|  |  |  |  |
| --- | --- | --- | --- |
| NPRR Number | [1092](http://www.ercot.com/mktrules/issues/NPRR1092) | NPRR Title | Reduce RUC Offer Floor and Remove RUC Opt-Out Provision |
| Date of Decision | February 23, 2022 |
| Action | Tabled |
| Timeline  | Normal |
| Proposed Effective Date | Upon system implementation |
| Priority and Rank Assigned | Priority – 2022; Rank – 3005 |
| Nodal Protocol Sections Requiring Revision  | 2.1, Definitions3.9.1, Current Operating Plan (COP) Criteria5.5.2, Reliability Unit Commitment (RUC) Process6.4.7, QSE-Requested Decommitment of Resources and Changes to Ancillary Service Resource Responsibility of Resources6.5.7.3, Security Constrained Economic Dispatch6.5.7.3.1, Determination of Real-Time On-Line Reliability Deployment Price Adder6.5.7.6.1, LFC Process Description6.6.12, Make-Whole Payment for Switchable Generation Resources Committed for Energy Emergency Alert (EEA)6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge6.7.6, Real-Time Ancillary Service Imbalance Revenue Neutrality Allocation |
| Related Documents Requiring Revision/Related Revision Requests | None |
| Revision Description | This Nodal Protocol Revision Request (NPRR) reduces the value of the offer floor on Resources that have the status of ONRUC and removes the ONOPTOUT status. |
| Reason for Revision |  Addresses current operational issues. Meets Strategic goals (tied to the [ERCOT Strategic Plan](http://www.ercot.com/content/wcm/lists/144926/ERCOT_Strategic_Plan_2019-2023.pdf) or directed by the ERCOT Board). Market efficiencies or enhancements Administrative Regulatory requirements Other: (explain)*(please select all that apply)* |
| Business Case | The Reliability Unit Commitment (RUC) offer floor was put into place in a market construct in which self-commitment was relied upon and RUC was infrequent. Recently, ERCOT has been utilizing the RUC process to procure an excess reliability margin. As such, it is no longer appropriate to have an offer floor on these MWs as high as $1,500/MWh. In conjunction with the opt-out process and the frequent reliability commitments, the RUC offer floor represents an inefficiency with regard to the incentive to commit. An offer floor in alignment with Non-Spinning Reserve’s (Non-Spin’s) will provide more appropriate incentives, as will removing the RUC opt-out provision. These two changes are supported by the Public Utility Commission of Texas (PUCT), as stated in their Open Meeting on January 27, 2022. |
| Credit Work Group Review | ERCOT Credit Staff and the Credit Work Group (Credit WG) have reviewed NPRR1092 and do not believe that it requires changes to credit monitoring activity or the calculation of liability. |
| PRS Decision | On 9/16/21, PRS voted unanimously via roll call to table NPRR1092 and refer the issue to WMS. The Independent Retail Electric Provider (IREP) Market Segment did not participate in the vote.On 12/14/21, PRS voted via roll call to table NPRR1092. There were eight opposing votes from the Consumer (3) (Occidental Chemical, City of Eastland, Residential Consumer), Independent Generator (2) (Jupiter Power, EDP Renewables), Independent Power Marketer (IPM) (Morgan Stanley), and IREP (2) (Reliant Energy, Just Energy) Market Segments, and five abstentions from the Independent Generator (Enel Green Power), IPM (Tenaska), Investor Owned Utility (IOU) (AEP), and Municipal (2) (DME, Austin Energy) Market Segments. All Market Segments participated in the vote.On 1/13/22, PRS voted via roll call to recommend approval of NPRR1092 as amended by the 12/23/21 ERCOT comments. There were seven opposing votes from the Cooperative (3) (Golden Spread, LCRA, STEC), Independent Generator (3) (Luminant, Exelon, Calpine), and IPM (EDF Trading) Market Segments, and six abstentions from the Independent Generator (Enel Green Power), IPM (2) (Tenaska, DC Energy), IOU (Oncor), and Municipal (2) (New Braunfels, GEUS) Market Segments. All Market Segments participated in the vote. On 2/9/22, PRS voted via roll call to endorse and forward to TAC the 1/13/22 PRS Report as amended by the 1/31/22 Joint Commenters comments and Impact Analysis for NPRR1092 with a recommended priority of 2022 and rank of 3005. There were seven opposing votes from the Cooperative (2) (LCRA, STEC), Independent Generator (3) (Luminant, Key Capture, Calpine), and IPM (2) (Tenaska, EDF Trading) Market Segments, and four abstentions from the Cooperative (Golden Spread), Independent Generator (Enel Green Power), IPM (Cpower), and IREP (Electranet Power) Market Segments. All Market Segments participated in the vote. |
| Summary of PRS Discussion | On 9/16/21, the sponsor provided an overview of NPRR1092 and the case for Urgent status. Some participants voiced a preference for waiting until the PUCT provides direction for a more holistic market redesign rather than piecemeal improvements to processes like RUC within individual NPRRs. Other participants questioned whether the RUC floor should be removed entirely, rather than lowered. Participants ultimately requested additional discussion of these issues at WMS.On 12/14/21, the sponsor again expressed a desire to move NPRR1092 forward to address current market issues, but some participants again expressed a desire to wait for additional direction from the PUCT prior to modifying Protocols.On 1/13/22, participants noted the 1/5/22 WMS comments endorsing the 12/23/21 ERCOT comments. Opponents expressed concerns that reducing the RUC floor could result in unnecessary price suppression and undercut market-based offers.On 2/9/22, participants reviewed the 1/31/22 Joint Commenters comments and the Impact Analysis for NPRR1092. ERCOT Staff noted the 1/31/22 Joint Commenters comments would likely reduce the cost of implementation and a Revised Impact Analysis would be prepared for TAC. Opponents again expressed concerns that NPRR1092 could negatively impact Load hedges and long-term Resource adequacy. |
| TAC Decision | On 2/23/22, TAC voted unanimously via roll call to table NPRR1092. All Market Segments participated in the vote. |
| Summary of TAC Discussion | On 2/23/22, TAC reviewed the ERCOT Opinion and ERCOT Market Impact Statement for NPRR1092. Participants noted several sets of recently filed comments containing analysis of RUC behavior and continuing discussions regarding the potential impacts of changes to the RUC offer floor; and requested tabling NPRR1092 for further discussion at a workshop. |
| ERCOT Opinion | ERCOT supports approval of NPRR1092. |
| ERCOT Market Impact Statement | ERCOT Staff has reviewed NPRR1092 and believes the market impact for NPRR1092 establishes more appropriate incentives for Resources related to RUC. |

|  |
| --- |
| Sponsor |
| Name | Carrie Bivens |
| E-mail Address | cbivens@potomaceconomics.com |
| Company | Potomac Economics, Independent Market Monitor (IMM) |
| Phone Number | 512-248-6678 |
| Market Segment | Not applicable |

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

|  |
| --- |
| **Comments Received** |
| Comment Author | **Comment Summary** |
| WMS 101221 | Requested PRS continue to table NPRR1092 for further review by the Wholesale Market Working Group (WMWG) |
| IMM 111921 | Proposed additional edits to include a heat-rate multiplier of 16 times Fuel Index Price (FIP) plus $5/MWh as a second phase modification to the RUC offer floor and to remove the RUC opt-out provision |
| ERCOT 120621 | Proposed additional clarifying edits to the 11/19/21 IMM comments |
| ERCOT 122321 | Proposed additional edits to the 12/6/21 ERCOT comments to address a concern raised by stakeholders regarding the rare instance where a Resource updates its Current Operating Plan (COP) to reflect self-commitment but still receives a RUC instruction during the hour due to its COP reflecting “OFF” when the RUC Snapshot was taken. |
| WMS 010522 | Endorsed NPRR1092 as amended by the 12/23/21 ERCOT comments |
| Joint Commenters 013122 | Proposed edits to align NPRR1092 with the policy dictated by the PUCT at its Open Meeting on January 27, 2022 |
| Shell 021622 | Opposed NPRR1092 |
| Luminant 021722 | Opposed NPRR1092 |
| Reliant 022222 | Supported NPRR1092 |

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

Please note the baseline Protocol language in the following sections has been updated to reflect the incorporation of the following NPRRs into the Protocols:

* NPRR1093, Load Resource Participation in Non-Spinning Reserve (incorporated 11/1/21)
	+ Section 3.9.1
	+ Section 6.5.7.3.1
	+ Section 6.7.5
* NPRR1105, Option to Deploy Distribution Voltage Reduction Measures Prior to Energy Emergency Alert (EEA) (incorporated 12/17/21)
	+ Section 6.5.7.3.1
* NPRR1091, Changes to Address Market Impacts of Additional Non-Spin Procurement (incorporated 1/1/22)
	+ Section 6.7.5.3.1

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

* NPRR1085, Ensuring Continuous Validity of Physical Responsive Capability (PRC) and Dispatch through Timely Changes to Resource Telemetry and Current Operating Plans (COPs)
	+ Section 3.9.1
* NPRR1100, Emergency Switching Solutions for Energy Storage Resources
	+ Section 6.4.7
* NPRR1113, Clarification of Regulation-Up Schedule for Controllable Load Resources in Ancillary Service Imbalance
	+ Section 6.7.5

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

**2.1 DEFINITIONS**

**Make-Whole Payment**

A payment made by ERCOT to a Qualified Scheduling Entity (QSE) for a Resource to reimburse a QSE for allowable startup and minimum energy costs of a Resource not recovered in energy revenue when a Resource is committed by Reliability Unit Commitment (RUC) or when a Resource is committed by the Day-Ahead Market (DAM).

|  |
| --- |
| ***[NPRR1013: Replace the definition “Make-Whole Payment” above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]*****Make-Whole Payment** A payment made by ERCOT to a Qualified Scheduling Entity (QSE) for a Resource to reimburse a QSE for allowable startup and minimum energy costs of a Resource not recovered in energy or Ancillary Service revenue when a Resource is committed by Reliability Unit Commitment (RUC) or when a Resource is committed by the Day-Ahead Market (DAM). |

**Qualified Scheduling Entity (QSE) Clawback Interval**

Any QSE-Committed Interval that is part of a contiguous block that includes at least one RUC-Committed Hour unless it is:

(a) QSE-committed in the COP and Trades Snapshot before the first RUC instruction for any RUC-Committed Hour in that contiguous block; or

(b) Part of a contiguous block of a QSE-Committed Intervals, at least one of which was committed by the QSE in the COP and Trades Snapshot before the RUC instruction described in paragraph (a) above.

.

|  |
| --- |
| ***[NPRR1013: Replace the definition “Qualified Scheduling Entity (QSE) Clawback Interval” above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]*****Qualified Scheduling Entity (QSE) Clawback Interval** Any QSE-Committed Interval that is part of a contiguous block that includes at least one Reliability Unit Commitment (RUC)-Committed Hour unless it is:(a) QSE-committed in the RUC Snapshot before the first RUC instruction for any RUC-Committed Hour in that contiguous block; or(b) Part of a contiguous block of a QSE-Committed Intervals, at least one of which was committed by the QSE in the RUC Snapshot before the RUC instruction described in paragraph (a) above. |

**Reliability Unit Commitment (RUC)-Committed Hour**

An Operating Hour for which a RUC has committed a Resource to be On-Line.

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

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

(2) Each QSE that represents a Resource shall update its COP reflecting changes in availability of any Resource as soon as reasonably practicable, but in no event later than 60 minutes after the event that caused the change.

(3) The Resource capacity in a QSE’s COP must be sufficient to supply the Ancillary Service Supply Responsibility of that QSE.

|  |
| --- |
| ***[NPRR1007, NPRR1014, and NPRR1029: Replace applicable portions of paragraph (3) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029:]***(3) Each QSE that represents a Resource shall update its COP to reflect the ability of the Resource to provide each Ancillary Service by product and sub-type. |

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

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

(a) The name of the Resource;

(b) The expected Resource Status:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

|  |
| --- |
| ***[NPRR863: Insert paragraph (L) below upon system implementation and renumber accordingly:]***(L) ONECRS – On-Line as a synchronous condenser providing ERCOT Contingency Response Service (ECRS) but unavailable for Dispatch by SCED and available for commitment by RUC; |

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

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

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

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

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

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

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

(O) ONFFRRRS – Available for Dispatch of RRS providing Fast Frequency Response (FFR) from Generation Resources. This Resource Status is only to be used for Real-Time telemetry purposes;

|  |
| --- |
| ***[NPRR1015: Replace paragraph (O) above with the following upon system implementation of NPRR863:]***(P) ONFFRRRS – Available for Dispatch of RRS when providing Fast Frequency Response (FFR) from Generation Resources. This Resource Status is only to be used for Real-Time telemetry purposes. A Resource with this Resource Status may also be providing Ancillary Services other than FFR; |

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

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

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

(A) OUT – Off-Line and unavailable;

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

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

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

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

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

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

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

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

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

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

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

(E) ONRL – Available for Dispatch of RRS, excluding Controllable Load Resources;

|  |
| --- |
| ***[NPRR1093: Replace item (E) above with the following upon system implementation:]***(E) ONRL – Available for Dispatch of RRS or Non-Spin, excluding Controllable Load Resources; |

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

|  |
| --- |
| ***[NPRR863: Insert paragraph (F) below upon system implementation and renumber accordingly:]***(F) ONECL – Available for Dispatch of ECRS, excluding Controllable Load Resources;  |

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

(F) OUTL – Not available;

|  |
| --- |
| ***[NPRR863 and NPRR1015: Insert applicable portions of paragraph (H) below upon system implementation of NPRR863:]***(H) ONFFRRRSL – Available for Dispatch of RRS when providing FFR, excluding Controllable Load Resources. This Resource Status is only to be used for Real-Time telemetry purposes; |

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

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

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

(c) The HSL;

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

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

(d) The LSL;

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

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

(e) The High Emergency Limit (HEL);

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

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

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

(i) Regulation Up (Reg-Up);

(ii) Regulation Down (Reg-Down);

(iii) RRS; and

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

(iv) Non-Spin.

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

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

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

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

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

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

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

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

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

(7) ERCOT may accept COPs only from QSEs.

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

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

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

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

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

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

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

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

(b) A hydro unit.

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

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

|  |
| --- |
| ***[NPRR1026: Insert paragraph (16) below upon system implementation:]***(16) A QSE representing a Self-Limiting Facility must ensure that the sum of the COP HSL/LSL and the sum of the telemetered HSL/LSL submitted for each Resource within the Self-Limiting Facility do not exceed either the limit on MW Injection or the limit on the MW Withdrawal established for the Self-Limiting Facility. |

|  |
| --- |
| ***[NPRR1029: Insert paragraph (16) below upon system implementation:]***(16) A QSE representing a DC-Coupled Resource shall not submit an HSL that exceeds the inverter rating or the sum of the nameplate ratings of the generation component(s) of the Resource. |

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

(1) The RUC process recommends commitment of Generation Resources, to match ERCOT’s forecasted Load including Direct Current Tie (DC Tie) Schedules, subject to all transmission constraints and Resource performance characteristics. The RUC process takes into account Resources already committed in the Current Operating Plans (COPs), Resources already committed in previous RUCs, Off-Line Available Resources having a start-up time of one hour or less, and Resource capacity already committed to provide Ancillary Service. The formulation of the RUC objective function must employ penalty factors on violations of security constraints. The objective of the RUC process is to minimize costs based on the Resource costs described in paragraphs (5) through (9) below. For all hours of the RUC Study Period within the RUC process, Quick Start Generation Resources (QSGRs) with a COP Resource Status of OFFQS shall be considered as On-Line with Low Sustained Limit (LSL) at zero MW. QSGRs with a Resource Status of OFFQS shall only be committed by ERCOT through a RUC instruction in instances when a reliability issue would not otherwise be managed through Dispatch Instructions from Security-Constrained Economic Dispatch (SCED).

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

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

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

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

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

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

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

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

(8) ERCOT shall create Three-Part Supply Offers for all Resources that did not submit a Three-Part Supply Offer, but are specified as available but Off-Line, excluding Resources with a Resource Status of EMR, in a QSE’s COP. For such Resources, excluding available Off-Line Resources with a cold start time of one hour or less that have not been removed from special consideration under paragraph (9) below pursuant to paragraph (4) of Section 8.1.2, ERCOT shall use in the RUC process 150% of any approved verifiable Startup Cost and verifiable minimum-energy cost or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as described specified in Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, registered with ERCOT. However for Settlement purposes, ERCOT shall use any approved verifiable Startup Costs and verifiable minimum-energy cost for such Resources, or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and Generic Minimum-Energy Offer Cost.

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

The above parameter is defined as follows:

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Current Value\*** |
| 1HRLESSCOSTSCALING | Percentage | Maximum value of 20% |
| \* The current value for the parameter(s) referenced in this table above will be recommended by the Technical Advisory Committee (TAC) and approved by the ERCOT Board. ERCOT shall update parameter value(s) on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. |

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

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

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

(c) Ask ERCOT to replace the capacity.

(11) Factors included in the RUC process are:

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

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

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

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

(c) Planned transmission topology;

(d) Energy sufficiency constraints;

(e) Inputs from the COP, as appropriate;

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

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

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

(i) Forced Outage information; and

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

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

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

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

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

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

(14) A Resource that has a Three-Part Supply Offer cleared in the Day-Ahead Market (DAM) and subsequently receives a RUC commitment for the Operating Hour for which it was awarded will be treated as if it is not RUC-committed for purposes of Section 6.5.7.3, Security Constrained Economic Dispatch, and Section 6.5.7.3.1, Determination of Real-Time On-Line Reliability Deployment Price Adder.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1009 and NPRR1032: Replace applicable portions of Section 5.5.2 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009; or upon system implementation for NPRR1032:]******5.5.2 Reliability Unit Commitment (RUC) Process***(1) The RUC process recommends commitment of Generation Resources, to match ERCOT’s forecasted Load including Direct Current Tie (DC Tie) Schedules and RUC Ancillary Service Demand Curves (ASDCs), subject to all transmission constraints and Resource performance characteristics. The RUC process takes into account Resources already committed in the Current Operating Plans (COPs), Resources already committed in previous RUCs, and Off-Line Available Resources having a start-up time of one hour or less. The formulation of the RUC objective function must employ penalty factors on violations of security constraints. The objective of the RUC process is to minimize costs based on the Resource costs described in paragraphs (9) through (13) below. (2) ERCOT shall create an ASDC for each Ancillary Service for use in RUC. ERCOT shall post the ASDCs to the ERCOT website as soon as practicable after any change to the ASDCs.(3) For all hours of the RUC Study Period within the RUC process, Quick Start Generation Resources (QSGRs) with a COP Resource Status of OFFQS shall be considered as On-Line with Low Sustained Limit (LSL) at zero MW. QSGRs with a Resource Status of OFFQS shall only be committed by ERCOT through a RUC instruction in instances when a reliability issue would not otherwise be managed through Dispatch Instructions from Security-Constrained Economic Dispatch (SCED). (4) In addition to On-Line qualified Resources, the RUC engine shall consider a COP Resource status of OFFQS for QSGRs that are qualified for ERCOT Contingency Reserve Service (ECRS), as being eligible to provide ECRS constrained by the Ancillary Service capability in the COP.(5) In addition to On-Line qualified Resources, the RUC engine shall consider a COP Resource Status of OFFQS for QSGRs that are qualified for Non-Spinning Reserve (Non-Spin), as being eligible to provide Non-Spin constrained by the Ancillary Service Capability in the COP. The RUC engine shall also consider a COP Resource Status of OFF (Off-Line but available for commitment in the DAM and RUC) for a Resource that is qualified for Non-Spin, as being eligible to provide Non-Spin constrained by the Ancillary Service capability in the COP.(6) The RUC process can recommend Resource decommitment. ERCOT may only decommit a Resource to resolve transmission constraints that are otherwise unresolvable. Qualifying Facilities (QFs) may be decommitted only after all other types of Resources have been assessed for decommitment. In addition, the HRUC process provides decision support to ERCOT regarding a Resource decommitment requested by a Qualified Scheduling Entity (QSE). (7) ERCOT shall review the RUC-recommended Resource commitments and the list of Off-Line Available Resources having a start-up time of one hour or less to assess feasibility and shall make any changes that it considers necessary, in its sole discretion. During the RUC process, ERCOT may also review and commit, through a RUC instruction, Combined Cycle Generation Resources that are currently planned to be On-Line but are capable of transitioning to a configuration with additional capacity. ERCOT may deselect Resources recommended in DRUC and in all HRUC processes if in ERCOT’s sole discretion there is enough time to commit those Resources in the future HRUC processes, taking into account the Resources’ start-up times, to meet ERCOT System reliability. After each RUC run, ERCOT shall post the amount of capacity deselected per hour in the RUC Study Period to the MIS Secure Area. A Generation Resource shown as On-Line and available for SCED dispatch for an hour in its COP prior to a DRUC or HRUC process execution, according to Section 5.3, ERCOT Security Sequence Responsibilities, will be considered self-committed for that hour. For purpose of Settlement, snapshot data will be used as specified in paragraph (2) of Section 5.3. (8) ERCOT shall issue RUC instructions to each QSE specifying its Resources that have been committed as a result of the RUC process. ERCOT shall, within one day after making any changes to the RUC-recommended commitments, post to the MIS Secure Area any changes that ERCOT made to the RUC-recommended commitments with an explanation of the changes.(9) ERCOT shall use the RUC process to evaluate the need to commit Resources for which a QSE has submitted Three-Part Supply Offers and other available Off-Line Resources in addition to Resources that are planned to be On-Line during the RUC Study Period. All of the above commitment information must be as specified in the QSE’s COP. For available Off-Line Resources with a cold start time of one hour or less that have not been removed from special consideration under paragraph (15) below pursuant to paragraph (4) of Section 8.1.2, Current Operating Plan (COP) Performance Requirements, the Startup Offers and Minimum-Energy Offer from a Resource’s Three-Part Supply Offer shall not be used in the RUC process. (10) ERCOT shall create Three-Part Supply Offers for all Resources that did not submit a Three-Part Supply Offer, but are specified as available but Off-Line, excluding Resources with a Resource Status of EMR, in a QSE’s COP. For such Resources, excluding available Off-Line Resources with a cold start time of one hour or less that have not been removed from special consideration under paragraph (13) below pursuant to paragraph (4) of Section 8.1.2, ERCOT shall use in the RUC process 150% of any approved verifiable Startup Cost and verifiable minimum-energy cost or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as described specified in Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, registered with ERCOT. However for Settlement purposes, ERCOT shall use any approved verifiable Startup Costs and verifiable minimum-energy cost for such Resources, or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and Generic Minimum-Energy Offer Cost.(11) A QSE shall notify the ERCOT Operator of any physical limitation that impacts its Resource’s ability to start that is not reflected in the Resource’s COP or the Resource’s startup time, minimum On-Line time, or minimum Off-Line time. The following shall apply:(a) If a Resource receives a RUC Dispatch Instruction that it cannot meet due to a physical limitation described in paragraph (4) above, the QSE representing the Resource shall notify the ERCOT Operator of the inability to fully comply with the instruction and shall comply with the instruction to the best of the Resource’s ability. If the QSE has provided the ERCOT Operator notice of that limitation at least seven days prior to the Operating Day in which the instruction occurs, the QSE shall be excused from complying with the portion of the RUC Dispatch Instruction that it could not meet due to the identified limitation. (b) If a QSE provides notice pursuant to paragraph (a) above of a physical limitation that will delay the RUC-committed Resource’s ability to reach its LSL in accordance with a RUC Dispatch Instruction, ERCOT shall extend the RUC Dispatch Instruction so that the Resource’s minimum run time is respected. However, if the Resource will not be available in time to address the issue for which it received the RUC instruction, ERCOT may instead cancel the RUC Dispatch Instruction.(12) A QSE shall be excused from complying with any portion of a RUC Dispatch Instruction that it could not meet due to a physical limitation that was reflected, at the time of the RUC Dispatch Instruction, in the Resource’s COP, startup time, minimum On-Line time, or minimum Off-Line time.(13) To determine the projected energy output level of each Resource and to project potential congestion patterns for each hour of the RUC, ERCOT shall calculate proxy Energy Offer Curves based on the Mitigated Offer Caps (MOCs) for the type of Resource as specified in Section 4.4.9.4, Mitigated Offer Cap and Mitigated Offer Floor, for use in the RUC. Proxy Energy Offer Curves are calculated by multiplying the MOC by a constant selected by ERCOT from time to time that is no more than 0.10% and applying the cost for all Generation Resource output between High Sustained Limit (HSL) and LSL. The intent of this process is to minimize the effect of the proxy Energy Offer Curves on optimization.(14) ERCOT shall calculate proxy Ancillary Service Offer Curves for use in RUC based on validated Ancillary Service Offers as specified in Section 4.4.7.2, Ancillary Service Offers. For all Resources that do not have a valid Ancillary Service Offer but are qualified to provide an Ancillary Service, ERCOT shall create an Ancillary Service Offer Curve for use in RUC as described in Section 6.5.7.3, Security Constrained Economic Dispatch. Proxy Ancillary Service Offer Curves for use in RUC are calculated by multiplying the Ancillary Service Offer by a constant selected by ERCOT from time to time that is no more than 0.1%, and are extended between the HSL and LSL. Notwithstanding the presence or absence of a proxy Ancillary Service Offer, Ancillary Service provision in RUC shall be limited by the Resource’s Ancillary Service capabilities as reflected in the COP. (15) For all available Off-Line Resources having a cold start time of one hour or less and not removed from special consideration pursuant to paragraph (4) of Section 8.1.2, ERCOT shall scale any approved verifiable Startup Cost and verifiable minimum-energy cost or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as specified in Section 4.4.9.2.3 for use in the RUC process. The above parameter is defined as follows:

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Current Value\*** |
| 1HRLESSCOSTSCALING | Percentage | Maximum value of 20% |
| \* The current value for the parameter(s) referenced in this table above will be recommended by the Technical Advisory Committee (TAC) and approved by the ERCOT Board. ERCOT shall update parameter value(s) on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. |

(16) Factors included in the RUC process are: (a) ERCOT System-wide hourly Load forecast allocated appropriately over Load buses;(b) ERCOT’s Ancillary Service Plans in the form of ASDCs;(c) Transmission constraints – Transfer limits on energy flows through the electricity network;(i) Thermal constraints – protect transmission facilities against thermal overload;(ii) Generic constraints – protect the transmission system against transient instability, dynamic instability or voltage collapse;(d) Planned transmission topology;(e) Energy sufficiency constraints;(f) Inputs from the COP, as appropriate;(g) Inputs from Resource Parameters, including a list of Off-Line Available Resources having a start-up time of one hour or less, as appropriate;(h) Each Generation Resource’s Minimum-Energy Offer and Startup Offer, from its Three-Part Supply Offer;(i) Any Generation Resource that is Off-Line and available but does not have a Three-Part Supply Offer;(j) Forced Outage information; and(k) Inputs from the eight-day look ahead planning tool, which may potentially keep a unit On-Line (or start a unit for the next day) so that a unit minimum duration between starts does not limit the availability of the unit (for security reasons). (17) The HRUC process and the DRUC process are as follows:(a) The HRUC process uses current Resource Status for the initial condition for the first hour of the RUC Study Period. All HRUC processes use the projected status of transmission breakers and switches starting with current status and updated for each remaining hour in the study as indicated in the COP for Resources and in the Outage Scheduler for transmission elements. (b) The DRUC process uses the current hourly forecast of total ERCOT Load including DC Tie Schedules up to the physical rating of the DC Tie for each hour of the Operating Day. The HRUC process uses the current hourly forecast of total ERCOT Load including DC Tie Schedules up to the physical rating of the DC Tie for each hour in the RUC Study Period.(c) The DRUC process uses the Day-Ahead weather forecast for each hour of the Operating Day. The HRUC process uses the weather forecast information for each hour of the balance of the RUC Study Period.(18) A Resource that has a Three-Part Supply Offer cleared in the Day-Ahead Market (DAM) and subsequently receives a RUC commitment for the Operating Hour for which it was awarded will be treated as if it is not RUC-committed for purposes of Section 6.5.7.3 and Section 6.5.7.3.1, Determination of Real-Time Reliability Deployment Price Adders. |

***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 Reliability Unit Commitment (RUC)-Committed Interval 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 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 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 by indicating a change in unit status in the QSE’s COP, unless the Resource received a Weekly Reliability Unit Commitment (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 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. ERCOT shall use the Hourly Reliability Unit Commitment (HRUC) and other processes to study the move and if Ancillary Services become infeasible as a result of the proposed move, ERCOT shall follow the provisions of Section 6.4.9.1.2, Replacement of Infeasible 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.

|  |
| --- |
| ***[NPRR1010: Replace Section 6.4.7 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]******6.4.7 QSE-Requested Decommitment of Resources*** (1) A Resource must remain committed during any Reliability Unit Commitment (RUC)-Committed Interval 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 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, 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 by indicating a change in unit status in the QSE’s COP, unless the Resource received a Weekly Reliability Unit Commitment (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 by verbally requesting ERCOT to consider its request. |

**6.5.7.3 Security Constrained Economic Dispatch**

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

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

(3) In the Generation To Be Dispatched (GTBD) determined by LFC, ERCOT shall subtract the sum of the telemetered net real power consumption from all 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-IRRs and Dynamically Scheduled Resources (DSRs) without Energy Offer Curves

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

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

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

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

(b) DSRs with Energy Offer Curves

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

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

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

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

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

(d) IRRs

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

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

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

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

(e) RUC-committed Resources

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

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL  | $75 |
| Zero | $75 |

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

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL (if more than highest MW in Energy Offer Curve) | Greater of $75 or price associated with the highest MW in QSE submitted Energy Offer Curve |
| Energy Offer Curve | Greater of $75 or the QSE submitted Energy Offer Curve |
| Zero | Greater of $75 or the first price point of the QSE submitted Energy Offer Curve |

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

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL of RUC-committed configuration  | $75 |
| Zero | $75 |

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

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL of RUC-committed configuration (if more than highest MW in Energy Offer Curve) | Greater of $75 or price associated with the highest MW in QSE submitted Energy Offer Curve |
| Energy Offer Curve for MW at and above HSL of QSE-committed configuration | Greater of $75 or the QSE submitted Energy Offer Curve |
| HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve and price associated with highest MW in Energy Offer Curve is less than $75) | $75 |
| HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve) | Price associated with the highest MW in QSE submitted Energy Offer Curve |
| Energy Offer Curve for MW at and below HSL of QSE-committed configuration | The QSE submitted Energy Offer Curve |
| 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 |
| LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

 |

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

(6) For a 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) If a Controllable Load Resource telemeters a status of OUTL, it is not considered as dispatchable capacity by SCED. A QSE may use this function to inform ERCOT of instances when the 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. This paragraph does not apply to ESRs.

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

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

(a) The first step is to execute the SCED process to determine Reference LMPs. In this step, ERCOT executes SCED using the full Network Operations Model while only observing limits of Competitive Constraints. Energy Offer Curves for all On-Line Generation Resources and RTM Energy Bids from available 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) or the appropriate Mitigated Offer Floor. In addition, each Energy Offer Curve subject to mitigation under the criteria described in Section 3.19.4, Security-Constrained Economic Dispatch Constraint Competitiveness Test, must be capped at the greater of the Reference LMP (from Step 1) at the Resource Node plus a variable not to exceed 0.01 multiplied by the value of the Resource’s Mitigated Offer Cap (MOC) curve at the LSL or the appropriate MOC;

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

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

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

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

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

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

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

(15) ERCOT may override one or more of a 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.

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR930, NPRR1000, NPRR1010, NPRR1014, and NPRR1019: Replace applicable portions of Section 6.5.7.3 above with the following upon system implementation for NPRR930, NPRR1000, NPRR1014, or NPRR1019; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]*****6.5.7.3 Security Constrained Economic Dispatch**(1) The SCED process is designed to simultaneously manage energy, Ancillary Services, the system power balance and network congestion through Resource Base Points, Ancillary Service awards, and the calculation of LMPs and Real-Time MCPCs approximately every five minutes, or more frequently if necessary. The SCED process uses a two-step methodology that applies mitigation to offers for energy prospectively to resolve Non-Competitive Constraints for the current Operating Hour. The SCED process evaluates Energy Offer Curves, Energy Bid/Offer Curves, Ancillary Service Offers, Output Schedules and Real-Time Market (RTM) Energy Bids to determine Resource Dispatch Instructions and Ancillary Service awards by maximizing bid-based revenues minus offer-based costs, subject to power balance, Ancillary Service Demand Curves (ASDCs), and network constraints. The SCED process uses the Resource Status provided by SCADA telemetry under Section 6.5.5.2, Operational Data Requirements, and validated by the Real-Time Sequence, instead of the Resource Status provided by the COP.(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 for determining energy dispatch and Ancillary Service awards, ERCOT shall use the available capacity of all committed Generation Resources by creating proxy Energy Offer Curves for certain Resources as follows: (a) Non-IRRs without Energy Offer Curves(i) ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below for:(A) Each non-IRR for which its QSE has submitted an Output Schedule instead of an Energy Offer Curve.

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

(b) Non-IRRs without full-range Energy Offer Curves (i) For each non-IRR for which its QSE has submitted an Energy Offer Curve that does not cover the full range of the Resource’s available capacity, ERCOT shall create a proxy Energy Offer Curve that extends the submitted Energy Offer Curve to use the entire available capacity of the Resource above the highest point on the Energy Offer Curve to the Resource’s HSL and the offer floor from the lowest point on the Energy Offer Curve to its LSL, using these points:

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

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

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

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

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

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

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL  | $75 |
| Zero | $75 |

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

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL (if more than highest MW in Energy Offer Curve) | Greater of $75 or price associated with the highest MW in QSE submitted Energy Offer Curve |
| Energy Offer Curve | Greater of $75 or the QSE submitted Energy Offer Curve |
| Zero | Greater of $75 or the first price point of the QSE submitted Energy Offer Curve |

(iii) For each RUC-committed Resource during the time period stated in the Advance Action Notice (AAN) if any Resource received an Outage Schedule Adjustment, ERCOT shall create a proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL | $4,500 or the effective Value of Lost Load (VOLL), whichever is less. |
| Zero | $4,500 or the effective VOLL, whichever is less. |

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

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL of RUC-committed configuration  | $75 |
| Zero | $75 |

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

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL of RUC-committed configuration (if more than highest MW in Energy Offer Curve) | Greater of $75 or price associated with the highest MW in QSE submitted Energy Offer Curve |
| Energy Offer Curve for MW at and above HSL of QSE-committed configuration | Greater of $75 or the QSE submitted Energy Offer Curve |
| HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve and price associated with highest MW in Energy Offer Curve is less than $75 ) | $75  |
| HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve) | Price associated with the highest MW in QSE submitted Energy Offer Curve |
| Energy Offer Curve for MW at and below HSL of QSE-committed configuration | The QSE submitted Energy Offer Curve |
| 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 |
| LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |

(vi) For each RUC-committed Switchable Generation Resource (SWGR) that is not part of a Combined Cycle Train already operating in ERCOT, that has not submitted an Energy Offer Curve, and that has a COP Resource Status of EMRSWGR for the instructed Operating Hour at the time of the RUC instruction, ERCOT shall create a proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL | $4,500 or the effective Value of Lost Load (VOLL), whichever is less |
| Zero | $4,500 or the effective VOLL, whichever is less |

(vii) For each RUC-committed SWGR that is not part of a Combined Cycle Train already operating in ERCOT, that has submitted an Energy Offer Curve, and that has a COP Resource Status of EMRSWGR for the instructed Operating Hour at the time of the RUC instruction, ERCOT shall create a proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL (if more than highest MW in Energy Offer Curve) | Greater of: $4,500 or the effective VOLL, whichever is less; and the price associated with the highest MW in QSE-submitted Energy Offer Curve |
| Energy Offer Curve | Greater of: $4,500 or the effective VOLL, whichever is less; and the QSE-submitted Energy Offer Curve |
| Zero | Greater of: $4,500 or the effective VOLL, whichever is less; and the first price point of the QSE-submitted Energy Offer Curve |

(viii) For each Combined Cycle Train configuration that includes at least one SWGR that is operating in a non-ERCOT Control Area as part of a configuration with a COP Resource Status of EMRSWGR for the instructed Operating Hour at the time of a RUC instruction requiring the switching of the SWGR into the ERCOT Control Area, if the QSE for the Combined Cycle Train has not submitted an Energy Offer Curve for the RUC-committed configuration, ERCOT shall create a proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL of RUC-committed configuration  | $4,500 or the effective VOLL, whichever is less |
| Zero | $4,500 or the effective VOLL, whichever is less |

(ix) For each Combined Cycle Train configuration that includes at least one SWGR that is operating in a non-ERCOT Control Area as part of a configuration with a COP Resource Status of EMRSWGR for the instructed Operating Hour at the time of a RUC instruction requiring the switching of the SWGR into the ERCOT Control Area, if the QSE for the Combined Cycle Train has submitted an Energy Offer Curve for the RUC-committed configuration, ERCOT shall create a proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL of RUC-committed configuration (if more than highest MW in Energy Offer Curve) | Greater of: $4,500 or the effective VOLL, whichever is less; and the price associated with the highest MW in QSE-submitted Energy Offer Curve |
| Energy Offer Curve for MW at and above HSL of QSE-committed configuration | Greater of: $4,500 or the effective VOLL, whichever is less; and the QSE-submitted Energy Offer Curve |
| HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve and price associated with highest MW in Energy Offer Curve is less than $4,500) | $4,500 or the effective VOLL, whichever is less |
| HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve) | Price associated with the highest MW in QSE-submitted Energy Offer Curve |
| Energy Offer Curve for MW at and below HSL of QSE-committed configuration | The QSE-submitted Energy Offer Curve |
| 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 |
| LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |

(5) For use as SCED inputs for determining energy dispatch and Ancillary Service awards, ERCOT shall use the available Ancillary Service MW capacity of all Resources by creating a proxy Ancillary Service Offer for qualified Resources as follows:(a) The proxy Ancillary Service Offer shall be a linked Ancillary Service Offer across all Ancillary Service products for which a Resource is qualified to provide. For Generation Resources, the proxy Ancillary Service Offer MW shall be equal to the Resource’s telemetered HSL. For ESRs, the proxy Ancillary Service Offer MW shall be equal to the difference between the Resource’s telemetered HSL and LSL. For Load Resources, the proxy Ancillary Service Offer MW shall be equal to the Resource’s telemetered Maximum Power Consumption (MPC).(b) For Resources that are not RUC-committed, the price in the proxy Ancillary Service Offer shall be set to:(i) For Reg-Up and RRS, the maximum of:(A) The proxy Ancillary Service Offer price floor for Reg-Up or RRS, respectively;(B) The Resource’s highest submitted Ancillary Service Offer price for Reg-Up or RRS, respectively;(C) The Resource’s highest Ancillary Service Offer price for ECRS (submitted or proxy); or(D) The Resource’s highest Ancillary Service Offer price for Non-Spin (submitted or proxy).(ii) For ECRS, the maximum of: (A) The proxy Ancillary Service Offer price floor for ECRS; (B) The Resource’s highest submitted Ancillary Service Offer price for ECRS; or(C) The Resource’s highest Ancillary Service Offer price for Non-Spin (submitted or proxy).(iii) For Non-Spin, the maximum of: (A) The proxy Ancillary Service Offer price floor for Non-Spin; or(B) The Resource’s highest submitted Ancillary Service Offer price for Non-Spin.(iv) For Reg-Down, the maximum of:(A) The proxy Ancillary Service Offer price floor for Reg-Down; or(B) The Resource’s highest submitted Ancillary Service Offer price for Reg-Down.(c) ERCOT systems shall be designed to allow for proxy Ancillary Service Offer price floors to differ when the same Ancillary Service product can be provided by either On-Line or Off-Line Resources, and/or an Ancillary Service product has sub-types. (d) Proxy Ancillary Service Offer price floors shall be approved by TAC and posted on the ERCOT website.(e) For RUC-committed Resources:(i) If a RUC-committed Resource does not have an Ancillary Service Offer for an Ancillary Service product that the Resource is qualified to provide, ERCOT shall create an Ancillary Service Offer for that Ancillary Service product at a value of $75/MWh for the full operating range of the Resource up to its telemetered HSL.(ii) For each Ancillary Service product for which a RUC-committed Resource has an Ancillary Service Offer, the Ancillary Service Offer used by SCED for that Ancillary Service product across the full operating range of the Resource up to its telemetered HSL shall be the maximum of: (A) The Resource’s highest submitted Ancillary Service Offer price; or (B) $75/MWh.(6) For use as SCED inputs for determining energy Dispatch and Ancillary Service awards, ERCOT shall use the available capacity of all On-Line ESRs by creating proxy Energy Bid/Offer Curves for certain Resources as follows: (a) For each ESR for which its QSE has submitted an Energy Bid/Offer Curve that does not cover the full offer range (LSL to HSL) of the Resource’s available capacity, ERCOT shall create a proxy Energy Bid/Offer Curve that extends the submitted Energy Bid/Offer Curve to use the entire available capacity of the Resource above the highest MW point on the Energy Bid/Offer Curve to the Resource’s HSL and from the lowest MW point on the Energy Bid/Offer Curve to LSL, using these prices for the corresponding MW segments:

|  |  |  |
| --- | --- | --- |
| **Scenario** | **MW Segment** | **Price (per MWh)** |
| HSL MW and the highest MW point on the Energy Bid/Offer are both greater than or equal to zero, and,HSL is greater than the highest MW in submitted Energy Bid/Offer Curve | From highest MW point on submitted Energy Bid/Offer Curve to HSL MW | RTSWCAP  |
| HSL MW is greater than or equal to zero, and,the highest MW point on the Energy Bid/Offer is less than zero | From highest MW point on submitted Energy Bid/Offer Curve to 0 MWFrom 0 MW to HSL | Price associated with the highest MW in submitted Energy Bid/Offer CurveRTSWCAP |
| HSL is less than zero and is also greater than the highest MW in submitted Energy Bid/Offer Curve | From highest MW point on submitted Energy Bid/Offer Curve to HSL MW | Price associated with the highest MW in submitted Energy Bid/Offer Curve |
| Energy Bid/Offer Curve |  | Energy Bid/Offer Curve |
| LSL MW and the lowest MW point on the Energy Bid/Offer Curve are both greater than or equal to zero, and,LSL is less than the lowest MW in submitted Energy Bid/Offer Curve | From LSL to lowest MW point on submitted Energy Bid/Offer Curve | Price associated with the lowest MW in submitted Energy Bid/Offer Curve |
| LSL MW is less than zero,and,the lowest MW point on the Energy Bid/Offer Curve is greater than zero | From LSL to 0 MWFrom 0 MW to lowest MW point on submitted Energy Bid/Offer Curve | -$250.00Price associated with the lowest MW in submitted Energy Bid/Offer Curve |
| LSL and the lowest MW point on the Energy Bid/Offer Curve are both less than or equal to zero,and,LSL is less than the lowest MW point on the Energy Bid/Offer Curve | From LSL to lowest MW point on submitted Energy Bid/Offer Curve | -$250.00 |

(b) At the time of SCED execution, if a valid Energy Bid/Offer Curve or Output Schedule does not exist for an ESR that has a status of On-Line, then ERCOT shall notify the QSE and create a proxy Energy Bid/Offer Curve priced at -$250/MWh for the MW portion of the curve less than zero MW, and priced at the RTSWCAP for the MW portion of the curve greater than zero MW.(c) At the time of SCED execution, if a QSE representing an ESR has submitted an Output Schedule instead of an Energy Bid/Offer Curve, ERCOT shall create a proxy Energy Bid/Offer Curve priced at -$250/MWh for the MW portion of the curve from its LSL to the MW amount on the Output Schedule, and priced at the RTSWCAP for the MW portion of the curve from the MW amount on the Output Schedule to its HSL.(7) The Entity with decision-making authority, as more fully described in Section 3.19.1, Constraint Competitiveness Test Definitions, over how a Resource or Split Generation Resource is offered or scheduled, shall be responsible for all offers associated with each Resource, including offers represented by a proxy Energy Offer Curve, proxy Energy Bid/Offer Curve, or proxy Ancillary Service Offer. (8) For a 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 |

(9) 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.(10) If a Controllable Load Resource telemeters a status of OUTL, it is not considered as dispatchable capacity by SCED. A QSE may use this function to inform ERCOT of instances when the 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 Services awarded to the Resource. This paragraph does not apply to ESRs. (11) 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.(12) SCED will enforce Resource-specific Ancillary Service constraints to ensure that Ancillary Service awards are aligned with a Resource’s qualifications and telemetered Ancillary Service capabilities.(13) Energy Bid/Offer Curves that were constructed in whole or in part with proxy Energy Bid/Offer Curves shall be so marked in all ERCOT postings or references to the energy bid/offer.(14) The two-step SCED methodology referenced in paragraph (1) above is:(a) The first step is to execute the SCED process to determine Reference LMPs. In this step, ERCOT executes SCED using the full Network Operations Model while only observing limits of Competitive Constraints in addition to power balance and Ancillary Service constraints. Energy Offer Curves for all On-Line Generation Resources, Energy Bid/Offer Curves for all On-Line ESRs, and 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, Ancillary Service awards, Shadow Prices, Real-Time MCPCs, and LMPs, subject to security constraints (including Competitive and Non-Competitive Constraints) and other Resource constraints. The second step must:(i) Use Energy Offer Curves for all On-Line Generation Resources, whether submitted by QSEs or created by ERCOT. Each Energy Offer Curve must be bounded at the lesser of the Reference LMP (from Step 1) or the appropriate Mitigated Offer Floor. In addition, each Energy Offer Curve subject to mitigation under the criteria described in Section 3.19.4, Security-Constrained Economic Dispatch Constraint Competitiveness Test, must be capped at the greater of the Reference LMP (from Step 1) at the Resource Node plus a variable not to exceed 0.01 multiplied by the value of the Resource’s Mitigated Offer Cap (MOC) curve at the LSL or the appropriate MOC; (ii) Use Energy Bid/Offer Curves for all On-Line ESRs, whether submitted by QSEs or created by ERCOT. Each Energy Bid/Offer Curve must be bounded at the lesser of the Reference LMP (from Step 1) or the appropriate Mitigated Offer Floor. The offer portion of each Energy Bid/Offer Curve subject to mitigation under the criteria described in Section 3.19.4, Security-Constrained Economic Dispatch Constraint Competitiveness Test, must be capped at the greater of the Reference LMP (from Step 1) at the Resource Node plus a variable not to exceed 0.01 multiplied by the value of the Resource’s MOC curve at the LSL or the appropriate MOC; (iii) Use 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. An RTM Energy Bid from a Controllable Load Resource represents the bid for energy distributed across all nodes in the Load Zone in which the Controllable Load Resource is located. For an ESR, an RTM Energy Bid represents a bid for energy at the ESR’s Resource Node; (iv) Observe all Competitive and Non-Competitive Constraints; and(v) Use Ancillary Service Offers to determine Ancillary Service awards.(c) ERCOT shall archive information and provide monthly summaries of security violations and any binding transmission constraints identified in Step 2 of the SCED process. The summary must describe the limiting element (or identified operator-entered constraint with operator’s comments describing the reason and the Resource-specific impacts for any manual overrides). ERCOT shall provide the summary to Market Participants on the MIS Secure Area and to the Independent Market Monitor (IMM).(d) The System Lambda used to determine LMPs from SCED Step 2 shall be capped at the effective VOLL. (15) For each SCED process, in addition to the binding Base Points, Ancillary Service awards, Real-Time MCPCs, and LMPs, ERCOT shall calculate a non-binding projection of the Base Points, Ancillary Service awards, MCPCs, Resource Node LMPs, Real-Time Reliability Deployment Price Adders, Hub LMPs, and Load Zone LMPs at a frequency of every five minutes for at least 15 minutes into the future based on the same inputs to the SCED process as described in this Section, except that the Resource’s HDL and LDL and the total generation requirement will be as estimated at future intervals. The Resource’s HDL and LDL will be calculated for each interval of the projection based on the ramp rate capability over the study period. ERCOT shall estimate the projected total generation requirement by calculating a Load forecast for the study period. In lieu of the steps described in Section 6.5.7.3.1, Determination of Real-Time Reliability Deployment Price Adders, the non-binding projection of Real-Time Reliability Deployment Price Adders shall be estimated based on GTBD, reliability deployments MWs, and aggregated offers. The Energy Offer Curve and Energy Bid/Offer Curves from SCED Step 2, the virtual offers for Load Resources deployed and the power balance penalty curve will be compared against the updated GTBD to get an estimate of the System Lambda from paragraph (2)(m) of Section 6.5.7.3.1. ERCOT shall post the projected non-binding Base Points and Ancillary Service awards for each Resource for each interval study period on the MIS Certified Area and the projected non-binding LMPs for Resource Nodes, Real-Time MCPCs, Real-Time Reliability Deployment Price Adders, Hub LMPs and Load Zone LMPs on the ERCOT website pursuant to Section 6.3.2, Activities for Real-Time Operations.(16) 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.(17) The QSE representing an ESR may withdraw energy from the ERCOT System only when dispatched by SCED to do so. An ESR may telemeter a status of OUT only if the ESR is in Outage status. |

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

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

(a) RUC-committed Resources;

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

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

(d) Deployed ERS;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(e) Add the deployed MW from Load Resources other than Controllable Load Resources to GTBD linearly ramped over the ten-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.

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

The above parameter is defined as follows:

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

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

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

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

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

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

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

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

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

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

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

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR904, NPRR1006, NPRR1010, NPRR1014, NPRR1091, NPRR1093, and NPRR1105: Replace applicable portions of Section 6.5.7.3.1 above with the following upon system implementation for NPRR904, NPRR1006, NPRR1014, NPRR1091, NPRR1093, or NPRR1105; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]*****6.5.7.3.1Determination of Real-Time Reliability Deployment Price Adder**(1) The following categories of reliability deployments are considered in the determination of the Real-Time Reliability Deployment Price Adder for Energy, and the Real-Time Reliability Deployment Price Adders for Ancillary Services:(a) RUC-committed Resources;(b) RMR Resources that are On-Line, including capacity secured to prevent an Emergency Condition pursuant to paragraph (4) of Section 6.5.1.1, ERCOT Control Area Authority; (c) Deployed Load Resources other than Controllable Load Resources;(d) Deployed ERS;(e) ERCOT-directed DC Tie imports during an EEA or transmission emergency where the total adjustment shall not exceed 1,250 MW in a single interval; (f) ERCOT-directed curtailment of DC Tie imports below the higher of DC Tie advisory import limit as of 0600 in the Day-Ahead or subsequent advisory import limit to address local transmission system limitations where the total adjustment shall not exceed 1,250 MW in a single interval;(g) ERCOT-directed curtailment of DC Tie imports below the higher of DC Tie advisory import limit as of 0600 in the Day-Ahead or subsequent advisory import limit due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT where the total adjustment shall not exceed 1,250 MW in a single interval;(h) ERCOT-directed DC Tie exports to address emergency conditions in the receiving electric grid where the total adjustment shall not exceed 1,250 MW in a single interval; (i) ERCOT-directed curtailment of DC Tie exports below the DC Tie advisory export limit as of 0600 in the Day-Ahead or subsequent advisory export limit during EEA, a transmission emergency, or to address local transmission system limitations where the total adjustment shall not exceed 1,250 MW in a single interval;(j) Energy delivered to ERCOT through registered Block Load Transfers (BLTs) during an EEA;(k) Energy delivered from ERCOT to another power pool through registered BLTs during emergency conditions in the receiving electric grid;(l) ERCOT-directed deployment of Transmission and/or Distribution Service Provider (TDSP) standard offer Load management programs;(m) ERCOT-directed deployment of distribution voltage reduction measures; and(n) ERCOT-directed deployment of Off-Line Non-Spin.(2) The Real-Time Reliability Deployment Price Adder for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Services are estimations of the impact to energy prices and Real-Time MCPCs due to the above categories of reliability deployments. For intervals where there are reliability deployments as described in paragraph (1) above, the Real-Time Reliability Deployment Price Adder for Energy and Real-Time Reliability Deployment Price Adders for Ancillary Services are determined as follows:(a) For Off-Line Non-Spin Resources that are brought On-Line by ERCOT deployment instruction, RUC-committed Resources with a telemetered Resource Status of ONRUC and for RMR Resources that are On-Line:(i) Set the LSL and LDL to zero;(ii) Remove all Ancillary Service Offers; and(iii) For the first step of SCED, administratively set the Energy Offer Curve for the Resource at a value equal to the power balance penalty price for all capacity between 0 MW and the HSL of the Resource.(b) Notwithstanding item (a) above, for RUC-committed Combined Cycle Generation Resources with a telemetered Resource Status of ONRUC that were instructed by ERCOT to transition to a different configuration to provide additional capacity:(i) Set the LSL and LDL equal to the minimum of their current value and the COP HSL of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction;(ii) Set the maximum Ancillary Service capabilities of the Resource equal to the minimum of their current value and COP Ancillary Service capabilities of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction; and(iii) For the first step of SCED, administratively set the Energy Offer Curve for the Resource at a value equal to the power balance penalty price for the additional capacity of the Resource, defined as the positive difference between the Resource’s current telemetered HSL and the COP HSL of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction. (c) For all other Generation Resources excluding ones with a telemetered status of ONRUC, ONTEST, STARTUP, SHUTDOWN, and also excluding RMR Resources that are On-Line and excluding Generation Resources with a telemetered output less than 95% of LSL:(i) If the Generation Resource SCED Base Point is not at LDL, set LDL to the greater of Aggregated Resource Output - (60 minutes \* Normal Ramp Rate down), or LSL; and(ii) If the Generation Resource SCED Base Point is not at HDL, set HDL to the lesser of Aggregated Resource Output + (60 minutes \* Normal Ramp Rate up), or HSL. (d) For all On-Line ESRs:(i) If the ESR SCED Base Point is not at LDL, set LDL to the greater of Aggregated Resource Output - (60 minutes \* Normal Ramp Rate down), or LSL; and(ii) If the ESR SCED Base Point is not at HDL, set HDL to the lesser of Aggregated Resource Output + (60 minutes \* Normal Ramp Rate up), or HSL.(e) For all Controllable Load Resources excluding ones with a telemetered status of OUTL:(i) If the Controllable Load Resource SCED Base Point is not at LDL, set LDL to the greater of Aggregated Resource Output - (60 minutes \* Normal Ramp Rate down), or LSL; and(ii) If the Controllable Load Resource SCED Base Point is not at HDL, set HDL to the lesser of Aggregated Resource Output + (60 minutes \* Normal Ramp Rate up), or HSL.(f) Add the deployed MW from Load Resources that are not Controllable Load Resources and that are providing RRS to GTBD linearly ramped over the ten-minute ramp period and add the deployed MW from Load Resources that are not Controllable Load Resources providing Non-Spin to GTBD linearly ramped over the 30-minute ramp period. The amount of deployed MW is calculated from the Resource telemetry and from applicable deployment instructions in Extensible Markup Language (XML) messages. ERCOT shall generate a linear bid curve defined by a price/quantity pair of $300/MWh for the first MW of Load Resources deployed and a price/quantity pair of $700/MWh for the last MW of Load Resources deployed in each SCED execution. After recall instruction, the restoration period length and amount of MW added to GTBD during the restoration period will be determined by validated telemetry and the type of Ancillary Service deployed from the Resource. The TAC shall review the validity of the prices for the bid curve at least annually. (g) Add the deployed MW from ERS to GTBD. The amount of deployed MW is determined from the XML messages and ERS contracted capacities for the ERS Time Periods when ERS is deployed. After recall, an approximation of the amount of un-restored ERS shall be used. After ERCOT recalls each group, GTBD shall be adjusted to reflect restoration on a linear curve over the assumed restoration period (“RHours”).The above parameter is defined as follows:

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

(h) Add the MW from DC Tie imports during an EEA or transmission emergency, to address local transmission system limitations, or due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator.(i) Add the MW from DC Tie export curtailments during an EEA or transmission emergency, to address local transmission system limitations, or due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator. The MW added to GTBD associated with any individual DC Tie shall not exceed the higher of DC Tie advisory limit for exports on that tie as of 0600 in the Day-Ahead or subsequent advisory export limit minus the aggregate export on the DC Tie that remained scheduled following the Dispatch Instruction from the ERCOT Operator.(j) Subtract the MW from DC Tie exports to address emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator. (k) Subtract the MW from DC Tie import curtailments to address local transmission system limitations or emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator. The MW subtracted from GTBD associated with any individual DC Tie shall not exceed the higher of DC Tie advisory limit for imports on that tie as of 0600 in the Day-Ahead or subsequent advisory import limit minus the aggregate import on the DC Tie that remained scheduled following the Dispatch Instruction from the ERCOT Operator.(l) Add the MW from energy delivered to ERCOT through registered BLTs during an EEA to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator.(m) Subtract the MW from energy delivered from ERCOT to another power pool through registered BLTs during emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator.(n) Add the deployed MWs from TDSP standard offer Load management programs to GTBD, if ERCOT instructs TDSPs to deploy their standard offer Load management programs. The amount of deployed MW is the value ERCOT provided for all TDSP standard offer Load management programs in the most current May Report on Capacity, Demand and Reserves in the ERCOT Region, unless modified as specified in this paragraph. If ERCOT is informed that all or a portion of a TDSP’s standard offer Load management program has been fully exhausted, or has been expanded as the result of a Public Utility Commission of Texas (PUCT) proceeding, ERCOT will remove the associated MW value of any exhausted capacity from the amount of deployed MW or, in the case of an expansion, ERCOT will request an updated MW value from the relevant TDSPs to use in place of the May Report on Capacity, Demand and Reserves in the ERCOT Region value for that year. The initial value ERCOT will use for deployed MW under this paragraph for each calendar year, as well as any subsequent changes to this value, will be communicated to Market Participants in a Market Notice. After recall, an approximation of the amount of un-restored TDSP standard offer Load management programs shall be used. GTBD shall be adjusted to reflect restoration on a linear curve over the assumed restoration period (“RHours”) defined by item (g) above. (o) Perform a SCED with changes to the inputs in items (a) through (m) above, considering only Competitive Constraints and the non-mitigated Energy Offer Curves.(p) Perform mitigation on the submitted Energy Offer Curves using the LMPs from the previous step as the reference LMP.(q) Perform a SCED with the changes to the inputs in items (a) through (m) above, considering both Competitive and Non-Competitive Constraints and the mitigated Energy Offer Curves.(r) The Real-Time Reliability Deployment Price Adder for Energy is equal to the positive difference between the System Lambda from item (q) above and the System Lambda of the second step in the two-step SCED process described in paragraph (10)(b) of Section 6.5.7.3, Security Constrained Economic Dispatch.(s) For each individual Ancillary Service, the Real-Time Reliability Deployment Price Adder for Ancillary Service is equal to the positive difference between the MCPC for that Ancillary Service from item (q) above and the MCPC for that Ancillary Service.  |

***6.5.7.6.1 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. 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 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.

|  |
| --- |
| ***[NPRR863 and NPRR1010: Replace applicable portions of Section 6.5.7.6.1 above with the following upon system implementation for NPRR863; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]*** ***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 Set Point (UDSP) 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 Service, RRS, and ECRS.(4) Based on the ACE MW correction, the LFC issues a set of control signals every four seconds for each Resource providing Regulation and, if required, each Resource providing RRS or ECRS. Control signals to each Resource are provided to the QSE using the ICCP data link. QSEs shall receive a UDSP updated every four seconds by LFC. ERCOT will provide an operations notice of any methodology change to the determination of the UDSP within 60 minutes of the change. (5) If all Reg-Up capacity has been deployed, ERCOT shall run off-cycle SCED executions or use the LFC system to deploy ECRS on Resources providing FFR or with an ONSC Resource Status. Such ECRS deployments by ERCOT must be deployed as specified in Section 6.5.7.6.2.4, Deployment and Recall of ERCOT Contingency Reserve Service.(6) ERCOT shall settle energy that results from LFC deployment at the Settlement Point Price for the point of injection. When a QSE deploys RRS or ECRS, the QSE shall deploy units consistent with the performance criteria in Sections 8.1.1.3.2, Responsive Reserve Capacity Monitoring Criteria, Section 8.1.1.3.4, ERCOT Contingency Reserve Service Capacity Monitoring Criteria, 8.1.1.4.2, Responsive Reserve Energy Deployment Criteria, and 8.1.1.4.4, ERCOT Contingency Reserve Service Energy Deployment Criteria.(7) The inputs for LFC include:(a) Actual system frequency;(b) Scheduled system frequency;(c) Capacity awarded for Regulation Service to Resources;(d) For Resources awarded Regulation Service, telemetered HSL or MPC, and LSL or LPC;(e) Resource limits calculated by ERCOT as described in Section 6.5.7.2, Resource Limit Calculator;(f) Capacity awarded for RRS and ECRS to Resources;(g) ERCOT System frequency bias; and(h) Telemetered Resource output. |

***6.6.12 Make-Whole Payment for Switchable Generation Resources Committed for Energy Emergency Alert (EEA)***

(1) If ERCOT directs a Switchable Generation Resource (SWGR) to switch to the ERCOT Control Area for an actual or anticipated Energy Emergency Alert (EEA) condition, ERCOT shall pay the QSE representing the SWGR a Switchable Generation Make-Whole Payment (SWMWAMT) as calculated in Section 6.6.12.1, Switchable Generation Make-Whole Payment, if the QSE has:

(a) Complied with the RUC instruction, which may be a verbal RUC, to switch to the ERCOT Control Area and start the Resource;

(b) Submitted a timely Settlement and billing dispute, including the following items:

(i) An attestation signed by an officer or executive with authority to bind the QSE stating that the information contained in the submission is accurate;

(ii) The dollar amount and calculation of the financial loss, if applicable, by Settlement Interval for:

(A) Energy and ancillary service imbalance costs assessed under the non-ERCOT Control Area Operator’s (CAO’s) settlement process arising from DAM energy and ancillary service obligations of the SWGR in the non-ERCOT Control Area for the time period starting at the initiation of the ramp-down in the non-ERCOT Control Area to two hours following the time ERCOT released the SWGR;

(B) Incremental fuel costs incurred to comply with the instruction. Incremental fuel costs may include only those fuel costs described in Section 9.14.9, Incremental Fuel Costs for Switchable Generation Make-Whole Payment Disputes;

(C) Make-Whole Payment distribution costs for the commitment of generation resources in the non-ERCOT Control Area arising from the need to replace the energy and ancillary service obligations of the generation instructed via a RUC instruction to switch into the ERCOT Control Area;

(D) Pipeline imbalance penalty costs arising from the SWGR not consuming or consuming over its contracted fuel quantities as a result of a switch from a non-ERCOT Control Area as requested by ERCOT. Fuel imbalance penalty costs are limited to those costs assessed for the period starting at the initiation of the ramp-down in the non-ERCOT Control Area to two hours following the time ERCOT released the SWGR;

(iii) Sufficient documentation to support the QSE’s calculation of the amount of the financial loss and all submitted costs.

(2) For a SWGR without approved verifiable costs, the startup and minimum-energy costs will be determined based on generic costs as described in Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps. If generic costs are insufficient to cover startup and minimum-energy costs of the SWGR, the QSE may provide documentation and request that generic costs be replaced by proxy costs, if available, as determined by ERCOT.

(3) For a SWGR that is a Combined Cycle Generation Resource, all operating costs are those costs for the Combined Cycle Generation Resource within the Combined Cycle Train that is instructed for the hour. If the QSE representing a Combined Cycle Generation Resource complies with a RUC instruction by ERCOT to transition from one Combined Cycle Generation Resource to a different Combined Cycle Generation Resource within the Combined Cycle Train, the incremental cost to transition shall be included in the Switchable Generation Start-Up Cost (SWSUC), as calculated in Section 6.6.12.1, for the Combined Cycle Resource.

(4) A QSE representing a SWGR that is committed through an ERCOT instruction to switch to the ERCOT Control Area may recover lost revenue, net of saved fuel costs, attributable to a reduction in the output of other ERCOT-connected generators that are part of a Combined Cycle Train that includes the RUC-committed SWGR if the following conditions have been met:

(a) The QSE had to turn off one or more generators that were physically connected to the non-ERCOT Control Area in order to achieve the instructed switch, or had to turn off one or more generators that were physically connected to the ERCOT System in order to switch back to the non-ERCOT Control Area, in which case it must have completed the shutdown sequence within 60 minutes of the end of the RUC instruction; and

(b) As a consequence of turning off one or more generators to facilitate a switch described in paragraph (a) above, the output of one or more generators in the configuration operating in ERCOT at the time of the instruction had to be reduced.

(5) The lost revenue, net of saved fuel costs, described in paragraph (4) above shall be included in the Switchable Generation Cost Guarantee (SWCG), as calculated in Section 6.6.12.1, for the Combined Cycle Generation Resource.

(6) For a SWGR switching from a non-ERCOT Control Area, the compensation described in paragraph (4) above shall be determined for the period from the commencement of the shutdown sequence of the switched unit in the non-ERCOT Control Area until breaker close in the ERCOT Control Area. For a SWGR switching to a non-ERCOT Control Area within 60 minutes of the end of the RUC instruction, the compensation described in paragraph (4) above shall be determined for the period from the commencement of the shutdown sequence of the unit in the ERCOT System until breaker close in the non-ERCOT Control Area, with a maximum duration equal to the duration of the switch from the non-ERCOT Control Area to ERCOT pursuant to the RUC instruction.

(7) A QSE that is entitled to compensation under paragraph (4) above, or the Resource Entity for the affected SWGR, must provide the following documentation for the Combined Cycle Train to verify the lost revenue:

(a) Documentation of the Real-Time output of each unit in the Combined Cycle Train, whether operating in ERCOT or in the non-ERCOT Control Area;

(b) For thermal units, the Input-Output Equation or other documentation that allows for calculating the reduction in fuel consumption if the unit had to reduce generation;

(c) Documentation of the time the shutdown sequence started while switching to ERCOT, and if the QSE seeks recovery of lost revenues for a switch to the non-ERCOT Control Area, documentation of the time the breaker closed in the non-ERCOT Control Area, which is subject to verification with the non-ERCOT Control Area operator;

(d) Documentation showing which combustion turbine of the Combined Cycle Generation Resource is providing the auxiliary service; and

(e) Any other technical documentation ERCOT finds necessary to verify the performance and physical characteristics of the Combined Cycle Train or any component thereof, such as thermal balance diagrams.

(8) The Startup Cost for the SWGR shall include the cost for starting in the ERCOT Control Area and, if the SWGR starts up in the non-ERCOT Control Area within 24 hours of being released from ERCOT, the cost of starting in the non-ERCOT Control Area, which will be based on the same warmth state.

(9) ERCOT may request additional supporting documentation or explanation with respect to the submitted materials within 15 Business Days of receipt. Additional information requested by ERCOT must be provided by the QSE within 15 Business Days of ERCOT’s request. ERCOT will provide Notice of its acceptance or rejection of the claim for the SWMWAMT within 15 Business Days of the updated submission.

(10) If ERCOT denies all or a portion of a QSE’s non-ERCOT Control Area costs, pursuant to paragraph (1)(c)(ii) above, the QSE may submit a request for ADR as described in Section 20, Alternative Dispute Resolution Procedure.

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

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

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

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

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

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

|  |
| --- |
| ***[NPRR863, NPRR987, and NPRR1093: Replace applicable portions of paragraph (b) above with the following upon system implementation:]***(b) The amount of On-Line capacity based on the telemetered High Sustained Limit (HSL) for all On-Line Generation Resources and ESRs, the telemetered consumption from Load Resources with a validated Ancillary Service Schedule for ECRS or RRS controlled by high-set under-frequency relay or Non-Spin, and the capacity from Controllable Load Resources available to SCED, including capacity from modeled Controllable Load Resources associated with ESRs; |

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

|  |
| --- |
| ***[NPRR863 and NPRR987: Replace applicable portions of paragraph (c) above with the following upon system implementation:]***(c) The amount of Ancillary Service Resource Responsibility for Reg-Up, ECRS, RRS and Non-Spin for all Generation Resources, ESRs, 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) Nuclear Resources;

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

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

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

(4) Reliability Must-Run (RMR) Units and Reliability Unit Commitment (RUC) Resources On-Line during the hour due to an ERCOT instruction will be excluded from the amounts calculated for the 15-minute Settlement Interval pursuant to paragraphs (2)(a), (b), and (c) above, except for:

(a) Those RUC Resources that had a Three-Part Supply Offer cleared in the DAM for the hour;

(b) A Switchable Generation Resource (SWGR) released by a non-ERCOT Control Area Operator (CAO) to operate in the ERCOT Control Area due to an ERCOT RUC instruction for an actual or anticipated Energy Emergency Alert (EEA) condition; or

(c) Any Combined Cycle Generation Resource that was RUC-committed from one On-Line configuration to a different configuration with additional capacity, as described in paragraph (3) of Section 5.5.2.

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

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

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

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

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

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

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

Where:

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

|  |
| --- |
| ***[NPRR1093: Replace the formula “RTASOLIMB q” above with the following upon system implementation:]***RTASOLIMB *q*= RTOLCAP *q* – [((SYS\_GEN\_DISCFACTOR \* RTASRESP *q* ) \* ¼) – RTASOFF *q* – RTRUCNBBRESP *q*– RTCLRNSRESP *q* – RTNCLRNSRESP *q* – RTRMRRESP *q*] |

Where:

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

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

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

|  |
| --- |
| ***[NPRR1093: Insert the formula “RTNCLRNSRESP q” below upon system implementation:]***RTNCLRNSRESP *q* =  SYS\_GEN\_DISCFACTOR \* RTNCLRNSRESPR *q, r, p* |

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

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

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

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

Where:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Where:

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

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

|  |
| --- |
| ***[NPRR1093: Replace the formula “RTASOFFIMB q” above with the following upon system implementation:]***RTASOFFIMB *q* = RTOFFCAP *q* – (RTASOFF *q* + RTCLRNSRESP *q* + RTNCLRNSRESP *q*) |

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

|  |
| --- |
| ***[NPRR1093: Replace the formula “RTOFFCAP q” above with the following upon system implementation:]***RTOFFCAP *q* = (SYS\_GEN\_DISCFACTOR \* RTCST30HSL *q*) + (SYS\_GEN\_DISCFACTOR \* RTOFFNSHSL *q*) + RTCLRNS *q* + RTNCLRNSCAP *q*RTNCLRNSCAP *q* = Min(Max(RTNCLRNPC *q* – RTNCLRLPC *q*, 0.0), RTNCLRNS *q* \* 1.5)RTNCLRNS *q* = SYS\_GEN\_DISCFACTOR \*  RTNCLRNSR *q, r, p* |

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

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

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

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

The above variables are defined as follows:

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

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

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

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

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

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

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

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

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

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

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

 |

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

|  |
| --- |
| ***[NPRR863 and NPRR1093: Replace the description above with the following upon system implementation:]****Real-Time Non-Controllable Load Resource Net Power Consumption—*The Real-Time net real power consumption from the Load Resource *r* (which is not a Controllable Load Resource)represented by QSE *q* at Resource Node *p* that has a validated Real-Time ECRS, RRS, or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval. |

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

|  |
| --- |
| ***[NPRR863 and NPRR1093: Replace the description above with the following upon system implementation:]****Real-Time Non-Controllable Load Resource Low Power Consumption—*The Real-Time Low Power Consumption (LPC) from the Load Resource *r* (which is not a Controllable Load Resource)represented by QSE *q* at Resource Node *p* that has a validated Real-Time ECRS, RRS, or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval  |

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

|  |
| --- |
| ***[NPRR863 and NPRR1093: Replace the description above with the following upon system implementation:]****Real-Time Non-Controllable Load Resource Net Power Consumption for the QSE—*The Real-Time net real power consumption from all Load Resources other than Controllable Load Resources for QSE *q* that have a validated Real-Time ECRS, RRS, or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |

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

|  |
| --- |
| ***[NPRR863 and NPRR1093: Replace the description above with the following upon system implementation:]****Real-Time Non-Controllable Load Resource Low Power Consumption for the QSE—*The Real-Time LPC from all Load Resources other than Controllable Load Resourcesfor QSE *q* that have a validated Real-Time ECRS, RRS, or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |

 |
|

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1093: Insert the variables below upon system implementation:]***

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

 |

 |
| RTCLRNPCR *q, r, p* | MWh | *Real-Time Net Power Consumption from the Controllable Load Resource—*The Real-Time net real power consumption from the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p* available to SCED integrated over the 15-minute Settlement Interval.

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

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

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

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

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

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

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

 |
| RTCLRREG *q* | MWh | *Real-Time Controllable Load Resources Regulation-Up Schedule for the QSE*—The Real-Time Reg-Up Ancillary Service Schedule from all Controllable Load Resources with Primary Frequency Response for the QSE *q*, integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor.

|  |
| --- |
| ***[NPRR987: Replace the description above with the following upon system implementation:]****Real-Time Controllable Load Resources Regulation-Up Schedule for the QSE*—The Real-Time Reg-Up Ancillary Service Schedule from all Controllable Load Resources, not including modeled Controllable Load Resources associated with ESRs, 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* represented by QSE *q* at Resource Node *p* with Primary Frequency Response, integrated over the 15-minute Settlement Interval.

|  |
| --- |
| ***[NPRR987: Replace the description above with the following upon system implementation:]****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 or modeled Controllable Load Resource associated with an ESR, *r* represented by QSE *q* at Resource Node *p* with Primary Frequency Response, integrated over the 15-minute Settlement Interval. |

 |
| RTMGA *q, r, p* | MWh | *Real-Time Adjusted Metered Generation per QSE per Settlement Point per Resource*—The adjusted metered generation, pursuant to paragraphs (3) and (4) above, of Generation Resource *r* represented by QSE *q* at Resource Node *p* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMGQ *q* | MWh | *Real-Time Metered Generation per QSE*—The metered generation, discounted by the system-wide discount factor, of all generation Resources represented by QSE *q* in Real-Time for the 15-minute Settlement Interval, pursuant to paragraphs (3) and (4) above.

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

 |
|

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

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

 |

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

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

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

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

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

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

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

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

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

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

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

 |

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

 |

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

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

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

 |

 |

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |

|  |
| --- |
|  |

 |
|  |  |

|  |
| --- |
|  |

 |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

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

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

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

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

Where:

RTASIAMTTOT = RTASIAMT *q*

RTRDASIAMTTOT = RTRDASIAMT *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. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
| 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. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1010: Replace Section 6.7.6 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]******6.7.6 Real-Time Ancillary Service Revenue Neutrality Allocation***(1) The total cost for Real-Time Ancillary Service payments and charges is allocated to the QSEs representing Load based on Load Ratio Share (LRS). The Real-Time Ancillary Service allocations to each QSE for a given 15-minute Settlement Interval are calculated as follows:(a) For Reg-Up:LARTRUAMT *q* = (-1) \* (RTRUIMBAMTTOT + RTRUOAMTTOT + RTRUTOAMTTOT) \* LRS *q*Where:RTRUIMBAMTTOT =  (RTRUIMBAMT *q*)RTRUOAMTTOT =  (RTRUOAMT *q*)RTRUTOAMTTOT =  (RTRUTOAMT *q*)The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| LARTRUAMT *q* | $ | *Load-Allocated Real-Time Reg-Up Amount for the QSE*— The QSE *q*­’s share of the total Real-Time Reg-Up amount for the 15-minute Settlement Interval. |
| RTRUIMBAMT *q* | $ | *Real-Time Reg-Up Imbalance Amount for the QSE -* The total payment or charge to QSE *q* for the Real-Time Reg-Up imbalance for each 15-minute Settlement Interval. |
| RTRUOAMT *q* | $ | *Real-Time Reg-Up Only Amount for the QSE*— The total charge to QSE *q* in Real-Time for Reg-Up only awards for each 15-minute Settlement Interval. |
| RTRUIMBAMTTOT | $ | *Real-Time Reg-Up Imbalance Market Total Amount -* The total payment or charge to all QSEs for the Real-Time Reg-Up imbalance for each 15-minute Settlement Interval. |
| RTRUOAMTTOT | $ | *Real-Time Reg-Up Only Market Total Amount -* The total charge to all QSEs in Real-Time for Reg-Up only awards for each 15-minute Settlement Interval. |
| RTRUTOAMT *q* | $ | *Real-Time Reg-Up Trade Overage Amount for the QSE*— The total charge to QSE *q* in Real-Time for Reg-Up trade overages for each 15-minute Settlement Interval. |
| RTRUTOAMTTOT | $ | *Real-Time Reg-Up Trade Overage Total Amount* — The total charge to all QSEs for Real-Time Reg-Up trade overages for each 15-minute Settlement Interval. |
| LRS*q* | none | *Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval, for QSE *q* for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |

(b) For Reg-Down:LARTRDAMT *q* = (-1) **\* (**RTRDIMBAMTTOT + RTRDOAMTTOT + RTRDTOAMTTOT) \* LRS *q*Where:RTRDIMBAMTTOT = (RTRDIMBAMT *q*)RTRDOAMTTOT = (RTRDOAMT *q*)RTRDTOAMTTOT = (RTRDTOAMT *q*)The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| LARTRDAMT *q* | $ | *Load-Allocated Real-Time Reg-Down Amount for the QSE* ⎯ The QSE *q*’s share of the total Real-Time Reg-Down amount for the 15-minute Settlement Interval. |
| RTRDIMBAMT *q* | $ | *Real-Time Reg-Down Imbalance Amount for the QSE -* The total payment or charge to QSE *q* for the Real-Time Reg-Down imbalance for each 15-minute Settlement Interval. |
| RTRDOAMT *q* | $ | *Real-Time Reg-Down Only Amount for the QSE*— The total charge to QSE *q* in Real-Time for Reg-Down only awards for each 15-minute Settlement Interval. |
| RTRDIMBAMTTOT | $ | *Real-Time Reg-Down Imbalance Market Total Amount -* The total payment or charge to all QSEs for the Real-Time Reg-Down imbalance for each 15-minute Settlement Interval. |
| RTRDOAMTTOT | $ | *Real-Time Reg-Down Only Market Total Amount -* The total charge to all QSEs in Real-Time for Reg-Down only awards for each 15-minute Settlement Interval. |
| RTRDTOAMT *q* | $ | *Real-Time Reg-Down Trade Overage Amount for the QSE*— The total charge to QSE *q* in Real-Time for Reg-Down trade overages for each 15-minute Settlement Interval. |
| RTRDOAMTTOT | $ | *Real-Time Reg-Down Trade Overage Total Amount* — The total charge to all QSEs for Real-Time Reg-Down trade overages for each 15-minute Settlement Interval. |
| LRS*q* | none | *Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2 for QSE *q* for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |

 (c) For Responsive Reserve (RRS):LARTRRAMT *q* = (-1) **\* (**RTRRIMBAMTTOT + RTRROAMTTOT + RTRRTOAMTTOT) \* LRS *q*Where:RTRRIMBAMTTOT =  (RTRRIMBAMT *q*)RTRROAMTTOT =  (RTRROAMT *q*)RTRRTOAMTTOT =  (RTRRTOAMT *q*)The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| LARTRRAMT *q* | $ | *Load-Allocated Real-Time Responsive Reserve Amount for the QSE* ⎯ The QSE’s share of the total Real-Time RRS amount for the 15-minute Settlement Interval. |
| RTRRIMBAMT *q* | $ | *Real-Time Responsive Reserve Imbalance Amount for the QSE -* The total payment or charge to QSE *q* for the Real-Time RRS imbalance for each 15-minute Settlement Interval. |
| RTRROAMT *q* | $ | *Real-Time Responsive Reserve Only Amount for the QSE*— The total charge to QSE *q* in Real-Time for RRS only awards for each 15-minute Settlement Interval. |
| RTRRIMBAMTTOT | $ | *Real-Time Responsive Reserve Imbalance Market Total Amount -* The total payment or charge to all QSEs for the Real-Time RRS imbalance for each 15-minute Settlement Interval. |
| RTRROAMTTOT | $ | *Real-Time Responsive Reserve Only Market Total Amount -* The total charge to all QSEs in Real-Time for RRS only awards for each 15-minute Settlement Interval. |
| RTRRTOAMT *q* | $ | *Real-Time Responsive Reserve Trade Overage Amount for the QSE*— The total charge to QSE *q* in Real-Time for RRS trade overages for each 15-minute Settlement Interval. |
| RTRROAMTTOT | $ | *Real-Time Responsive Reserve Trade Overage Total Amount* — The total charge to all QSEs for Real-Time RRS trade overages for each 15-minute Settlement Interval. |
| LRS*q* | none | *Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2 for QSE *q* for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |

(d) For Non-Spin:LARTNSAMT *q* = (-1) \* (RTNSIMBAMTTOT + RTNSOAMTTOT + RTNSTOAMTTOT) \* LRS *q*Where:RTNSIMBAMTTOT =  (RTNSIMBAMT *q*)RTNSOAMTTOT =  (RTNSOAMT *q*)RTNSTOAMTTOT =  (RTNSTOAMT *q*)The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| LARTNSAMT *q* | $ | *Load-Allocated Real-Time Non-Spin Amount for the QSE* ⎯ The QSE’s share of the total Real-Time Non-Spin amount for the 15-minute Settlement Interval. |
| RTNSIMBAMT *q* | $ | *Real-Time Non-Spin Imbalance Amount for the QSE -* The total payment or charge to QSE *q* for the Real-Time Non-Spin imbalance for each 15-minute Settlement Interval. |
| RTNSOAMT *q* | $ | *Real-Time Non-Spin Only Amount for the QSE*— The total charge to QSE *q* in Real-Time for Non-Spin only awards for each 15-minute Settlement Interval. |
| RTNSIMBAMTTOT | $ | *Real-Time Non-Spin Imbalance Market Total Amount -* The total payment or charge to all QSEs for the Real-Time Non-Spin imbalance for each 15-minute Settlement Interval. |
| RTNSOAMTTOT | $ | *Real-Time Non-Spin Only Market Total Amount -* The total charge to all QSEs in Real-Time for Non-Spin only awards for each 15-minute Settlement Interval. |
| RTNSTOAMT *q* | $ | *Real-Time Non-Spin Trade Overage Amount for the QSE*— The total charge to QSE *q* in Real-Time for Non-Spin trade overages for each 15-minute Settlement Interval. |
| RTNSOAMTTOT | $ | *Real-Time Non-Spin Trade Overage Total Amount* — The total charge to all QSEs for Real-Time Non-Spin trade overages for each 15-minute Settlement Interval. |
| LRS*q* | none | *Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2 for QSE *q* for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |

 (e) For ERCOT Contingency Reserve Service (ECRS):LARTECRAMT *q* = (-1) \* (RTECRIMBAMTTOT + RTECROAMTTOT +  RTECRTOAMTTOT) \* LRS *q*Where:RTECRIMBAMTTOT =  (RTECRIMBAMT *q*)RTECROAMTTOT = (RTECROAMT *q*)RTECRTOAMTTOT = (RTECRTOAMT *q*)The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| LARTECRAMT *q* | $ | *Load-Allocated Real-Time ERCOT Contingency Reserve Service Amount for the QSE -* The QSE *q*’s share of the total Real-Time ECRS amount for the 15-minute Settlement Interval. |
| RTECRIMBAMT *q* | $ | *Real-Time ERCOT Contingency Reserve Service Imbalance Amount for the QSE -* The total payment or charge to QSE *q* for the Real-Time ECRS imbalance for each 15-minute Settlement Interval. |
| RTECROAMT *q* | $ | *Real-Time ERCOT Contingency Reserve Service Only Amount for the QSE—* The total charge to QSE *q* in Real-Time for ECRS only awards for each 15-minute Settlement Interval. |
| RTECRIMBAMTTOT | $ | *Real-Time ERCOT Contingency Reserve Service Imbalance Market Total Amount -* The total payment or charge to all QSEs for the Real-Time ECRS imbalance for each 15-minute Settlement Interval. |
| RTECROAMTTOT | $ | *Real-Time ERCOT Contingency Reserve Service Only Market Total Amount -* The total charge to all QSEs in Real-Time for ECRS only awards for each 15-minute Settlement Interval. |
| RTECRTOAMT *q* | $ | *Real-Time ERCOT Contingency Reserve Service Trade Overage Amount for the QSE*— The total charge to QSE *q* in Real-Time for ECRS trade overages for each 15-minute Settlement Interval. |
| RTECROAMTTOT | $ | *Real-Time ERCOT Contingency Reserve Service Trade Overage Total Amount* — The total charge to all QSEs for Real-Time ECRS trade overages for each 15-minute Settlement Interval. |
| LRS*q* | none | *Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2 for QSE *q* for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |

 |