of an RMR Unit *r* represented by QSE *q*, for the hour. See paragraph (2) of Section 3.14.1.13. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |
| *hr* | none | The index for a given hour and all the previous 4379 hours. |
| 4380 | none | The number of hours in a six-month period. |

(4) The total of the Standby Payments to each QSE for all RMR Units represented by this QSE for a given hour is calculated as follows:

RMRSBAMTQSETOT *q* = RMRSBAMT *q, r*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMRSBAMTQSETOT q | $ | *Reliability Must-Run Standby Amount QSE Total per QSE*⎯The total of the Standby Payments to QSE *q* for all RMR Units represented by this QSE for the hour. |
| RMRSBAMT q, r | $ | *Reliability Must-Run Standby Payment per QSE per Resource*—The Standby Payment to QSE *q* for RMR Unit *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |

6.6.6.2 RMR Payment for Energy

(1) Payment for energy on the Initial Settlement and settlements executed before true-up and before actual cost data is submitted must be calculated using the estimated input/output curve and startup fuel as specified in the RMR Agreement, the actual energy produced and the FIP. The payment for energy for all other settlements must be based on actual fuel costs for the RMR Unit. The payment for energy for each hour is calculated as follows:

RMREAMT *q, r*= (-1) \* ((FIP + RMRCEFA *q, r*) \* RMRSUFQ *q, r* / RMRH *q, r*) \* RMRALLOCFLAG *q, r* + (((FIP + RMRCEFA *q, r*) \* RMRHR *q, r, i* + RMRVCC *q, r*) \* RTMG *q, r, i*)

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMREAMT *q, r* | $ | *Reliability Must-Run Energy Amount per QSE per Resource by hour*—The energy payment to QSE *q* for RMR Unit *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| FIP | $/MMBtu | *Fuel Index Price*—The FIP for the Operating Day. |
| RMRSUFQ *q, r* | MMBtu | *Reliability Must-Run Startup Fuel Quantity per QSE per Resource*⎯The Estimated Start Up Fuel specified in the RMR Agreement for RMR Unit *r* represented by QSE *q*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRH *q, r,h* | hour | *Reliability Must-Run Hours*—The number of hours during which RMR Unit *r* represented by QSE *q* is instructed On-Line for the Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRALLOCFLAG *q, r* | none | *Reliability Must-Run Startup Flag per QSE per Resource by hour*—The number that indicates whether or not the startup fuel cost of RMR Unit *r* represented by QSE *q* is allocated to the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. The startup fuel cost will be allocated equally to all contiguous intervals for which there is an eligible start. The RMRALLOCFLAG q, r value is 1 if the startup fuel cost is allocated; otherwise, its value is 0.  The RMRALLOCFLAG q, r for eligibility is determined in Sections 5.6.2, RUC Startup Cost Eligibility, and 5.6.3, Forced Outage of a RUC-Committed Resource, for start-up payments and commitments in either the RUC or DAM. |
| RMRHR *q, r, i* | MMBtu /MWh | *Reliability Must-Run Heat Rate per QSE per Resource by Settlement Interval by hour*—The multiplier determined based on the input/output curve and the Real-Time generation of RMR Unit *r* represented by QSE *q*, for the 15-minute Settlement Interval *i* in the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRVCC *q, r* | $/MWh | *Reliability Must-Run Variable Cost Component per QSE per Resource*—The monthly cost component that is used to adjust the energy cost calculation to reflect the actual fuel costs of RMR Unit *r* represented by QSE *q*. The value is initially set to zero. For resettlements, see item (2) below. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMG *q, r, i,* | MWh | *Real-Time Metered Generation per QSE per Resource by Settlement Interval by hour*—The Real-Time energy from RMR Unit *r* represented by QSE *q*, for the 15-minute Settlement Interval *i* in the hour *h*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRCEFA*q, r* | $/MMBtu | *Reliability Must-Run Contractual Estimated Fuel Adder*—The Estimated Fuel Adder that is contractually agreed upon in Section 22, Attachment B, Standard Form Reliability Must-Run Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. The fuel adder will be subsequently trued up to reflect actual fuel costs as set forth in item (1) above. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |
| *i* | none | A 15-minute Settlement Interval. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| [NPRR664: Replace paragraph (1) above with the following upon system implementation:]  (1) Payment for energy on the Initial Settlement and settlements executed before true-up and before actual cost data is submitted must be calculated using the estimated input/output curve and startup fuel as specified in the RMR Agreement, the actual energy produced and the FIPRr. The payment for energy for all other settlements must be based on actual fuel costs for the RMR Unit. The payment for energy for each hour is calculated as follows:  RMREAMT *q, r*= (-1) \* ((FIPRr + RMRCEFA *q, r*) \* RMRSUFQ *q, r* / RMRH *q, r*) \* RMRALLOCFLAG *q, r* + (((FIPRr + RMRCEFA *q, r*) \* RMRHR *q, r, i* + RMRVCC *q, r*) \* RTMG *q, r, i*)  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | RMREAMT *q, r* | $ | *Reliability Must-Run Energy Amount per QSE per Resource by hour*—The energy payment to QSE *q* for RMR Unit *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | FIPRr | $/MMBtu | *Fuel Index Price for Resource*—The FIPRr for the Operating Day. | | RMRSUFQ *q, r* | MMBtu | *Reliability Must-Run Startup Fuel Quantity per QSE per Resource*⎯The Estimated Start Up Fuel specified in the RMR Agreement for RMR Unit *r* represented by QSE *q*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RMRH *q, r,h* | hour | *Reliability Must-Run Hours*—The number of hours during which RMR Unit *r* represented by QSE *q* is instructed On-Line for the Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RMRALLOCFLAG *q, r* | none | *Reliability Must-Run Startup Flag per QSE per Resource by hour*—The number that indicates whether or not the startup fuel cost of RMR Unit *r* represented by QSE *q* is allocated to the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. The startup fuel cost will be allocated equally to all contiguous intervals for which there is an eligible start. The RMRALLOCFLAG q, r value is 1 if the startup fuel cost is allocated; otherwise, its value is 0.  The RMRALLOCFLAG q, r for eligibility is determined in Sections 5.6.2, RUC Startup Cost Eligibility, and 5.6.3, Forced Outage of a RUC-Committed Resource, for start-up payments and commitments in either the Reliability Unit Commitment (RUC) or DAM. | | RMRHR *q, r, i* | MMBtu /MWh | *Reliability Must-Run Heat Rate per QSE per Resource by Settlement Interval by hour*—The multiplier determined based on the input/output curve and the Real-Time generation of RMR Unit *r* represented by QSE *q*, for the 15-minute Settlement Interval *i* in the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RMRVCC *q, r* | $/MWh | *Reliability Must-Run Variable Cost Component per QSE per Resource*—The monthly cost component that is used to adjust the energy cost calculation to reflect the actual fuel costs of RMR Unit *r* represented by QSE *q*. The value is initially set to zero. For resettlements, see item (2) below. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTMG *q, r, i,* | MWh | *Real-Time Metered Generation per QSE per Resource by Settlement Interval by hour*—The Real-Time energy from RMR Unit *r* represented by QSE *q*, for the 15-minute Settlement Interval *i* in the hour *h*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RMRCEFA*q, r* | $/MMBtu | *Reliability Must-Run Contractual Estimated Fuel Adder*—The Estimated Fuel Adder that is contractually agreed upon in Section 22, Attachment B, Standard Form Reliability Must-Run Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. The fuel adder will be subsequently trued up to reflect actual fuel costs as set forth in item (1) above. | | *q* | none | A QSE. | | *r* | none | An RMR Unit. | | *i* | none | A 15-minute Settlement Interval. | |

(2) If the RMR actual fuel cost is filed in accordance with the timeline in these Protocols, the monthly RMR variable cost component is calculated for the subsequent resettlements as follows:

RMRVCC *q, r*= (RMRMFCOST *q, r* + RMREAMT *q, r, f, h*) /

(RTMG *q, r, i*)

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMRVCC *q, r* | $/MWh | *Reliability Must-Run Variable Cost Component per QSE per Resource*—The monthly cost component that is used to adjust the energy cost calculation to reflect the actual fuel costs of RMR Unit *r* represented by QSE *q*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRMFCOST *q, r* | $ | *Reliability Must-Run Monthly actual Fuel Cost per QSE per Resource*—The monthly actual fuel cost of RMR Unit *r* represented by QSE *q*, for the month. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMG *q, r, i* | MWh | *Real-Time Metered Generation per QSE per Resource by Settlement Interval*—The Real-Time energy from RMR Unit *r* represented by QSE *q* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMREAMT *q, r, f, h* | $ | *Reliability Must-Run Energy Amount per QSE per Resource by hour*—The energy payment to QSE *q* for RMR Unit *r*, for the hour *h,* from the former Settlement Statement *f*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |
| *h* | none | An hour in the month. |
| *i* | none | A 15-minute Settlement Interval in the month. |
| *f* | none | Amount from former settlement run. |

(3) The total of the payments for energy to each QSE for all RMR Units represented by this QSE for a given hour is calculated as follows:

RMREAMTQSETOT *q* = RMREAMT *q, r*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| RMREAMTQSETOT *q* | $ | *Reliability Must-Run Energy Amount QSE Total per QSE*⎯The total of the energy payments to QSE *q* for all RMR Units represented by this QSE for the hour. |
| RMREAMT *q, r* | $ | *Reliability Must-Run Energy Amount per QSE per Resource by hour*—The energy payment to QSE *q* for RMR Unit *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |

6.6.6.3 RMR Adjustment Charge

(1) Each QSE that represents an RMR Unit shall pay a charge designed to recover the net total revenues from RUC settlements, and from Real-Time settlements received by that QSE for all RMR Units that it represents, except that the charge does not include net revenues received by the QSE for the RMR Standby Payments calculated under Section 6.6.6.1, RMR Standby Payment, and the RMR energy payments calculated under Section 6.6.6.2, RMR Payment for Energy.

(2) The charge for each QSE representing an RMR Unit for a given Operating Hour is calculated as follows:

RMRAAMT *q* = (-1) \* [(((-1) \*(RTMG *q, r, p, i* \* RTSPP *p, i*)) + EMREAMT *q, r, p, i* + RUCMWAMT *q, r, p* + RUCCBAMT*q, r, p* + RUCDCAMT *q, r, p* + VSSEAMT *q, r, p, i* + VSSVARAMT *q, r, i*)]

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMRAAMT *q* | $ | *RMR Adjustment Charge per QSE*—The adjustment from QSE *q* Standby Payments and energy payments for all RMR Units represented by this QSE, for the revenues received for the same RMR Units from RUC and Real-Time operations, for the hour. |
| EMREAMT *q, r, p, i* | $ | *Emergency Energy Amount per QSE per Settlement Point per unit per interval*—The payment to QSE *q* for the additional energy produced by RMR Unit *r* at Resource Node *p* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. Payment for emergency energy is made to the Combined Cycle Train. |
| RUCMWAMT *q, r, p* | $ | *RUC Make-Whole Amount per QSE per Settlement Point per unit*—The amount calculated for RMR Unit *r* committed in RUC at Resource Node *p* to make whole the Startup Cost and minimum-energy cost of this unit, for the hour. See Section 5.7.1, RUC Make-Whole Payment. When one or more Combined Cycle Generation Resources are committed by RUC, payment is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCCBAMT *q, r* | $ | *RUC Clawback Charge per QSE per unit*—The RUC Clawback Charge to QSE *q* for RMR Unit *r*, for the hour. See Section 5.7.2, RUC Clawback Charge. When one or more Combined Cycle Generation Resources are committed by RUC, a charge is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCDCAMT *q, r, p* | $ | *RUC Decommitment Amount per QSE per Settlement Point per unit*—The amount calculated for RMR Unit *r* at Resource Node *p* represented by QSE *q* due to ERCOT de-commitment, for the hour. When one or more Combined Cycle Generation Resources are decommitted by RUC, payment is made to the Combined Cycle Train for all RUC-decommitted Combined Cycle Generation Resources. |
| VSSEAMT *q, r, p, i* | $ | *Voltage Support Service Energy Amount per QSE per Settlement Point per unit per interval* —The compensation to QSE *q* for ERCOT-directed power reduction from RMR Unit *r* at Resource Node *p* to provide Voltage Support Service (VSS), for the 15-minute Settlement Interval *i*. Payment for VSS is made to the Combined Cycle Train. |
| VSSVARAMT *q, r, i* | $ | *Voltage Support Service VAr Amount per QSE per Unit*—The payment to QSE *q* for the VSS provided by RMR Unit *r*, for the 15-minute Settlement Interval *i*. Payment for VSS is made to the Combined Cycle Train. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
| RTMG *q, r, p, i* | MWh | *Real-Time Metered Generation per QSE per Settlement Point per Resource*—The Real-Time energy produced by the Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *p* | none | A Resource Node Settlement Point. |
| *r* | none | An RMR Unit. |
| *i* | none | A 15-minute Settlement Interval in the hour. |

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| ***[NPRR419: Replace paragraph (2) above with the following upon system implementation:]***  (2) The charge for each QSE representing an RMR Unit for a given Operating Hour is calculated as follows:  RMRAAMT *q* = (-1) \* [((-1) \* RESREV *q, r, gsc, p* + EMREAMT *q, r, p, i* + RUCMWAMT *q, r, p* + RUCCBAMT *q, r, p* + RUCDCAMT *q, r, p* + VSSEAMT *q, r, p, i* + VSSVARAMT *q, r, i*)]  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | RMRAAMT *q* | $ | *RMR Adjustment Charge per QSE*—The adjustment from QSE *q* Standby Payments and energy payments for all RMR Units represented by this QSE, for the revenues received for the same RMR Units from RUC and Real-Time operations, for the hour. | | EMREAMT *q, r, p, i* | $ | *Emergency Energy Amount per QSE per Settlement Point per unit per interval*—The payment to QSE *q* for the additional energy produced by RMR Unit *r* at Resource Node *p* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. Payment for emergency energy is made to the Combined Cycle Train. | | RESREV *q, r, gsc, p* | $ | *Resource Share Revenue Settlement Payment*—The RMR Resource share of the total payment to the entire Facility with a net metering arrangement attributed to Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*. | | RUCMWAMT *q, r, p* | $ | *RUC Make-Whole Amount per QSE per Settlement Point per unit*—The amount calculated for RMR Unit *r* committed in RUC at Resource Node *p* to make whole the Startup Cost and minimum-energy cost of this unit, for the hour. See Section 5.7.1, RUC Make-Whole Payment. When one or more Combined Cycle Generation Resources are committed by RUC, payment is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. | | RUCCBAMT *q, r* | $ | *RUC Clawback Charge per QSE per unit*—The RUC Clawback Charge to QSE *q* for RMR Unit *r*, for the hour. See Section 5.7.2, RUC Clawback Charge. When one or more Combined Cycle Generation Resources are committed by RUC, a charge is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. | | RUCDCAMT *q, r, p* | $ | *RUC Decommitment Amount per QSE per Settlement Point per unit*—The amount calculated for RMR Unit *r* at Resource Node *p* represented by QSE *q* due to ERCOT de-commitment, for the hour. When one or more Combined Cycle Generation Resources are decommitted by RUC, payment is made to the Combined Cycle Train for all RUC-decommitted Combined Cycle Generation Resources. | | VSSEAMT *q, r, p, i* | $ | *Voltage Support Service Energy Amount per QSE per Settlement Point per unit per interval* —The compensation to QSE *q* for ERCOT-directed power reduction from RMR Unit *r* at Resource Node *p* to provide Voltage Support Service (VSS), for the 15-minute Settlement Interval *i*. Payment for VSS is made to the Combined Cycle Train. | | VSSVARAMT *q, r, i* | $ | *Voltage Support Service VAr Amount per QSE per Unit*—The payment to QSE *q* for the VSS provided by RMR Unit *r*, for the 15-minute Settlement Interval *i*. Payment for VSS is made to the Combined Cycle Train. | | *q* | none | A QSE. | | *gsc* | none | A generation site code. | | *p* | none | A Resource Node Settlement Point. | | *r* | none | An RMR Unit. | | *i* | none | A 15-minute Settlement Interval in the hour. | |

6.6.6.4 RMR Charge for Unexcused Misconduct

(1) If a Misconduct Event, as defined in the RMR Agreement, is not excused as provided in the RMR Agreement, then ERCOT shall charge the QSE that represents the RMR Unit an unexcused misconduct amount of $10,000 for each unexcused Misconduct Event as follows:

RMRNPAMT *q, r* = $10,000 \* RMRNPFLAG*q,r*

The above variable is defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMRNPAMT *q, r* | $ | *Reliability Must-Run Unexcused Misconduct Charge per QSE per Resource*—The charge to QSE *q* for the unexcused Misconduct Event of RMR Unit *r* for an Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRNPFLAG *q, r* | $ | *Reliability Must-Run Non-Performance Flag per QSE per Resource*—A flag for the QSE *q* for the unexcused Misconduct Event of RMR Unit *r* for an Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |

(2) The total of the charges to each QSE for unexcused Misconduct Events of all RMR Units represented by this QSE for a given Operating Day is calculated as follows:

RMRNPAMTQSETOT *q* = RMRNPAMT *q, r*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMRNPAMTQSETOT *q* | $ | *Reliability Must-Run Unexcused Misconduct Amount QSE Total per QSE*⎯The total of the charges to QSE *q* for unexcused Misconduct Events of the RMR Units represented by this QSE for the Operating Day. |
| RMRNPAMT *q, r* | $ | *Reliability Must-Run Unexcused Misconduct Charge per QSE per Resource*—The charge to QSE *q* for the unexcused Misconduct Event of RMR Unit *r* for the Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |

6.6.6.5 RMR Service Charge

The total RMR cost for all RMR Units less the amount received from DAM, RUC processes and Real-Time operations for all RMR Units is allocated to the QSEs representing Loads based on LRS. The RMR Service charge to each QSE for a given hour is calculated as follows:

LARMRAMT *q* = (-1) \* (RMRSBAMTTOT + RMREAMTTOT   
+ RMRAAMTTOT – RMRDAESRTVTOT *i* – (RMRDAEREVTOT + RMRDAMWREVTOT) + RMRNPAMTTOT / H) \* HLRS *q*

Where:

RMR Standby Amount Total

RMRSBAMTTOT = RMRSBAMTQSETOT *q*

RMR Energy Amount Total

RMREAMTTOT = RMREAMTQSETOT *q*

RMR Adjustment Charge Total

RMRAAMTTOT = RMRAAMT *q*

RMR Non-Performance Amount Total

RMRNPAMTTOT = RMRNPAMTQSETOT *q*

Total Day-Ahead energy revenue for all RMR Units

RMRDAEREVTOT = DAEREV *q, r, p*

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

Total Real-Time value of Day-Ahead energy for all RMR Units by interval

RMRDAESRTVTOT *i* = DAESRTV *q, r, p, i*

DAESRTV *q, r, p, i* = RTSPP *p, i* \* (DAESR *q, r, p* \* ¼)

Total Real-Time value of Day-Ahead Make-Whole Revenue for all RMR units by interval

RMRDAMWREVTOT *i* = DAMWRMRREVQSETOT

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| LARMRAMT *q* | $ | *Load-Allocated Reliability Must-Run Amount per QSE*—The amount charged to QSE *q* based on its LRS of the difference between the amount paid to all QSEs for RMR Service under Section 6.6.6, Reliability Must-Run Settlement, and the amount that would have been paid to the QSEs for the same RMR Units if they were not providing RMR Service under the other parts of this Section 6, Adjustment Period and Real-Time Operations, Section 5, Transmission Security Analysis and Reliability Unit Commitment, and Section 4, Day-Ahead Operations, for the hour. |
| RMRSBAMTTOT | $ | *RMR Standby Amount Total*—The total of the Standby Payments to all QSEs for all RMR Units, for the hour. |
| RMREAMTTOT | $ | *RMR Energy Amount Total*—The total of the energy cost payments to all QSEs for all RMR Units, for the hour. |
| RMRAAMTTOT | $ | *RMR Adjusted Amount Total*—The total of the adjusted amounts from all QSEs representing RMR Units for the revenues received for these units from RUC, Real-Time operations and Ancillary Service markets, for the hour. |
| RMRNPAMTTOT | $ | *RMR Non-Performance Amount Total*—The total of the charges to all QSEs for unexcused Misconduct Events of all RMR Units, for the Operating Day. |
| RMRDAEREVTOT | $ | *RMR Day-Ahead Energy Revenue Total*—The total of the revenues for the offers cleared in the DAM for all RMR Units, for the hour. |
| RMRDAESRTVTOT | $ | *RMR Day-Ahead Energy Sale Real-Time Value Total*—The total of the Real-Time value of the offers cleared in the DAM for all RMR Units, for the hour. |
| RMRDAMWREVTOT | $ | *RMR Day-Ahead Make-Whole Revenue Total*⎯The total of the RMR Day-Ahead Make-Whole Revenue for all DAM-committed RMR Units for the hour. |
| HLRS *q* | none | The hourly LRS calculated for QSE *q* for the hour. See Section 6.6.2.3, QSE Load Ratio Share for an Operating Hour. |
| RMRSBAMTQSETOT *q* | $ | *Reliability Must-Run Standby Amount QSE Total per QSE*⎯The total of the Standby Payments to QSE *q* for the RMR Units represented by the same QSE for the hour. |
| RMREAMTQSETOT *q* | $ | *Reliability Must-Run Energy Amount QSE Total per QSE*⎯The total of the energy payments to QSE *q* for the RMR Units represented by the same QSE for the hour. |
| RMRAAMT *q* | $ | *RMR Adjusted Amount per QSE*—The adjustment from QSE *q* Standby Payments and energy payments for all RMR Units represented by this QSE, for the revenues received for the same RMR Units from RUC and Real-Time operations, for the hour. |
| RMRNPAMTQSETOT *q* | $ | *Reliability Must-Run Unexcused Misconduct Amount QSE Total per QSE*⎯The total of the charges to QSE *q* for unexcused Misconduct Events of the RMR Units represented by the same QSE for the Operating Day. |
| DAEREV *q, r, p* | $ | *Day-Ahead Energy Revenue per QSE by Settlement Point per unit*⎯The revenue that ERCOT collects for the offer cleared in the DAM submitted for RMR Unit *r* at Resource Node *p* represented by QSE *q*, based on the DAM Settlement Point Price, for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| DAESRTV *q, r, p, i* | $ | *Day-Ahead Energy Sale Real-Time Value per QSE per Settlement Point per unit per interval*—The Real-Time value of the energy sold in the DAM from RMR Unit *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| DASPP *p* | $/MWh | *Day-Ahead Settlement Point Price by Settlement Point*⎯The DAM Settlement Point Price at Resource Node *p* for the hour. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point per interval*—The Real-Time Settlement Point Price at Resource Node *p*, for the 15-minute Settlement Interval *i*. |
| DAESR *q, r, p* | MW | *Day-Ahead Energy Sale from Resource per QSE by Settlement Point per unit*⎯The amount of energy cleared through Three-Part Supply Offers in the DAM and/or DAM Energy-Only Offer Curves for RMR Unit *r* at Resource Node *p* represented by QSE *q* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| DAESR *q, r, p, i* | MW | *Day-Ahead Energy Sale from Resource per QSE by Settlement Point per unit per interval*⎯The amount of energy cleared through Three-Part Supply Offers in the DAM and/or DAM Energy-Only Offer Curves for Resource *r* at Resource Node *p* represented by QSE *q* for the hour that includes the 15-minute Settlement Interval *i*. |
| DAMWRMRREVQSETOT | $ | *Day-Ahead Make-Whole RMR Revenue QSE Total per QSE*⎯The total of the Day-Ahead Make-Whole Revenue calculated for QSE *q* for DAM-committed RMR Units represented by this QSE for the hour. |
| *q* | none | A QSE. |
| *p* | none | A Resource Node Settlement Point. |
| *r* | none | An RMR Unit. |
| *i* | none | A 15-minute Settlement Interval in the hour. |
| H | none | The number of hours of the Operating Day. |

6.6.7 Voltage Support Settlement

6.6.7.1 Voltage Support Service Payments

(1) All other Generation Resources shall be eligible for compensation for Reactive Power production in accordance with Section 6.5.7.7, Voltage Support Service, only if ERCOT issues a Dispatch Instruction that results in the following unit operation:

(a) When ERCOT instructs the Generation Resource to exceed its Unit Reactive Limit (URL) and the Generation Resource provides additional Reactive Power, then ERCOT shall pay for the additional Reactive Power provided at a price that recognizes the avoided cost of reactive support Resources on the transmission network.

(b) Any real power reduction directed by ERCOT through VDIs to provide for additional reactive capability for voltage support must be compensated as a lost opportunity payment

(2) The payment for a given 15-minute Settlement Interval to each QSE representing a Generation Resource that operates in accordance with an ERCOT Dispatch Instruction is calculated as follows:

Depending on the Dispatch Instruction, payment for Volt-Amperes reactive (VAr):

If VSSVARLAG *q, r* > 0

VSSVARAMT *q, r* = (-1) \* VSSVARPR \* VSSVARLAG *q, r*

If VSSVARLEAD *q, r* > 0

VSSVARAMT *q, r* = (-1) \* VSSVARPR \* VSSVARLEAD *q, r*

Where:

VSSVARLAG *q, r* = Max [0, Min (¼ \* VSSVARIOL *q, r*, RTVAR *q, r*) – (¼ \* URLLAG *q, r*)]

VSSVARLEAD *q, r* = Max {0, [(¼ \* URLLEAD *q, r* ) – Max ((¼ \* VSSVARIOL *q, r*), RTVAR *q, r*)]}

URLLAG *q,r* = 0.32868 \* HSL *q,r*

URLLEAD *q,r* = (-1) \* 0.32868 \* HSL *q,r*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| VSSVARAMT *q, r* | $ | *Voltage Support Service VAr Amount per QSE per Generation Resource -* The payment to QSE *q* for the VSS provided by Generation Resource *r*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| VSSVARPR | $/MVArh | *Voltage Support Service VAr Price -* The price for instructed MVAr beyond a Generation Resource’s URL currently is $2.65/MVArh (based on $50.00/installed kVAr). |
| VSSVARLAG *q, r* | MVArh | *Voltage Support Service VAr Lagging per QSE per Generation Resource -* The instructed portion of the Reactive Power above the Generation Resource’s lagging URL for Generation Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| VSSVARLEAD *q, r* | MVArh | *Voltage Support Service VAr Leading per QSE per Generation Resource* - The instructed portion of the Reactive Power below the Generation Resource’s leading URL for Generation Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| VSSVARIOL *q, r* | MVAr | *Voltage Support Service VAr Instructed Output Level per QSE per Generation Resource*—The instructed Reactive Power output level of Generation Resource *r* represented by QSE *q*, lagging Reactive Power if positive and leading Reactive Power if negative, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| RTVAR *q, r* | MVArh | *Real-Time VAr per QSE per Resource*—The netted Reactive Energy measured for Generation Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| URLLAG *q, r* | MVAr | *Unit Reactive Limit Lagging per QSE per Resource*—The URL for lagging Reactive Power of the Generation Resource *r* represented by QSE *q* as determined in accordance with these Protocols. Its value is positive. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| URLLEAD *q, r* | MVAr | *Unit Reactive Limit Leading per QSE per Resource*—The URL for leading Reactive Power of the Generation Resource *r* represented by QSE *q* as determined in accordance with these Protocols. Its value is negative. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| HSL *q, r* | MW | *High Sustained Limit*—The HSL of a Generation Resource as defined in Section 2, Definitions, for the hour that includes the Settlement Interval *i*. Where for a combined cycle resource, *r* is a Combined Cycle Generation Resource. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

(3) The total additional compensation to each QSE for voltage support service for the 15-minute Settlement Interval is calculated as follows:

**VSSVARAMTQSETOTq =**  **VSSVARAMT***q,r*

| Variable | Unit | Definition |
| --- | --- | --- |
| VSSVARAMT *q, r* | $ | *Voltage Support Service VAr Amount per QSE per Generation Resource*—The payment to QSE *q* for the VSS provided by Generation Resource *r*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| VSSVARAMTQSETOT *q* | $ | *Voltage Support VAr Amount QSE total per QSE*—The total of the payments to QSE *q* as compensation for VSS by this QSE for the 15-minute settlement interval. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

(4) The lost opportunity payment, if applicable:

VSSEAMT *q, r* = (-1) \* Max (0, RTSPP p \* Max (0, (HSL *q, r* \* ¼ - RTMG *q, r*)) – (RTICHSL *q, r* – RTVSSAIEC *q, r* \* (RTMG *q, r* - LSL *q, r* \* ¼)))

Where:

RTICHSL *q, r* = RTHSLAIEC *q, r* \* (¼ \* HSL *q, r* – ¼ \* LSL *q, r*)

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| VSSEAMT *q, r* | $ | *Voltage Support Service Energy Amount per QSE per Generation Resource*—The lost opportunity payment to QSE *q* for ERCOT-directed VSS from Generation Resource r for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| RTMG *q, r* | MWh | *Real-Time Metered Generation per QSE per Resource*—The Real-Time metered generation of Generation Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| RTSPP *p* | $ | *Real-Time Settlement Point Price*—The Real-Time SPP at the Resource Node for the 15-minute Settlement Interval. |
| RTVSSAIEC *q, r* | $/MWh | *Real-Time Average Incremental Energy Cost per QSE per Resource*—The average incremental cost to operate (not subject to cost cap) the Generation Resource *r* represented by QSE *q* from its LSL to its metered MW output, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Generation Resource. |
| RTICHSL *q, r* | $ | *Real-Time Incremental Cost Corresponding with HSL per QSE per Resource*—The incremental cost to operate (not subject to cost cap) Generation Resource *r* represented by QSE *q* from its LSL to its HSL, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Generation Resource. |
| RTHSLAIEC *q, r* | $/MWh | *Real-Time Average Incremental Energy Cost for the entire Energy Offer Curve through the HSL per QSE per Resource—*The average incremental cost to operate (not subject to cost cap) the Generation Resource *r* represented by QSE *q* from its LSL to its HSL, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Generation Resource. |
| HSL *q, r* | MW | *High Sustained Limit Generation per QSE per Settlement Point per Resource*—The HSL of Generation Resource *r* represented by QSE *q* at Resource Node p for the hour that includes the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Generation Resource. |
| LSL *q, r* | MW | *Low Sustained Limit Generation per QSE per Settlement Point per Resource*—The LSL of Generation Resource *r* represented by QSE *q* at Resource Node p for the hour that includes the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Generation Resource. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |
| *p* | none | A Resource Node Settlement Point. |

(5) The total of the payments to each QSE for ERCOT-directed power reduction to provide VSS for a given 15-minute Settlement Interval is calculated as follows:

VSSEAMTQSETOT *q* = VSSEAMT *q,*r

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| VSSEAMTQSETOT *q* | $ | *Voltage Support Service Lost Opportunity Amount QSE Total per QSE*⎯The total of the lost opportunity payments to QSE *q* for providing VSS for providing ERCOT-directed VSS for the 15-minute Settlement Interval. |
| VSSEAMT *q, r* | $ | *Voltage Support Service Energy Amount per QSE per Settlement Point per Generation Resource*—The lost opportunity payment to QSE *q* for ERCOT-directed VSS from Generation Resource *r* for the 15-minute Settlement Interval for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

6.6.7.2 Voltage Support Charge

ERCOT shall charge each QSE representing LSEs the total payment for VSS as specified in Section 6.6.7.1, Voltage Support Service Payments, based on a LRS. The charge to each QSE for a given 15-minute Settlement Interval is calculated as follows:

LAVSSAMT *q* = (-1) \* (VSSVARAMTTOT + VSSEAMTTOT) \* LRS *q*

Where:

VSSVARAMTTOT = VSSVARAMTQSETOT *q*

VSSEAMTTOT = VSSEAMTQSETOT *q*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| LAVSSAMT *q* | $ | *Load-Allocated Voltage Support Service Amount per QSE*—The charge to QSE *q* for VSS, for the 15-minute Settlement Interval. |
| VSSVARAMTTOT | $ | *Voltage Support Service var Amount Total*—The total of payments to all QSEs providing VSS, for the 15-minute Settlement Interval. |
| VSSVARAMTQSETOT *q* | $ | *Voltage Support Service var Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for providing VSS for the 15-minute Settlement Interval. |
| LRS *q* | none | *The Load Ratio Share* calculated for QSE *q* for the 15-minute Settlement Interval. See Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval. |
| VSSEAMTTOT | $ | *Voltage Support Service Lost Opportunity Amount Total*—The total of payments to all QSEs providing VSS in lieu of energy, for the 15-minute Settlement Interval. |
| VSSEAMTQSETOT *q* | $ | *Voltage Support Service Lost Opportunity Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for providing VSS in lieu of energy, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |

6.6.8 Black Start Capacity

6.6.8.1 Black Start Hourly Standby Fee Payment

(1) ERCOT shall pay an Hourly Standby Fee to the QSEs representing a Black Start Resource. This standby fee is determined through a competitive bi-annual bidding process, with an adjustment for reliability based on a six-month rolling availability equal to 85% in accordance with Section 22, Attachment D, Standard Form Black Start Agreement.

(2) The Black Start Hourly Standby Fee is subject to reduction and claw-back provisions as described in Section 8.1.1.2.1.5, System Black Start Capability Qualification and Testing.

(3) ERCOT shall pay a Black Start Hourly Standby Fee payment to each QSE for each Black Start Resource. The payment for each hour is calculated as follows:

BSSAMT *q, r* = (-1) \* BSSPR *q, r* \* BSSARF *q, r*

Where:

Black Start Service Availability Reduction Factor

If (BSSHREAF *q, r* ≥ 0.85)

BSSARF *q, r* = 1

Otherwise

BSSARF *q, r* = Max (0, 1 - (0.85 - BSSHREAF *q, r*) \* 2)

Black Start Service Hourly Rolling Equivalent Availability Factor

If (BSSEH *q, r* < 4380)

BSSHREAF *q, r* = 1

Otherwise

BSSHREAF *q, r* = ( BSSAFLAG *q,r,hr*) / 4380

Availability for a Combined Cycle Train will be determined pursuant to contractual terms but no more than once per hour.

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| BSSAMT *q, r* | $ | *Black Start Service Amount per QSE per Resource by hour*—The standby payment to QSE *q* for the Black Start Service (BSS) provided by Resource *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| BSSPR *q, r* | $ per hour | *Black Start Service Price per QSE per Resource*—The standby price of BSS Resource *r* represented by QSE *q*, as specified in the Black Start Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| BSSARF *q, r* | none | *Black Start Service Availability Reduction Factor per QSE per Resource by hour*—The availability reduction factor of Resource *r* represented by QSE *q* under the Black Start Agreement, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| BSSHREAF *q, r* | none | *Black Start Service Hourly Rolling Equivalent Availability Factor per QSE per Resource by hour*—The equivalent availability factor of the BSS Resource *r* represented by QSE *q* over 4,380 hours, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| BSSEH *q, r* | none | *Black Start Service Elapsed number of Hours per QSE per Resource by hour*—The number of the elapsed hours of BSS Resource *r* represented by QSE *q* since the beginning of the BSS Agreement, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| BSSAFLAG *q, r, hr* | none | *Black Start Service Availability Flag per QSE per Resource by hour*—The flag of the availability of BSS Resource *r* represented by QSE *q*, 1 for available and 0 for unavailable, for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | A BSS Resource. |
| *hr* | none | The index of a given hour and the previous 4379 hours. |
| 4380 | none | The number of hours in a six-month period. |

(3) The total of the payments to each QSE for all BSS Resources represented by this QSE for a given hour is calculated as follows:

BSSAMTQSETOT *q* = BSSAMT *q, r*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| BSSAMTQSETOT *q* | $ | *Black Start Service Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for BSS provided by all the BSS Resources represented by this QSE for the hour *h*. |
| BSSAMT *q, r* | $ | *Black Start Service Amount per QSE per Resource*—The standby payment to QSE *q* for BSS provided by Resource *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | A BSS Resource. |

6.6.8.2 Black Start Capacity Charge

ERCOT shall allocate the total Black Start Service Capacity payment to the QSEs representing Loads based on a LRS. The resulting charge to each QSE for a given hour is calculated as follows:

LABSSAMT *q* = (-1) \* BSSAMTTOT \* HLRS *q*

Where:

BSSAMTTOT = BSSAMTQSETOT *q*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| LABSSAMT *q* | $ | *Load-Allocated Black Start Service Amount per QSE*—The charge allocated to QSE *q* for the BSS, for the hour. |
| BSSAMTQSETOT *q* | $ | *Black Start Service Amount QSE Total per QSE*—The Black Start Service payment to QSE *q* for BSS Resource *r*, for the hour. |
| BSSAMTTOT | $ | *Black Start Service Amount QSE Total ERCOT-Wide —* The total of the payments to QSE *q* for BSS provided by all the BSS Resource represented by this QSE for the hour h. |
| HLRS *q* | none | The hourly LRS calculated for QSE *q* for the hour. See Section 6.6.2.3, QSE Load Ratio Share for an Operating Hour. |
| *q* | none | A QSE. |

6.6.9 Emergency Operations Settlement

(1) Due to Emergency Conditions or Watches, additional compensation for each Generation Resource for which ERCOT provides an Emergency Base Point may be awarded to the QSE representing the Generation Resource. If the Emergency Base Point is higher than the SCED Base Point immediately before the Emergency Condition or Watch and the Settlement Point Price at the Resource Node is lower than the Generation Resource’s Energy Offer Curve price at the Emergency Base Point, ERCOT shall pay the QSE additional compensation for the additional energy above the SCED Base Point.

(2) In accordance with paragraph (8) of Section 8.1.1.2, General Capacity Testing Requirements, QSEs that receive a VDI to operate the designated Generation Resource for an unannounced Generation Resource test may be considered for additional compensation utilizing the formula as stated in Section 6.6.9.1, Payment for Emergency Power Increase Directed by ERCOT. If the test period SCED Base Point is higher than the SCED Base Point immediately before the test period and the Settlement Point Price at the Resource Node is lower than the Generation Resource’s Energy Offer Curve price, or Mitigated Offer Cap if no offer exists, at the test Base Point, and the test was not a retest requested by the QSE, ERCOT shall pay the QSE additional compensation for the additional energy above the pre-test SCED Base Point. For the purpose of this Settlement, and limited to Settlement Intervals inclusive of the unannounced Generation Resource test, SCED Base Points will be used in place of the Emergency Base Point.

(3) A QSE that represents a QSGR that comes On-Line as a result of a Base Point greater than zero shall be considered for additional compensation using the formula in Section 6.6.9.1 when the Base Point is less than or equal to its applicable Seasonal net minimum sustainable rating provided in the Resource Registration data. If the Resource Settlement Point Price at the QSGR’s Resource Node is lower than the Energy Offer Curve price, capped per the Mitigated Offer Cap pursuant to Section 4.4.9.4.1, Mitigated Offer Cap, at the aggregated Base Point during the 15-minute Settlement Interval, ERCOT shall pay the QSE additional compensation for the amount of energy from the Off-Line zero Base Point to the aggregated output level. For the purpose of this Settlement, inclusive of the first Settlement Interval in which the QSGR is deployed by SCED from a current SCED Base Point equal to zero MW to a Base Point greater than zero, SCED Base Points will be used in place of the Emergency Base Point. The compensation specified in this paragraph continues over all applicable Intervals until SCED no longer needs the QSGR to generate energy pursuant to Section 3.8.3.1, Quick Start Generation Resource Decommitment Decision Process, and there is no manual Low Dispatch Limit (LDL) override in place on the QSGR.

(4) QSEs that received Base Points that are inconsistent with Real-Time Settlement Point Prices and QSEs that receive a manual override from the ERCOT Operator shall be considered for additional compensation using the formula in Section 6.6.9.1. If the Resource Settlement Point Price at the Resource Node is lower than the Energy Offer Curve price, capped per the Mitigated Offer Cap pursuant to Section 4.4.9.4.1, at the held Base Point during the 15-minute Settlement Interval, ERCOT shall pay the QSE additional compensation for the amount of energy from a zero Base Point to the held Base Point. The held Base Point is the Base Point that the QSE received due to a manual override by ERCOT Operator or the Base Point received by the QSE that ERCOT identified as inconsistent with Real-Time Settlement Point Prices. For the purpose of this Settlement, and limited to the held Settlement Intervals inclusive of the manual override or Base Points identified as inconsistent with prices, SCED Base Points will be used in place of the Emergency Base Point.

(5) In accordance with Section 6.3, Adjustment Period and Real-Time Operations Timeline, if ERCOT sets any SCED interval as failed, then QSEs shall be considered for additional compensation using the formula in Section 6.6.9.1. For the purpose of this Settlement, and limited to the failed SCED interval, SCED Base Points will be used in place of the Emergency Base Point.

(6) For each 15-minute Settlement Interval, a QSGR that receives a manual override from the ERCOT Operator shall only be considered for compensation under paragraph (4) above.

(7) For a QSGR, the Mitigated Offer Cap curve used to cap the Energy Offer Curve shall not include the variable Operations and Maintenance (O&M) adjustment cost to start the Resource from first fire to LSL, including the startup fuel described in paragraph (d) of Section 4.4.9.4.1 for all emergency operations Settlement calculations with the exception of paragraph (3) above.

(8) QSEs that receive a VDI to operate its Resources for an unannounced CFC test, as described in the ERCOT Operating Guides, or have been instructed to operate in CFC mode, may be considered for additional compensation utilizing the formula in Section 6.6.9.1. If the Resource Settlement Point Price at the Resource Node is lower than the Energy Offer Curve price, capped per the Mitigated Offer Cap pursuant to Section 4.4.9.4.1, at the Emergency Base Point during the CFC period, ERCOT shall pay the QSE additional compensation for the amount of energy from a zero Base Point to the Emergency Base Point for each Resource that provided CFC. Compensation for a CFC test will not be provided if the test was a retest requested by the QSE. For the purpose of this Settlement, and limited to Settlement Intervals inclusive of the CFC period, the Emergency Base Point shall be set to the Average Telemetered Generation for the 5 Minutes (AVGTG5M). Only Resources that moved in the direction to correct frequency are eligible to receive compensation for providing CFC.

6.6.9.1 Payment for Emergency Power Increase Directed by ERCOT

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

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

Where:

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

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

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

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

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

The above variables are defined as follows:

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

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

Q1 Q2 SCED Q3 EBP MW

$/

MWh

P 3

P2

P1

The area under the capped Energy Offer Curve equals

(EBPPR \* (EBP – SCED BP))

Mitigated Offer Cap

Extended portion of Energy Offer Curve

Q1 Q2 SCED Q3 EBP MW

$/

MWh

P 3

P2

P1

The area under the capped Energy Offer Curve equals

(EBPPR \* (EBP – SCED BP))

Mitigated Offer Cap

Extended portion of Energy Offer Curve

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

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

The above variables are defined as follows:

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

6.6.9.2 Charge for Emergency Power Increases

The total cost for additional compensation for emergency power increases and unannounced Generation Resource tests is allocated to the QSEs representing Loads based on LRS. The charge to each QSE for a given 15-minute Settlement Interval is calculated as follows:

LAEMREAMT *q* = (-1) \* EMREAMTTOT \* LRS *q*

Where:

EMREAMTTOT = EMREAMTQSETOT *q*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| LAEMREAMT *q* | $ | *Load-Allocated Emergency Energy Amount per QSE*—The QSE *q*’s Load-allocated amount of the total payments for all the Generation Resources with Real-Time Emergency Base Points, for the 15-minute Settlement Interval. |
| EMREAMTTOT | $ | *Emergency Energy Amount Total*⎯The total of the payments to all QSEs as additional compensation for emergency power increases of the Generation Resources for the 15-minute Settlement Interval. |
| EMREAMTQSETOT *q* | $ | *Emergency Energy Amount QSE Total per QSE*⎯The total of the payments to QSE *q* as additional compensation for emergency power increases of the Generation Resources represented by this QSE for the 15-minute Settlement Interval. |
| LRS *q* | none | The LRS calculated for QSE *q* for the 15-minute Settlement Interval. See Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval. |
| *q* | none | A QSE. |

6.6.10 Real-Time Revenue Neutrality Allocation

(1) ERCOT must be revenue-neutral in each Settlement Interval. Each QSE receives an allocated share, on a LRS basis, of the net amount of:

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

(b) Real-Time Energy Imbalance payments or charges under Section 6.6.3.2, Real-Time Energy Imbalance Payment or Charge at a Load Zone;

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

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

(e) Real-Time energy payments under Section 6.6.3.5, Real-Time Payment for a Block Load Transfer Point;

(f) Real-Time energy charge under Section 6.6.3.6, Real-Time Energy Charge for DC Tie Export Represented by the QSE Under the Oklaunion Exemption;

(g) Real-Time congestion payments or charges under Section 6.6.4, Real-Time Congestion Payment or Charge for Self-Schedules;

(h) Real-Time value of Day-Ahead energy sale from RMR Units under Section 6.6.6.5, RMR Service Charge;and

(i) Real-Time payments or charges to the Congestion Revenue Right (CRR) Owners under Section 7.9.2, Real-Time CRR Payments and Charges.

(2) The Real-Time Revenue Neutrality Allocation for each QSE for a given 15-minute Settlement Interval is calculated as follows:

LARTRNAMT *q* = (-1) \* (RTEIAMTTOT + BLTRAMTTOT + RTDCIMPAMTTOT + RTDCEXPAMTTOT + RTCCAMTTOT + RMRDAESRTVTOT + RTOBLAMTTOT / 4 + RTOBLLOAMTTOT / 4) \* LRS *q*

Where:

Total Real-Time Energy Imbalance Payment (or Charge) at Settlement Point (or Hub)

RTEIAMTTOT = RTEIAMTQSETOT *q*

Total Real-Time Payment for BLT Resources

BLTRAMTTOT = BLTRAMTQSETOT *q*

Total Real-Time Payment for DC Tie Imports

RTDCIMPAMTTOT = RTDCIMPAMTQSETOT *q*

Total Real-Time Charge for DC Tie Exports (under “Oklaunion Exemption”)

RTDCEXPAMTTOT = RTDCEXPAMTQSETOT *q*

Total Real-Time Congestion Payment or Charge for Self-Schedules

RTCCAMTTOT = RTCCAMTQSETOT *q*

Total Real-Time Payment or Charge for Point-to-Point (PTP) Obligations

RTOBLAMTTOT = RTOBLAMTQSETOT *q*

Total Real-Time Payment for PTP Obligations with Links to Options

RTOBLLOAMTTOT = RTOBLLOAMTQSETOT *q*

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| LARTRNAMT *q* | $ | *Load-Allocated Real-Time Revenue Neutrality Amount per QSE*—The QSE *q*’s share of the total Real-Time revenue neutrality amount, for the 15-minute Settlement Interval. |
| RTEIAMTTOT *q* | $ | *Real-Time Energy Imbalance Amount Total*—The total net payments and charges for Real-Time Energy Imbalance Service at all Settlement Points (Resource, Load Zone or Hub) for the 15-minute Interval. |
| BLTRAMTTOT | $ | *Block Load Transfer Resource Amount Total*⎯The total of payments for energy delivered into the ERCOT Region through BLT points for the 15-minute Settlement Interval. |
| RTDCIMPAMTTOT | $ | *Real-Time DC Import Amount Total*—The summation of payments for DC Tie imports for the 15-minute Settlement Interval. |
| RTDCEXPAMTTOT | $ | *Real-Time DC Export Amount Total*—The summation of charges to all QSEs under the “Oklaunion Exemption” for DC Tie exports for the 15-minute Settlement Interval. |
| RTCCAMTTOT | $ | *Real-Time Energy Congestion Cost Amount Total*—The total net congestion payments and charges for all Self-Schedules for the 15-minute Settlement Interval. |
| RMRDAESRTVTOT | $ | *RMR Day-Ahead Energy Sale Real-Time Value Total*—The total of the Real-Time value of the Day-Ahead energy sales from all RMR Units for the 15-minute Settlement Interval. See Section 6.6.6, Reliability Must-Run Settlement. |
| RTOBLAMTTOT | $ | *Real-Time Obligation Amount Total*—The sum of all payments and charges for PTP Obligations settled in Real-Time for the hour that includes the 15-minute Settlement Interval. |
| RTOBLLOAMTTOT | $ | *Real-Time Obligation with Links to an Option Amount Total*—The sum of all payments for PTP Obligations with Links to an Option settled in Real-Time for the hour that includes the 15-minute Settlement Interval. |
| RTEIAMTQSETOT *q* | $ | *Real-Time Energy Imbalance Amount QSE Total per QSE*⎯The total net payments and charges to QSE *q* for Real-Time Energy Imbalance at all Resource Node Settlement Points for the 15-minute Settlement Interval. |
| RTCCAMTQSETOT *q* | $ | *Real-Time Congestion Cost Amount QSE Total per QSE*⎯The total net congestion payments and charges to QSE *q* for its Self-Schedules for the 15-minute Settlement Interval. |
| BLTRAMTQSETOT *q* | $ | *Block Load Transfer Resource Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for energy delivered into the ERCOT Region through BLT points for the 15-minute Settlement Interval. |
| RTDCIMPAMTQSETOT *q* | $ | *Real-Time DC Import Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for energy imported into the ERCOT Region through DC Ties for the 15-minute Settlement Interval. |
| RTDCEXPAMTQSETOT *q* | $ | *Real-Time DC Export Amount QSE Total per QSE*⎯The total of the charges to QSE *q* for energy exported from the ERCOT Region through DC Ties for the 15-minute Settlement Interval. |
| RTOBLAMTQSETOT q | $ | *Real-Time Obligation Amount QSE Total per QSE*—The net total payment or charge to QSE *q* of all its PTP Obligations settled in Real-Time for the hour that includes the 15-minute Settlement Interval. See paragraph (2) of Section 7.9.2.1, Payments and Charges for PTP Obligations Settled in Real-Time. |
| RTOBLLOAMTQSETOT *q* | $ | *Real-Time Obligation with Links to an Option Amount QSE Total per QSE*—The total payment to QSE *q* for all of its PTP Obligations with Links to an Option settled in Real-Time for the hour that includes the 15-minute Settlement Interval. See paragraph (2) of Section 7.9.2.1. |
| LRS *q* | none | The LRS calculated for QSE *q* for the 15-minute Settlement Interval. See Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval. |
| *q* | none | A QSE. |
| *o* | none | A CRR owner. |

(3) In the event that ERCOT is unable to execute the DAM, the Real-Time Revenue Neutrality Allocation for each QSE for a given 15-minute Settlement Interval is calculated as follows:

**LARTRNAMT *q* = (-1) \* (RTEIAMTTOT + BLTRAMTTOT + RTDCIMPAMTTOT + RTDCEXPAMTTOT + RTCCAMTTOT + RMRDAESRTVTOT + NDRTOBLAMTTOT / 4 + NDRTOPTAMTTOT / 4 + NDRTOPTRAMTTOT / 4 + NDRTOBLRAMTTOT / 4) \* LRS *q***

Where:

Total Real-Time Energy Imbalance Payment (or Charge) at Settlement Point (or Hub)

RTEIAMTTOT = RTEIAMTQSETOT *q*

Total Real-Time Payment for BLT Resources

BLTRAMTTOT = BLTRAMTQSETOT *q*

Total Real-Time Payment for DC Tie Imports

RTDCIMPAMTTOT = RTDCIMPAMTQSETOT *q*

Total Real-Time Charge for DC Tie Exports (under “Oklaunion Exemption”)

RTDCEXPAMTTOT = RTDCEXPAMTQSETOT *q*

Total Real-Time Congestion Payment or Charge for Self Schedules

RTCCAMTTOT = RTCCAMTQSETOT *q*

Total Real-Time Payment or Charge for PTP Obligations when ERCOT is unable to execute the DAM

NDRTOBLAMTTOT =  NDRTOBLAMTOTOT *o*

Total Real-Time Payment for PTP Options when ERCOT is unable to execute the DAM

NDRTOPTAMTTOT =  NDRTOPTAMTOTOT *o*

Total Real-Time Payment for PTP Options with Refund when ERCOT is unable to execute the DAM

NDRTOPTRAMTTOT = NDRTOPTRAMTOTOT *o*

Total Real-Time Payment or Charge for PTP Obligations with Refund when ERCOT is unable to execute the DAM

NDRTOBLRAMTTOT =  NDRTOBLRAMTOTOT *o*

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| LARTRNAMT *q* | $ | *Load-Allocated Real-Time Revenue Neutrality Amount per QSE*—The QSE *q*’s share of the total Real-Time revenue neutrality amount for the 15-minute Settlement Interval. |
| RTEIAMTTOT | $ | *Real-Time Energy Imbalance Amount Total*—The total net payments and charges for Real-Time Energy Imbalance at all Settlement Points (Resource, Load Zone, or Hub) for the 15-minute Interval. |
| BLTRAMTTOT | $ | *Block Load Transfer Resource Amount Total*⎯The total of the payments for energy delivered into the ERCOT Region through BLT points for the 15-minute Settlement Interval. |
| RTDCIMPAMTTOT | $ | *Real-Time DC Import Amount Total*—The summation of payments for DC Tie imports for the 15-minute Settlement Interval. |
| RTDCEXPAMTTOT | $ | *Real-Time DC Export Amount Total*—The summation of charges to all QSEs that are under the “Oklaunion Exemption” for DC Tie exports for the 15-minute Settlement Interval. |
| RTCCAMTTOT | $ | *Real-Time Energy Congestion Cost Amount Total*—The total net congestion payments and charges for all Self-Schedules for the 15-minute Settlement Interval. |
| RMRDAESRTVTOT | $ | *RMR Day-Ahead Energy Sale Real-Time Value Total*—The total of the Real-Time value of the Day-Ahead energy sales from all RMR Units for the 15-minute Settlement Interval. See Section 6.6.6, Reliability Must-Run Settlement. |
| NDRTOBLAMTTOT | $ | *No DAM Real-Time Obligation Amount Total*—The sum of all payments and charges for PTP Obligations settled in Real-Time, when ERCOT is unable to execute the DAM, for the hour that includes the 15-minute Settlement Interval. |
| NDRTOPTAMTTOT | $ | *No DAM Real-Time Option Amount Total*—The sum of all payments for PTP Options settled in Real-Time, when ERCOT is unable to execute the DAM, for the hour that includes the 15-minute Settlement Interval. |
| NDRTOPTRAMTTOT | $ | *No DAM Real-Time Option with Refund Amount Total*—The sum of all payments for PTP Options with Refund settled in Real-Time, when ERCOT is unable to execute the DAM, for the hour that includes the 15-minute Settlement Interval. |
| NDRTOBLRAMTTOT | $ | *No DAM Real-Time Obligation with Refund Amount Total*— The sum of all payments for PTP Obligations with Refund settled in Real-Time, when ERCOT is unable to execute the DAM, for the hour that includes the 15-minute Settlement Interval. |
| RTEIAMTQSETOT *q* | $ | *Real-Time Energy Imbalance Amount QSE Total per QSE*⎯The total net payments and charges to QSE *q* for Real-Time Energy Imbalance Service at all Resource Node Settlement Points for the 15-minute Settlement Interval. |
| RTCCAMTQSETOT *q* | $ | *Real-Time Congestion Cost Amount QSE Total per QSE*⎯The total net congestion payments and charges to QSE *q* for its Self-Schedules for the 15-minute Settlement Interval. |
| BLTRAMTQSETOT *q* | $ | *Block Load Transfer Resource Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for energy delivered into the ERCOT Region through BLT points for the 15-minute Settlement Interval. |
| RTDCIMPAMTQSETOT *q* | $ | *Real-Time DC Import Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for energy imported into the ERCOT Region through DC Ties for the 15-minute Settlement Interval. |
| RTDCEXPAMTQSETOT *q* | $ | *Real-Time DC Export Amount QSE Total per QSE*⎯The total of the charges to QSE *q* for energy exported from the ERCOT Region through DC Ties for the 15-minute Settlement Interval. |
| NDRTOBLAMTOTOT *o* | $ | *No DAM Real-Time Obligation Amount Owner Total per CRR Owner*—The net total payment or charge to CRR owner *o* of all its PTP Obligations settled in Real-Time when ERCOT is unable to execute the DAM, for the hour. |
| NDRTOPTAMTOTOT *o* | $ | *No DAM Real-Time Option Amount Owner Total per CRR Owner*—The total payment to CRR owner *o* for all its PTP Options settled in Real-Time when ERCOT is unable to execute the DAM, for the hour. |
| NDRTOPTRAMTOTOT *o* | $ | *No DAM Real-Time Option with Refund Amount Owner Total per CRR Owner*—The total payment to NOIE CRR owner *o* for all its PTP Options with Refund settled in Real-Time when ERCOT is unable to execute the DAM, for the hour. |
| NDRTOBLRAMTOTOT *o* | $ | *No DAM Real-Time Obligation with Refund Amount Owner Total per CRR Owner*—The net total payment or charge to CRR owner *o* for all its PTP Obligations with Refund settled in Real-Time, when ERCOT is unable to execute the DAM, for the hour. |
| LRS *q* | none | The LRS calculated for QSE *q* for the 15-minute Settlement Interval. See Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval. |
| *q* | none | A QSE. |
| *o* | none | A CRR Owner. |

6.6.11 Emergency Response Service Capacity

6.6.11.1 Emergency Response Service Capacity Payments

ERCOT shall pay, for each Emergency Response Service (ERS) Contract Period, the QSEs representing ERS Resources as follows:

ERSPAMT *qc(tp)d* = COMPAMT *qc(tp)d +* SPAMT *qc(tp)d*

ERSPAMTQSETOT *qcd* = ERSPAMT *qc(tp)d*

ERSPAMTTOT *c(tp)d* = ERSPAMT *qc(tp)d*

Where:

COMPAMT *qc(tp)d* = -1 \* ERSPRICE *qc(tp)d* \* COMPDELQSEMW *qcd(tp)d*\* TPH *c(tp)d*

SPAMT *qc(tp)d* = -1 \* (ERSPRICE  *qc(tp)d \** (Min(SPCUL *qc(tp)d,* SPDELQSEMW *qc(tp)d*)*\** TPH *c(tp)d*)

COMPDELQSEMW *qc(tp)d*  = COMPDELMW *qce(tp)d*

COMPDELMWTOT *c(tp)d* = COMPDELQSEMW *qc(tp)d*

SPDELQSEMW *qc(tp)d*  = SPDELMW *qce(tp)d*

SPDELMWTOT *c(tp)d* =  SPDELQSEMW *qc(tp)d*

COMPDELMW *qce(tp)d* = ERSTESTPF *qred* \* COMPOFFERMW *qce(tp)d* \* (ERSAFWT *qcd* \* Min (ERSAFCOMB *qrd*,1) + (1 - ERSAFWT *qcd*) \* Min (ERSEPF *qrd*,1))

SPDELMW *qc(tp)d* = ERSTESTPF *qred* \* SPOFFERMW *qce(tp)d* \* (ERSAFWT *qcd* \* Min(ERSAFCOMB *qrd*,1) + (1 – ERSAFWT *qcd*) \* Min(ERSEPF *qrd*,1))

The ERS Self-Provision Capacity Upper Limit for each self-providing QSE shall be calculated by ERCOT using a two-pass process for each of the four ERS service types. The first pass will consist of simultaneously solving for all QSEs’ ERS Self-Provision Capacity Upper Limits with the constraint that each QSE’s ERS Self-Provision Capacity Upper Limit will equal its LRS multiplied by the total capacity awarded for competitive offers, plus the sum of all QSEs’ ERS Self-Provision Capacity Upper Limits. The second pass will repeat the solution of the equations with a QSE’s delivered self-provided MW capacity (adjusted for availability and/or event performance) substituted for the ERS Self-Provision Capacity Upper Limit if the delivered MW capacity is less than the first pass calculation of the ERS Self-Provision Capacity Upper Limit.

Pass 1:

For QSE 1:

SPCUL*1c(tp)d*= ERSLRS *1c(tp)d* \* (COMPDELMWTOT *c(tp)d* + SPCUL *1c(tp)d* + SPCUL *2c(tp)d*+ … + SPCUL*nc(tp)d*)

For QSE 2:

SPCUL*2c(tp)d*= ERSLRS *2c(tp)d* \* (COMPDELMWTOT *c(tp)d* + SPCUL *1c(tp)d* + SPCUL *2c(tp)d*+ … + SPCUL*nc(tp)d*)

…

For QSE n:

SPCUL*nc(tp)d*= ERSLRS *nc(tp)d* \* (COMPDELMWTOT *c(tp)d* + SPCUL *1c(tp)d* + SPCUL *2c(tp)d*+ … + SPCUL*nc(tp)d*)

Pass 2:

For QSE 1:

SPCUL*1c(tp)d*= ERSLRS *1c(tp)d* \* (COMPDELMWTOT *c(tp)d* +

Min(SPDELMW *1c(tp)d,*SPCUL *1c(tp)d*) +

Min(SPDELMW *2c(tp)d,*SPCUL *2c(tp)d*)

+ … + Min(SPDELMW *nc(tp)d,*SPCUL *nc(tp)d*))

For QSE 2:

SPCUL*2c(tp)d*= ERSLRS *2c(tp)d* \* (COMPDELMWTOT *c(tp)d* +

Min(SPDELMW *1c(tp)d,*SPCUL *1c(tp)d*) +

Min(SPDELMW *2c(tp)d,*SPCUL *2c(tp)d*)

+ … + Min(SPDELMW *nc(tp)d,*SPCUL *nc(tp)d*))

…

For QSE n:

SPCUL*nc(tp)d*= ERSLRS *nc(tp)d* \* (COMPDELMWTOT *c(tp)d* +

Min(SPDELMW *1c(tp)d,*SPCUL *1c(tp)d*) +

Min(SPDELMW *2c(tp)d,*SPCUL *2c(tp)d*)

+ … + Min(SPDELMW *nc(tp)d,*SPCUL *nc(tp)d*))

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| ERSPAMT *qc(tp)d* | $ | *ERS Payment Amount per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—ERS total payment to QSE *q* for ERS Contract Period *c,* and ERS Time Period *tp* and ERS service type *d*. |
| COMPAMT *qc(tp)d* | $ | *Competitive Amount per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—ERS total payment to QSE *q* for all competitively procured ERS Resources delivered for ERS Contract Period *c*, and ERS Time Period *tp* and ERS service type *d*. |
| SPAMT *qc(tp)d* | $ | *Self-Procured Amount* *per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—ERS total payment to QSE *q* for its self-provided ERS Resources for ERS Contract Period *c*, ERS Time Period *tp* and ERS service type *d*. |
| ERSPAMTQSETOT *q* | $ | *ERS Payment QSE Total per QSE*—The total ERS total payments to QSE *q*. |
| ERSPAMTTOT *c(tp)d* | $ | *ERS Payment Amount Total per ERS Contract Period per ERS Time Period per ERS Service Type*—Total of all ERS payments for ERS Contract Period *c*, ERS Time Period *tp* and ERS service type *d*. |
| ERSPRICE *qc(tp)d* | $/MW per hour | *Price of the Highest Offer Cleared per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—Contracted clearing price for QSE *q* for ERS Contract Period *c*, ERS Time Period *tp* and ERS service type *d*. |
| COMPDELMW *qce(tp)d* | MW | *Competitive Delivered MW per QSE per ERS Contract Period per ERS Resource per ERS Time Period per ERS Service Type*—ERS capacity delivered by the QSE *q* for ERS Contract Period *c,* competitive ERS Resource *e*, ERS Time Period *tp* and ERS service type *d*. |
| TPH *c(tp)d* | Hours | Hours in ERS Time Period *tp* for ERS Contract Period *c*, and ERS service type *d*.  For ERS Resources *e* whose obligation is not exhausted in an ERS Contract Period *c,* the number of hours in that ERS Time Period *tp* in that ERS Contract Period *c*.  For ERS Resources *e* whose obligation is exhausted in an ERS Contract Period *c*, the number of hours in that ERS Time Period *tp* from the beginning of the ERS Contract Period *c* to the end of the ERS Standard Contract Term. |
| ERSTESTPF *qred* | None | *ERS Test Performance Factor per QSE per ERS Standard Contract Term per ERS Resource per ERS Service Type*—Test performance factor for QSE *q* in ERS Standard Contract Term *r* for ERS Resource *e* and ERS service type *d* as calculated pursuant to Section 8.1.3.3.1, Suspension of Qualification of Non-Weather-Sensitive Emergency Response Service Resources and/or their Qualified Scheduling Entities. |
| SPDELMW *qc(tp)d* | MW | *Self-Provided Delivered MW* *per QSE per ERS Contract Period per ERS Resource per ERS Time Period per ERS Service Type*—Total ERS capacity self-provided and delivered by QSE *q* for ERS Contract Period *c,* ERS Resource *e*, ERS Time Period *tp* and ERS service type *d*. |
| COMPDELQSEMW *qc(tp)d* | MW | *Competitive Delivered MW Total per QSE per ERS Contract Period per ERS Time Period per ERS service type*—Total ERS competitive capacity delivered by QSE *q* for ERS Contract Period *c* and ERS Time Period *tp* and ERS service type *d*. |
| COMPDELMWTOT *c(tp)d* | MW | *Competitive Delivered MW Total per ERS Contract Period per ERS Time Period per ERS Service Type*—Total ERS competitive capacity delivered by all QSEs for ERS Contract Period *c*, ERS Time Period *tp* and ERS service type *d*. |
| SPDELQSEMW *qc(tp)d* | MW | *Self-Provision Delivered Total MW per QSE per ERS Contract Period per ERS Time Period per ERS service type*—Total ERS self-provision capacity delivered by QSE q for ERS Contract Period *c* and ERS Time Period *tp* and ERS service type *d*. |
| SPDELMWTOT *c(tp)d* | MW | *Self-Provision Delivered Total MW per ERS Contract Period per ERS Time Period per ERS service type*—Total ERS self-provision capacity delivered by all QSE q for ERS Contract Period *c* and ERS Time Period *tp* and ERS service type *d*. |
| COMPOFFERMW *qce(tp)d* | MW | *Competitive Offered MW Total per QSE per ERS Contract Period per ERS Resource per ERS Time Period per ERS Service Type*—ERS capacity offered by QSE *q* for ERS Contract Period *c*, competitive ERS Resource *e* and ERS Time Period *tp* and ERS service type *d*. |
| ERSAFWT*qcd* | None | *Availability Settlement weighting factor per QSE per ERS Contract Period per ERS Service Type*—The weighting factor for QSE *q* for ERS Contract Period *c*, and ERS service type *d* to apply for Settlement as calculated pursuant to Section 8.1.3.1.3.3, Contract Period Availability Calculations for Emergency Response Service Resources. |
| ERSAFCOMB *qrd* | None | *Time- and Capacity-Weighted ERS Availability Factor per QSE per ERS Standard Contract Term per ERS Service Type*—The availability factor for QSE *q* for ERS Standard Contract Term *r* and ERS service type *d,* as calculated pursuant to Section 8.1.3.3, Payment Reductions and Suspension of Qualification of Emergency Response Service Resources and/or their Qualified Scheduling Entities. |
| ERSEPF *qrd* | None | *ERS Event Performance Factor per QSE per ERS Standard Contract Term per ERS Service Type*—Event performance factor for QSE *q* in ERS Standard Contract Term *r* and ERS service type *d* as calculated pursuant to Section 8.1.3.3.1. |
| SPCUL *qc(tp)d* | MW | *Self-Provision Capacity Upper Limit per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—The ERS Self-Provision Capacity Upper Limit calculated by ERCOT for a self-providing QSE for ERS Contract Period *c* and ERS Time Period *tp* by simultaneously solving for all QSEs’ obligations with the constraint that each QSE’s ERS Self-Provision Capacity Upper Limit does not exceed its obligation. |
| SPOFFERMW *qce(tp)d* | MW | *Self-Provision Offer MW per QSE per ERS Contract Period per ERS Resource per ERS Time Period per ERS Service Type*—ERS capacity offered as self-provision by QSE *q* for ERS Contract Period *c*, ERS Resource *e*, ERS Time Period *tp* and ERS service type *d*. |
| ERSLRS *qc(tp)* | None | *ERS Load Ratio Share per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—ERS LRS for QSE *q* for ERS Contract Period *c*, ERS Time Period *tp* and ERS service type *d,* calculated starting with the first hour of the ERS Contract Period and ending with the earlier of the last hour of the ERS Contract Period or the hour containing the recall instruction in an ERS deployment event that results in the exhaustion of a QSE portfolio’s ERS obligation. |
| *q* | None | A QSE. |
| *c* | None | ERS Contract Period. |
| *r* | None | ERS Standard Contract Term. |
| *tp* | None | Hours in an ERS Time Period. |
| *e* | None | An ERS Resource procured from a QSE for an ERS Contract Period. |
| *co* | None | The number of competitive ERS Resources procured from a QSE for an ERS Contract Period. |
| *s* | None | The number of self-provided ERS Resources procured from a QSE for an ERS Contract Period. |
| *n* | None | The number of QSEs for an ERS Contract Period. |
| *d* | None | ERS service type (Weather-Sensitive ERS-10, Non-Weather-Sensitive ERS-10, Weather-Sensitive ERS-30, or Non-Weather-Sensitive ERS-30). |

6.6.11.2 Emergency Response Service Capacity Charge

(1) ERCOT shall allocate costs for an ERS service type and ERS Contract Period based on the LRS of each QSE during each ERS Time Period in an ERS Contract Period. A QSE’s LRS for an ERS Time Period shall be the QSE’s total Load for the ERS Time Period divided by the total ERCOT Load in the ERS Time Period. For the first Settlement of the ERS Contract Period as described in paragraph (1) of Section 9.14.5, Settlement of Emergency Response Service, LRS will be calculated using the latest Settlement Load for each Operating Day in the ERS Contract Period. For the resettlement of the ERS Contract Period as described in paragraph (2) of Section 9.14.5, the LRS will be calculated using the true-up Load for each Operating Day in the ERS Contract Period.

(2) ERCOT shall calculate each QSE’s ERS capacity charge as follows:

LAERSAMT  *qc(tp)d* = ERSLRS *qc(tp)d*\* ERSPAMTTOT *c(tp)d*

LAERSAMTQSETOT*q* = LAERSAMT *q(tp)d*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| ERSPAMTTOT *c(tp)d* | $ | *ERS Payment Amount Total per ERS Contract Period per ERS Time Period per ERS Service Type*—Total of all ERS payments for ERS Contract Period *c,* ERS Time Period *tp* and ERS service type *d*. |
| ERSLRS *qc(tp)d* | None | *ERS Load Ratio Share per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—ERS LRS for QSE *q* for ERS Contract Period *c,* ERS Time Period *tp* and ERS service type *d,* calculated starting with the first hour of the ERS Contract Period and ending with the earlier of the last hour of the ERS Contract Period or the hour containing the recall instruction in an ERS deployment event that results in the exhaustion of a QSE portfolio’s ERS obligation. |
| LAERSAMT *qc(tp)d* | $ | *Load-Allocated ERS Amount* *per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—ERS charge for QSE *q* for ERS Contract Period *c,* ERS Time Period *tp* and ERS service type *d*. |
| LAERSAMTQSETOT *q* | $ | *Load-Allocated ERS Amount QSE Total per QSE*—The total ERS charge for QSE *q*. |
| *q* | None | A QSE. |
| *c* | None | ERS Contract Period. |
| *tp* | None | An ERS Time Period. |
| *d* | None | ERS service type (Weather-Sensitive ERS-10, Non-Weather-Sensitive ERS-10, Weather-Sensitive ERS-30, or Non-Weather-Sensitive ERS-30). |

6.7 Real-Time Settlement Calculations for the Ancillary Services

6.7.1 Payments for Ancillary Service Capacity Sold in a Supplemental Ancillary Services Market (SASM) or Reconfiguration Supplemental Ancillary Services Market (RSASM)

(1) If a Supplemental Ancillary Services Market (SASM) or a Reconfiguration Supplemental Ancillary Services Market (RSASM) is executed for one or more Operating Hours for any reason, ERCOT shall pay Qualified Scheduling Entities (QSEs) for their Ancillary Service Offers cleared in the SASM or RSASM, based on the Market Clearing Price for Capacity (MCPC) for that SASM or RSASM and that service. By service and by SASM or RSASM, the payment to each QSE for a given Operating Hour is calculated as follows:

(a) For Regulation Up (Reg-Up), if applicable:

RTPCRUAMT *q, m* = (-1) \* MCPCRU *m* \* RTPCRU *q, m*

Where:

RTPCRU *q,**m* = PCRUR *q, r, m*

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTPCRUAMT *q, m* | $ | *Procured Capacity for Reg-Up Amount by QSE by market*—The payment to QSE *q* for the Ancillary Service Offers cleared in the market *m* to provide 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 from the market *m*, for the hour. |
| RTPCRU *q, m* | MW | *Procured Capacity for Reg-Up by QSE by market—*The portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide Reg-Up, for the hour. |
| PCRUR *q, r, m* | MW | *Procured Capacity for Reg-Up from Resource per Resource per QSE by market*—The Reg-Up capacity quantity awarded to QSE *q* in the market *m* for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *m* | none | An Ancillary Service market (SASM or RSASM). |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

(b) For Regulation Down (Reg-Down), if applicable:

RTPCRDAMT *q, m* = (-1) \* MCPCRD *m* \* RTPCRD *q, m*

Where:

RTPCRD *q,**m* = PCRDR *r, q, m*

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTPCRDAMT *q, m* | $ | *Procured Capacity for Reg-Down Amount by QSE by market*—The payment to QSE *q* for the Ancillary Service Offers cleared in the market *m* to provide 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 from the market *m*, for the hour. |
| RTPCRD *q, m* | MW | *Procured Capacity for Reg-Down by QSE by market—*The portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide Reg-Down, for the hour. |
| PCRDR *r, q, m* | MW | *Procured Capacity for Reg-Down from Resource per Resource per QSE by market*—The Reg-Down capacity quantity awarded to QSE *q* in the market *m* for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *m* | none | An Ancillary Service market (SASM or RSASM). |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

(c) For Responsive Reserve (RRS), if applicable:

RTPCRRAMT *q, m* = (-1) \* MCPCRR *m* \* RTPCRR *q, m*

Where:

RTPCRR *q,**m* = PCRRR *q, r, m*

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTPCRRAMT *q, m* | $ | *Procured Capacity for Responsive Reserve Amount by QSE by market*—The payment to QSE *q* for the Ancillary Service Offer cleared in the market *m* to provide RRS, for the hour. |
| MCPCRR *m* | $/MW per hour | *Market Clearing Price for Capacity for Responsive Reserve by market—*The MCPC for RRS from the market *m*, for the hour. |
| RTPCRR *q, m* | MW | *Procured Capacity for Responsive Reserve by QSE by market—*The portion of QSE *q* Ancillary Service Offers cleared in the market *m* to provide RRS, for the hour. |
| PCRRR *q,r, m* | MW | *Procured Capacity for Responsive Reserve from Resource per Resource per QSE by market*—The RRS capacity quantity awarded to QSE *q* in the market *m* for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *m* | none | An Ancillary Service market (SASM or RSASM). |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

(d) For Non-Spinning Reserve (Non-Spin), if applicable:

RTPCNSAMT *q, m* = (-1) \* MCPCNS *m* \* RTPCNS *q, m*

Where:

RTPCNS *q,**m* = PCNSR *q, r, m*

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTPCNSAMT *q, m* | $ | *Procured Capacity for Non-Spin Amount by QSE by market*—The payment to QSE *q* for Ancillary Service Offer cleared in the market *m* to provide 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 from the market *m*, for the hour. |
| RTPCNS *q, m* | MW | *Procured Capacity for Non-Spin by QSE by market—*The portion of QSE *q*’s Ancillary Service Offer cleared in the market *m* to provide Non-Spin, for the hour. |
| PCNSR *q,r, m* | MW | *Procured Capacity for Non-Spin from Resource per Resource per QSE by market*—The Non-Spin capacity quantity awarded to QSE *q* in the market *m* for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *m* | none | An Ancillary Service market (SASM or RSASM). |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

6.7.2 Charges for Ancillary Service Capacity Replaced Due to Failure to Provide

(1) A charge to each QSE that fails on its Ancillary Service Supply Responsibility, whether or not a SASM is executed due to its failure to supply, is calculated based on the greatest of the MCPC in the Day-Ahead Market (DAM) or any SASM for the same Operating Hour. Included in the failed quantity is the charge to each QSE that reduces its Ancillary Service Supply Responsibility by an RSASM, which is calculated based on the cleared MCPC associated with the RSASM. By service, the charge to each QSE for a given Operating Hour is calculated 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* = ((MCPCRU *m*) \* RUFQ *q*)

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

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. |
| *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. |

(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* = ((MCPCRD *m*) \* RDFQ *q*)

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

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. |
| *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. |

(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* = ((MCPCRR *m*) \* RRFQ *q*)

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

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. |
| *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. |

(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* = ((MCPCNS *m*) \* NSFQ *q*)

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

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. |
| *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. |

6.7.3 Adjustments to Cost Allocations for Ancillary Services Procurement

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

(2) For Reg-Up, if applicable:

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

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

Where:

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

RTPCRUAMTTOT *m* = RTPCRUAMT *q, m*

Total payment of DAM-procured capacity for Reg-Up

PCRUAMTTOT = PCRUAMT *q*

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

RUFQAMTTOT = RUFQAMTQSETOT *q*

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

RTPCRUAMTQSETOT q = RTPCRUAMT *q, m*

The above variables are defined as follows:

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

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

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

Where:

RUPR = RUCOSTTOT / RUQTOT

RUQTOT = RUQ *q*

RUQ *q* = RUO *q* – SARUQ *q*

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

RUFQ *q* – RRUFQ *q*) \* HLRS *q*+ RURP *q*

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

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RUCOST *q* | $ | *Reg-Up Cost per QSE*—QSE *q*’s share of the net total costs for Reg-Up, for the hour. |
| RUPR | $/MW per hour | *Reg-Up Price—*The price for Reg-Up calculated based on the net total costs for Reg-Up, for the hour. |
| RUCOSTTOT | $ | *Reg-Up Cost Total*—The net total costs for Reg-Up for the hour. See item (a) above. |
| RUQTOT | MW | *Reg-Up Quantity Total*—The sum of every QSE’s portion of its Ancillary Service Obligation that is not self-arranged in either DAM or any SASM, for the hour. |
| RUQ *q* | MW | *Reg-Up Quantity per QSE*—The portion of QSE *q*’s Ancillary Service Obligation that is not self-arranged in either DAM or any SASM, for the hour. |
| [NPRR680: Replace the variables “RUQTOT” and “RUQ q” above with the following upon system implementation:]   |  |  |  | | --- | --- | --- | | RUQTOT | MW | *Reg-Up Quantity Total*—The sum of every QSE’s Ancillary Service Obligation minus its self-arranged Reg-Up quantity in the DAM and any and all SASMs for the hour. | | RUQ *q* | MW | *Reg-Up Quantity per QSE*—The QSE *q*’s Ancillary Service Obligation minus its self-arranged Reg-Up quantity in the DAM and any and all SASMs for the hour. | | | |
| RUO *q* | MW | *Reg-Up Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| DASARUQ *q* | MW | *Day-Ahead Self-Arranged Reg-Up Quantity per QSE*—The self-arranged Reg-Up quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| RTSARUQ *q* | MW | *Self-Arranged Reg-Up Quantity per QSE for all SASMs*—The sum of all self-arranged Reg-Up quantities submitted by QSE *q* for all SASMs. |
| RTPCRU *q, m* | MW | *Procured Capacity for Reg-Up per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide Reg-Up, for the hour. |
| RUFQ *q* | MW | *Reg-Up Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| RRUFQ *q* | MW | *Reconfiguration Reg-Up Failure Quantity per QSE—*QSE *q* total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.3, QSE Load Ratio Share for an Operating Hour. |
| RURP *q* | MW | *Reg-Up Replacement per QSE*—The total Reg-Up capacity that was a portion of the Ancillary Service Supply Responsibility of QSE *q* but is replaced in a SASM for the hour. |
| PCRU *q* | MW | *Procured Capacity for Reg-Up per QSE in DAM*—The total Reg-Up capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE for the hour. |
| SARUQ*q* | MW | *Total Self-Arranged Reg-Up Quantity per QSE for all markets*—The sum of all self-arranged Reg-Up quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *m* | none | A SASM for the given Operating Hour. |

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

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

The above variables are defined as follows:

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

(3) For Reg-Down, if applicable:

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

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

Where:

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

RTPCRDAMTTOT *m* = RTPCRDAMT *q, m*

Total payment of DAM-procured capacity for Reg-Down

PCRDAMTTOT= PCRDAMT *q*

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

RDFQAMTTOT = RDFQAMTQSETOT *q*

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

RTPCRDAMTQSETOT *q* = RTPCRDAMT *q, m*

The above variables are defined as follows:

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

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

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

Where:

RDPR = RDCOSTTOT / RDQTOT

RDQTOT = RDQ *q*

RDQ *q* = RDO *q* – SARDQ *q*

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

RDFQ *q* – RRDFQ *q*) \* HLRS *q*+ RDRP *q*

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

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RDCOST *q* | $ | *Reg-Down Cost per QSE*—QSE *q*’s share of the net total costs for Reg-Down, for the hour. |
| RDPR | $/MW per hour | *Reg-Down Price—*The price for Reg-Down calculated based on the net total costs for Reg-Down, for the hour. |
| RDCOSTTOT | $ | *Reg-Down Cost Total*—The net total costs for Reg-Down for the hour. See item (a) above. |
| RDQTOT | MW | *Reg-Down Quantity Total*—The sum of every QSE’s portion of its Ancillary Service Obligation that is not self-arranged in either DAM or any SASM, for the hour. |
| RDQ *q* | MW | *Reg-Down Quantity per QSE*—The portion of QSE *q*’s net Ancillary Service Obligation that is not self-arranged in either DAM or any SASM, for the hour. |
| [NPRR680: Replace the variables “RDQTOT” and “RDQ q” above with the following upon system implementation:]   |  |  |  | | --- | --- | --- | | RDQTOT | MW | *Reg-Down Quantity Total*—The sum of every QSE’s Ancillary Service Obligation minus its self-arranged Reg-Down quantity in the DAM and any and all SASMs for the hour. | | RDQ *q* | MW | *Reg-Down Quantity per QSE*—The QSE *q*’s Ancillary Service Obligation minus its self-arranged Reg-Down quantity in the DAM and any and all SASMs for the hour. | | | |
| RDO *q* | MW | *Reg-Down Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| DASARDQ *q* | MW | *Self-Arranged Reg-Down Quantity per QSE for DAM*—The self-arranged Reg-Down quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| RTSARDQ *q* | MW | *Self-Arranged Reg-Down Quantity per QSE for all SASMs*—The sum of all self-arranged Reg-Down quantities submitted by QSE *q* for all SASMs. |
| RTPCRD *q, m* | MW | *Procured Capacity for Reg-Down per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide Reg-Down, for the hour. |
| RDFQ *q* | MW | *Reg-Down Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| RRDFQ *q* | MW | *Reconfiguration Reg-Down Failure Quantity per QSE*—QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| HLRS *q* |  | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.3. |
| RDRP *q* | MW | *Reg-Down Replacement per QSE per market*—The total Reg-Down capacity that was a portion of the Ancillary Service Supply Responsibility of QSE *q* but is replaced in a SASM, 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. |
| SARDQ *q* | MW | *Total Self-Arranged Reg-Down Quantity per QSE for all markets*—The sum of all self-arranged Reg-Down quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

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

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

The above variables are defined as follows:

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

(4) For RRS service, if applicable:

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

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

Where:

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

RTPCRRAMTTOT *m* = RTPCRRAMT *q, m*

Total payment of DAM-procured capacity for RRS

PCRRAMTTOT= PCRRAMT *q*

Total charge of failure on Ancillary Service Supply Responsibility for RRS

RRFQAMTTOT = RRFQAMTQSETOT *q*

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

RTPCRRAMTQSETOT *q* = RTPCRRAMT *q, m*

The above variables are defined as follows:

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

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

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

Where:

RRPR = RRCOSTTOT / RRQTOT

RRQTOT = RRQ *q*

RRQ *q* = RRO *q* – SARRQ *q*

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

RRFQ *q* – RRRFQ *q*) \* HLRS *q*+ RRRP *q*

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

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RRCOST *q* | $ | *Responsive Reserve Cost per QSE*—QSE *q*’s share of the net total costs for RRS, for the hour. |
| RRPR | $/MW per hour | *Responsive Reserve Price—*The price for RRS calculated based on the net total costs for RRS, for the hour. |
| RRCOSTTOT | $ | *Responsive Reserve Cost Total*—The net total costs for RRS for the hour. See item (a) above. |
| RRQTOT | MW | *Responsive Reserve Quantity Total*—The sum of every QSE’s portion of its Ancillary Service Obligation that is not self-arranged in either DAM or any SASM, for the hour. |
| RRQ *q* | MW | *Responsive Reserve Quantity per QSE*—The portion of QSE *q*’s Ancillary Service Obligation that is not self-arranged in either DAM or any SASM, for the hour. |
| [NPRR680: Replace the variables “RRQTOT” and “RRQ q” above with the following upon system implementation:]   |  |  |  | | --- | --- | --- | | RRQTOT | MW | *Responsive Reserve Quantity Total*—The sum of every QSE’s Ancillary Service Obligation minus its self-arranged RRS quantity in the DAM and any and all SASMs for the hour. | | RRQ *q* | MW | *Responsive Reserve Quantity per QSE*—The QSE *q*’s Ancillary Service Obligation minus its self-arranged RRS quantity in the DAM and any and all SASMs. | | | |
| RRO *q* | MW | *Responsive Reserve Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| DASARRQ *q* | MW | *Day-Ahead Self-Arranged Responsive Reserve Quantity per QSE*—The self-arranged RRS quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| RTSARRQ *q* | MW | *Self-Arranged Responsive Reserve Quantity per QSE for all SASMs*—The sum of all self-arranged RRS quantities submitted by QSE *q* for all SASMs. |
| RTPCRR *q, m* | MW | *Procured Capacity for Responsive Reserve per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide RRS, for the hour. |
| RRFQ *q* | MW | *Responsive Reserve Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| RRRFQ *q* | MW | *Reconfiguration Responsive Reserve Failure Quantity per QSE—*QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.3. |
| RRRP *q* | MW | *Responsive Reserve Replacement per QSE per market*—The total RRS capacity that was a portion of the Ancillary Service Supply Responsibility of QSE *q* but is replaced in a SASM 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. |
| SARRQ *q* | MW | *Total Self-Arranged Responsive Reserve Quantity per QSE for all markets*—The sum of all self-arranged RRS quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

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

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

The above variables are defined as follows:

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

(5) For Non-Spin, if applicable:

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

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

Where:

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

RTPCNSAMTTOT *m* = RTPCNSAMT *q, m*

Total payment of DAM-procured capacity for Non-Spin

PCNSAMTTOT = PCNSAMT *q*

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

NSFQAMTTOT = NSFQAMTQSETOT *q*

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

RTPCNSAMTQSETOT *q* = RTPCNSAMT *q, m*

The above variables are defined as follows:

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

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

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

Where:

NSPR = NSCOSTTOT / NSQTOT

NSQTOT = NSQ *q*

NSQ *q* = NSO *q* – SANSQ *q*

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

NSFQ *q* – RNSFQ *q*) \* HLRS *q*+ NSRP *q*

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

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| NSCOST *q* | $ | *Non-Spin Cost per QSE*—QSE *q*’s share of the net total costs for Non-Spin, for the hour. |
| NSPR | $/MW per hour | *Non-Spin Price—*The price for Non-Spin calculated based on the net total costs for Non-Spin, for the hour. |
| NSCOSTTOT | $ | *Non-Spin Cost Total*—The net total costs for Non-Spin for the hour. See item (a) above. |
| NSQTOT | MW | *Non-Spin Quantity Total*—The sum of every QSE’s portion of its Ancillary Service Obligation that is not self-arranged in either DAM or any SASM, for the hour. |
| NSQ *q* | MW | *Non-Spin Quantity per QSE*—The portion of QSE *q*’s Ancillary Service Obligation that is not self-arranged in either DAM or any SASM, for the hour. |
| [NPRR680: Replace the variables “NSQTOT” and “NSQ q” above with the following upon system implementation:]   |  |  |  | | --- | --- | --- | | NSQTOT | MW | *Non-Spin Quantity Total*—The sum of every QSE’s Ancillary Service Obligation minus its self-arranged Non-Spin quantity in the DAM and any and all SASMs for the hour. | | NSQ *q* | MW | *Non-Spin Quantity per QSE*—The difference in QSE *q*’s Ancillary Service Obligation minus its self-arranged Non-Spin quantity in the DAM and any and all SASMs for the hour. | | | |
| NSO *q* | MW | *Non-Spin Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| DASANSQ *q* | MW | *Day-Ahead Self-Arranged Non-Spin Quantity per QSE for DAM*—The self-arranged Non-Spin quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| RTSANSQ *q* | MW | *Self-Arranged Non-Spin Quantity per QSE for all SASMs*—The sum of all self-arranged Non-Spin quantities submitted by QSE *q* for all SASMs. |
| RTPCNS *q, m* | MW | *Procured Capacity for Non-Spin per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide Non-Spin, for the hour. |
| NSFQ *q* | MW | *Non-Spin Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| RNSFQ *q* | MW | *Reconfiguration Non-Spin Failure Quantity per QSE—*QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.3. |
| NSRP *q* | MW | *Non-Spin Replacement per QSE per market*—The total Non-Spin capacity that was a portion of the Ancillary Service Supply Responsibility of QSE *q* but is replaced in a SASM for the hour. |
| PCNS *q* | MW | *Procured Capacity for Non-Spin Service per QSE in DAM*—The total Non-Spin capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE for the hour. |
| SANSQ *q* | MW | *Total Self-Arranged Non-Spin Supplied Quantity per QSE for all markets*—The sum of all self-arranged Non-Spin quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

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

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

The above variables are defined as follows:

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

6.7.4 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 (11) 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;

(b) The amount of On-Line capacity based on the telemetered High Sustained Limit (HSL) for all On-Line Generation Resources, the Ancillary Service Schedule for RRS from Load Resources controlled by high-set under-frequency relay, and the capacity from Controllable Load Resources available to Security-Constrained Economic Dispatch (SCED);

|  |
| --- |
| ***[NPRR698: Replace item (2)(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, the telemetered consumption from Load Resources with a validated Ancillary Service Schedule for RRS controlled by high-set under-frequency relay, and the capacity from Controllable Load Resources available to Security-Constrained Economic Dispatch (SCED); |

(c) The amount of Ancillary Service Resource Responsibility for Reg-Up, RRS and Non-Spin for all Generation and Load Resources represented by 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) Intermittent Renewable Resources (IRRs) excluding Wind-powered Generation Resources (WGRs);

(b) Nuclear Resources;

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

|  |
| --- |
| ***[NPRR710: Replace paragraph (c) above with the following upon system implementation:]***  (c) 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 |

(d) 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.

(4) Reliability Must-Run (RMR) Units and Reliability Unit Commitment (RUC) Resources On-Line during the hour due to an ERCOT instruction, except RUC Resources that were issued a RUC Dispatch Instruction to provide Ancillary Services pursuant to paragraph (10) of Section 5.5.2, Reliability Unit Commitment (RUC) Process, and that the QSE subsequently self-committed pursuant to paragraph (11) 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.

(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 Energy Emergency Alert (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.

(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* – 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 \*  HNSADJ *q, r, p* \* ¼

RTRMRRESP *q* = SYS\_GEN\_DISCFACTOR \* (HRRADJ *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* + RTNCLRRRS *q*

|  |
| --- |
| ***[NPRR698: Replace the above equation RTOLCAP q with the following upon system implementation:]***  RTOLCAP *q* = (RTOLHSL *q* – RTMGQ *q* – SYS\_GEN\_DISCFACTOR \* (UGENA *q, r, p*)) + RTCLRCAP *q* + RTNCLRCAP *q* |

Where:

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

|  |
| --- |
| ***[NPRR698: Replace the above equation RTNCLRRRS q with the following upon system implementation:]***  RTNCLRCAP *q* = RTNCLRNPC *q* – RTNCLRLPC *q*  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*

RTCLRCAP *q*= RTCLRNPF *q* – RTCLRLSL *q* – RTCLRNS *q* + RTCLRREG *q*

|  |
| --- |
| ***[NPRR698: Replace the above equation* RTCLRCAP *q with the following upon system implementation:]***  RTCLRCAP *q*= RTCLRNPC *q* – RTCLRLPC *q* – RTCLRNS *q* + RTCLRREG *q* |

Where:

RTCLRNPF *q*= SYS\_GEN\_DISCFACTOR \* RTCLRNPFR ***q, r, p***

|  |
| --- |
| ***[NPRR698: Replace the above equation* RTCLRNPF *q with the following upon system implementation:]***  RTCLRNPC *q*= SYS\_GEN\_DISCFACTOR \* RTCLRNPCR ***q, r, p*** |

RTCLRLSL *q* = SYS\_GEN\_DISCFACTOR \* RTCLRLSLR ***q, r, p***

|  |
| --- |
| ***[NPRR698: Replace the above equation* RTCLRLSL *q with the following upon system implementation:]***  RTCLRLPC *q* = SYS\_GEN\_DISCFACTOR \* RTCLRLPCR ***q, r, p*** |

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

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

RTRSVPOR= image010(RNWF  *y* \* RTORPA *y*)

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

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

RTRSVPOFF= image010(RNWF  *y* \* RTOFFPA *y*)

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

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

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 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 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. |
| 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 all Generation and Load Resources discounted by the system-wide discount factor 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. |
| RTNCLRRRSR *q* | MWh | *Real-Time Non-Controllable Load Resources Responsive Reserve Schedule for the QSE*—The validated Real-Time RRS Ancillary Service Schedule from all Load Resources other than Controllable Load Resources available to SCED discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval. |
| RTNCLRRRS *q* | MWh | *Real-Time Non-Controllable Load Resources Responsive Reserve Schedule for the QSE*—The Real-Time RRS Ancillary Service Schedule from all Load Resources other than Controllable Load Resources available to SCED for the QSE *q*, integrated over the 15-minute Settlement Interval. |
| ***[NPRR698: Delete the above variables RTNCLRRRSR q and RTNCLRRRS q and insert the following variables upon system implementation:]***   |  |  |  | | --- | --- | --- | | 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. | | 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)that has a validated Real-Time RRS 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)that has a validated Real-Time RRS 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 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 Ancillary Service Schedule integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. | | | |
| RTCLRNPFR *q, r, p* | MWh | *Real-Time Net Power Flow from the Controllable Load Resource—*The Real-Time net power flow from the Controllable Load Resource *r* available to SCED integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |
| ***[NPRR698: Replace the above variable RTCLRNPFR q, r, p with the following upon system implementation:]***   |  |  |  | | --- | --- | --- | | 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* available to SCED integrated over the 15-minute Settlement Interval. | | | |
| RTCLRNPF *q* | MWh | *Real-Time Net Power Flow from Controllable Load Resources for the QSE*—The Real-Time net power flow from all Controllable Load Resources available to SCED integrated over the 15-minute Settlement Interval for the QSE *q*. |
| ***[NPRR698: Replace the above variable RTCLRNPF q with the following upon system implementation:]***   |  |  |  | | --- | --- | --- | | 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. | | | |
| RTCLRLSLR *q, r, p* | MWh | *Real-Time Low Sustained Limit for the Controllable Load Resource—*The Real-Time LSL from the Controllable Load Resource *r* available to SCED integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |
| ***[NPRR698: Replace the above variable RTCLRLSLR q, r, p with the following upon system implementation:]***   |  |  |  | | --- | --- | --- | | 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* available to SCED integrated over the 15-minute Settlement Interval. | | | |
| RTCLRLSL *q* | MWh | *Real-Time Low Sustained Limit from Controllable Load Resources for the QSE*—The Real-Time LSL from Controllable Load Resources available to SCED integrated over the 15-minute Settlement Interval for the QSE *q*. |
| ***[NPRR698: Replace the above variable RTCLRLSL q with the following upon system implementation:]***   |  |  |  | | --- | --- | --- | | 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. | | | |
| 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 with Primary Frequency Response for the QSE *q*, integrated over the 15-minute Settlement Interval. |
| ***[NPRR698: Replace the above variable RTCLRREG q with the following upon system implementation:]***   |  |  |  | | --- | --- | --- | | 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 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 *r* with Primary Frequency Response discounted by the system-wide discount factor, integrated over the 15-minute Settlement Interval. |
| ***[NPRR698: Replace the above variable RTCLRREGR q, r, p with the following upon system implementation:]***   |  |  |  | | --- | --- | --- | | 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 *r* 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* at Resource Node *p* represented by QSE *q* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| 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. |
| 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. |
| RTCST30HSL *q* | MWh | *Real-Time Generation Resources with Cold Start Available in 30 Minutes*⎯The Real-Time telemetered HSLs of Generation Resources that have telemetered an OFF Resource Status and can be started from a cold temperature state in 30 minutes and discounted by the system-wide discount factor for the QSE *q*, time-weighted over the 15-minute Settlement Interval. |
| ***[NPRR710: Replace the above variable*** ***RTCST30HSL q with the following upon system implementation:]***   |  |  |  | | --- | --- | --- | | RTCST30HSL *q* | MWh | *Real-Time Generation Resources with Cold Start Available in 30 Minutes*⎯ The Real-Time telemetered HSLs of Generation Resources, excluding IRRs, that have telemetered an OFF Resource Status and can be started from a cold temperature state in 30 minutes and discounted by the system-wide discount factor 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 and discounted by the system-wide discount factor 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* discounted by the system-wide discount factor, 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 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 Responsive Reserve Ancillary Service Resource Responsibility for the Resource *r* 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* 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* 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.* |
| 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.* |
| RTCLRNSRESP *q* | MWh | *Real-Time Controllable Load Resource Non-Spin Responsibility for the QSE*⎯The Real Time Non-Spin Ancillary Service Supply Responsibility as set forth in the end of the Adjustment Period COP for all Controllable Load Resources available to SCED discounted by the system-wide discount factor for the QSE *q*, for the 15-minute Settlement Interval. |
| 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. |
| 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*, discounted by the system-wide discount factor, integrated over the 15-minute Settlement Interval. |
| ***[NPRR698: Replace the above variable RTCLRNSR q, r, p with the following upon system implementation:]***   |  |  |  | | --- | --- | --- | | 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*, integrated over the 15-minute Settlement Interval. | | | |
| 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. |
| ***[NPRR698: Replace the above variable RTCLRNS q with the following 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. | | | |
| 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 for each Season based on the average of the Reserve Discount Factors (RDFs) for that 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. |
| *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. |

(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 (11) 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 (11) of Section 5.5.2 discounted by the system-wide discount factor for the QSE *q*, for the 15-minute Settlement Interval. |
| ***[NPRR698: Replace the above variable RTRUCRESP q with the following upon system implementation:]***   |  |  |  | | --- | --- | --- | | 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 (11) 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.* |
| 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. |

6.7.5 Real-Time Ancillary Service Imbalance Revenue Neutrality Allocation

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

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

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

Where:

RTASIAMTTOT = RTASIAMT *q*

RTRUCRSVAMTTOT =  RTRUCRSVAMT *q*

RTRDASIAMTTOT = RTRDASIAMT *q*

RTRDRUCRSVAMTTOT=  RTRDRUCRSVAMT *q*

The above variables are defined as follows:

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