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| **NPRR Number** | [**1214**](https://www.ercot.com/mktrules/issues/NPRR1214) | **NPRR Title** | **Reliability Deployment Price Adder Fix to Provide Locational Price Signals, Reduce Uplift and Risk** |
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| **Date** | November 4, 2024 |
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| **Submitter’s Information** |
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| **Market Segment** | Independent Power Marketer (IPM) and Consumer |

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| **Comments** |

Joint Sponsors submit these comments in response to ERCOT’s 8/9/24 comments on Nodal Protocol Revision Request (NPRR) 1214. ERCOT comments point to additional details required in the NPRR, ERCOT’s limitations in providing additional analysis requested by a Market Participant, and timing considerations related to the implementation of the Real-Time Co-Optimization plus Batteries (RTC+B) initiative.

This NPRR:

1. Reduces tens of millions in unnecessary uplift and eliminates inefficient and counter-productive price signals in the current market as well as under RTC+B,
2. Addresses the lack of an indifference payment related to the inconsistencies between the Base Point from Security-Constrained Economic Dispatch (SCED) dispatch run and the Settlement Point Prices from the SCED Real-Time Reliability Deployment Price Adder (RTRDPA) pricing run under RTC+B – there will be serious incentive incompatibility issues whenever the RTRDPA is high – an outcome ERCOT market designs have consistently taken extraordinary steps to address since the introduction of the ERCOT Zonal Market; and
3. Requires mostly Settlements-related changes.

Given these significant benefits of the NPRR, Joint Sponsors thought is was worth implementing the changes in the NPRR as soon as practicable. However, with RTC+B implementation being moved to a much earlier date, we recognize that it may not be possible to implement these changes prior to RTC+B. We would strongly recommend and encourage ERCOT to implement this NPRR as soon as practicable after RTC+B implementation.

These comments remove all the changes related to implementation of this NPRR prior to RTC+B – thus significantly reducing the changes that need to be considered. There is no reason to delay approval of this NPRR due to ERCOT’s current inability to perform the additional analysis that was requested by a Market Participant since the analysis already provided by ERCOT is sufficient to make an informed estimate of the impact on Load Zone prices with implementation of this NPRR. Once endorsed by Protocol Revision Subcommittee (PRS), the Impact Analysis will specify the cost and implementation time for this NPRR.

Joint Sponsors greatly appreciate ERCOT staff support in adding the necessary details and ensuring the implementation impact of this NPRR is minimized.

On specific policy and design Issues in ERCOT comments:

1. Of course, indifference payments would apply to Energy Storage Resources (ESRs). These comments address this issue.
2. NPRR1188, Implement Nodal Dispatch and Energy Settlement for Controllable Load Resources, has not been approved yet. Of course, pre-NPRR1188 would require zonal prices and post-NPRR1188 would require nodal prices. However, since NPRR1188 has not been approved yet, it’s not possible to incorporate this impact. These comments allow for the CLR Settlement Point to be either a Load Zone or Resource Node. Once NPRR1188 is approved, ERCOT can change the implementation from Load Zone to Resource Node.
* This NPRR makes no changes to the way impacts of Load Resource deployments, Block Load Transfers (BLTs), and utility programs, and High Dispatch Limit (HDL) overrides are currently handled. Some of these ERCOT out-of-market actions, such as Load Resource deployments, are infrequent and due to system-wide scarcity situations – thus, there is little to be gained trying to model these locationally which would be difficult to implement anyway.
* Since modeling of Direct Current Tie (DC Tie) curtailments as a “pseudo Energy Storage Resource” would have an NPRR implementation impact beyond the Settlement system and if the IA shows that this change would delay implementation of the other changes in this NPRR, these DC Tie changes in the NPRR can be implemented at a later time as a second phase whereas the rest of the changes would be implemented as the first phase. This change is already in the grey-boxed language of Section 6.5.7.3.1, Determination of Real-Time On-Line Reliability Deployment Price Adder, which is to be implemented upon system implementation for NPRR904, NPRR1006, NPRR1014, NPRR1091, or NPRR1105; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010.

With the changes in this NPRR, Joint Sponsors believe we’ve addressed all of ERCOT’s concerns.

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| Revised Cover Page Language |

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| Revision Description | This Nodal Protocol Revision Request (NPRR) revises the Real-Time On-Line Reliability Deployment Price Adder (RTRDPA) to: * Send appropriate locational price signals to avoid counterproductive Load and Resource responses to RTRDPA price signals under Real-Time Co-Optimization (RTC);
* Limit Resource payment to the actual “indifference payment” (consistent with its definition), thereby reducing associated uplift by eliminating future need of RTRDPA payments to Resources that exacerbate constraints and eliminating payments to available capacity not requiring an indifference payment;
* Eliminate any future need for Ancillary Service Imbalance Payments or Charges (ASIP/C) type of indifference payment associated with RTRDPA, thereby reducing the risk associated with providing Ancillary Services;
* Provide Resources an indifference payment under Real-Time Co-optimization (RTC) to eliminate the potentially large incentive to ignore Base Point instructions that are likely to cause serious reliability issues; and
* Provide a stronger locational price signal around Resources committed by the Reliability Unit Commitment (RUC) process or other reliability actions for congestion, thereby reducing RUC Make-Whole Payment-related charges and uplifts and appropriately compensating impacted Qualified Scheduling Entities (QSEs).
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| Justification of Reason for Revision and Market Impacts | This NPRR fixes RTRDPA implementation by making it consistent with the definition of RTRDPA in the Nodal Protocols. RTRDPA is an energy price adder to undo the price-suppressing impact of reliability deployments. The associated indifference payment is supposed to pay Resources to keep them indifferent between being dispatched at the adjusted price that includes the RTRDPA or receiving the indifference payment – thereby eliminating any incentive to chase prices and ignore Base Point instructions. Unfortunately, the current implementation of RTRDPA treats RTRDPA as an operating reserve-related price adder, effectively making it the same as the Operating Reserve Demand Curve (ORDC) price adder. Its current application is inconsistent with its definition and results in counter-productive outcomes including compensation to capacity exacerbating a constraint and compensation to capacity with Energy Offer Curves above the resulting energy prices after adding the RTRDPA (both part of RTRDPA-related ASIP Settlement). This inconsistent treatment of RTRDPA resulted in an unnecessary ASIP-related uplift to Load and Direct Current Tie (DC Tie) exports of $10 million on a single Operating Day (4/22/2022) and many tens of millions of dollars in ASIC-related charges to Resources providing Ancillary Services deployed during Winter Storm Uri in February 2021. Without the changes in this NPRR making RTRDPA locational, the same issue may arise if the obvious lack of indifference payment under RTC is similarly addressed for post-RTC system-wide RTRDPA. Drs. Hogan and Pope, in their paper “[Priorities for the Evolution of an Energy-Only Electricity Market Design in ERCOT](https://hepg.hks.harvard.edu/publications/priorities-evolution-energy-only-electricity-market-design-ercot-1)” (2017) pointed out that “The Reliability Deployment Price Adder implemented in August 2014 does not attribute local scarcity value to capacity deployments occurring to relieve local reliability problems” and “It does not confer value to reliability actions causing changes in relative locational prices within ERCOT, as measured by changes in the congestion components of LMPs in different locations. A RUC commitment and other reliability deployments may decrease prices in a local area, due to relieving a transmission constraint, for example, yet have little or no effect on prices outside of this local area, so that the estimated change in the system reference price will often be close to zero.” This NPRR elegantly addresses this issue using ERCOT systems that are already in use – the RTRDPA Security-Constrained Economic Dispatch (SCED) pricing run.To appropriately reflect the impact of reliability deployments on energy prices, ERCOT reliability actions taken to address localized issues must, by necessity, be reflected in the appropriate locational RTRDPA. Otherwise, the post-RTC system-wide RTRDPA for a local issue provides inefficient and inappropriate price signals throughout the market. For example, a RUC commitment required in East Texas due to congestion limiting supply from West Texas could result in a high RTRDPA that is added to prices throughout the system, potentially causing thousands of MWs of Large Flexible Loads (LFLs) in West Texas to unnecessarily curtail their consumption in response to this price signal. This counterproductive price response by LFLs would also result in unnecessary curtailment of Wind and Solar generators in West Texas while sending the wrong price signal for investment in West Texas. This is a very inefficient outcome for the market that needs to be addressed urgently due to the dramatic ongoing increase of LFLs in ERCOT. Moreover, locational RTRDPA sends better congestion price signals throughout the system.Another benefit from more accurate locational RTRDPA will be appropriate compensation for QSEs that are adversely impacted by the reliability action. For example, say a QSE purchases energy in the Day-Ahead Market (DAM) at $100/MWh for a DC Tie export. ERCOT curtails the DC Tie export in real-time for local congestion issues, a reliability action that reduces the Locational Marginal Price (LMP) at the corresponding DC Tie Load Zone to $40/MWh. If the resulting system-wide RTRDPA at that time is $5/MWh, then the QSE whose exports were curtailed lost $55/MWh on energy it purchased in the DAM on top of bilateral losses due to the curtailed export. However, the proposed locational RTRDPA calculated by the RTRDPA SCED pricing run for the DC Tie Load Zone could be $1,000/MWh since exports were curtailed. Then, the QSE receives a net payment of $900/MWh for its DAM purchase that the QSE can use to offset its bilateral losses.Even though the current RTRDPA implementation pays Resources much more than the amount required as indifference payment through the ASIP, RTC will eliminate the ASIP. Thus, there will be no indifference payment for the RTRDPA under RTC. RTRDPA can be thousands of dollars per MWh during scarcity and thus, absent any indifference payment, Resources will have a strong incentive to generate above their Base Points during scarcity events. This NPRR fixes this misaligned incentive and associated reliability concerns by applying indifference payment once RTC is implemented. The current 60-minute ramp relaxation in RTRDPA SCED pricing run results in meaningless price adders in many cases. Given the many fast ramp rate Resources, this NPRR changes the ramp relaxation to a realistic value.Since ERCOT’s current systems already calculate locational RTRDPA, the changes required to implement this NPRR are mostly Settlements-related – making its implementation less challenging than NPRRs that require changes in market systems.This NPRR addresses all the issues described above by using the locational RTRDPA from the current RTRDPA SCED pricing run, eliminating the need for future ASIC/P-type indifference payment using system-wide RTRDPA, and introducing an indifference payment associated with RTRDPA that is paid to Resources only to the extent required to keep such Resources from chasing prices and ignoring Base Point instructions.  |

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| **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:

* NPRR1092, Reduce RUC Offer Floor and Limit RUC Opt-Out Provision (unboxed 1/26/24)
	+ Section 6.7.5
* NPRR1131, Controllable Load Resource Participation in Non-Spin (unboxed 8/23/24)
	+ Section 6.7.5
* NPRR1149, Implementation of Systematic Ancillary Service Failed Quantity Charges (unboxed 6/28/24)
	+ Section 6.7.5

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

* NPRR1188, Implement Nodal Dispatch and Energy Settlement for Controllable Load Resources
	+ Section 6.5.7.3.1
* NPRR1235, Dispatchable Reliability Reserve Service as a Stand-Alone Ancillary Service
	+ Section 6.5.7.3.1
* NPRR1238, Voluntary Registration of Loads with Curtailable Load Capabilities
	+ Section 6.5.7.3.1
* NPRR1245, Additional Clarifying Revisions to Real-Time Co-Optimization
	+ Section 6.5.7.3.1
	+ Section 6.7.5

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| Revised Proposed Protocol Language |

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

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

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

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

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

(d) Deployed ERS;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The above parameter is defined as follows:

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

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

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

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

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

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

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

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

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

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

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

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| ***[NPRR904, NPRR1006, NPRR1010, NPRR1014, NPRR1091, and NPRR1105: Replace applicable portions of Section 6.5.7.3.1 above with the following upon system implementation for NPRR904, NPRR1006, NPRR1014, NPRR1091, or NPRR1105; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]*****6.5.7.3.1Determination of Real-Time Reliability Deployment Price Adder**(1) The following categories of reliability deployments are considered in the determination of the Real-Time Reliability Deployment Price Adder for Energy, and the Real-Time Reliability Deployment Price Adders for Ancillary Services:(a) RUC-committed Resources, except for those whose QSEs have opted out of RUC Settlement in accordance with paragraph (14) of Section 5.5.2, Reliability Unit Commitment (RUC) Process;(b) RMR Resources that are On-Line, including capacity secured to prevent an Emergency Condition pursuant to paragraph (4) of Section 6.5.1.1, ERCOT Control Area Authority; (c) Deployed Load Resources other than Controllable Load Resources;(d) Deployed ERS;(e) ERCOT-directed DC Tie imports during an EEA or transmission emergency where the total adjustment shall not exceed 1,250 MW in a single interval; (f) ERCOT-directed curtailment of DC Tie imports below the higher of DC Tie advisory import limit as of 0600 in the Day-Ahead or subsequent advisory import limit to address local transmission system limitations where the total adjustment shall not exceed 1,250 MW in a single interval;(g) ERCOT-directed curtailment of DC Tie imports below the higher of DC Tie advisory import limit as of 0600 in the Day-Ahead or subsequent advisory import limit due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT where the total adjustment shall not exceed 1,250 MW in a single interval;(h) ERCOT-directed DC Tie exports to address emergency conditions in the receiving electric grid where the total adjustment shall not exceed 1,250 MW in a single interval; (i) ERCOT-directed curtailment of DC Tie exports below the DC Tie advisory export limit as of 0600 in the Day-Ahead or subsequent advisory export limit during EEA, a transmission emergency, or to address local transmission system limitations where the total adjustment shall not exceed 1,250 MW in a single interval;(j) Energy delivered to ERCOT through registered Block Load Transfers (BLTs) during an EEA;(k) Energy delivered from ERCOT to another power pool through registered BLTs during emergency conditions in the receiving electric grid;(l) ERCOT-directed deployment of TDSP standard offer Load management programs;(m) ERCOT-directed deployment of distribution voltage reduction measures; 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 - (5 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 + (5 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 - (5 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 + (5 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 - (5 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 + (5 minutes \* Normal Ramp Rate up), or HSL.(f) Add the deployed MW from Load Resources that are not Controllable Load Resources and that are providing RRS or ECRS to GTBD linearly ramped over the ten-minute ramp period and add the deployed MW from Load Resources that are not Controllable Load Resources providing Non-Spin to GTBD linearly ramped over the 30-minute ramp period. The amount of deployed MW is calculated from the Resource telemetry and from applicable deployment instructions in Extensible Markup Language (XML) messages. ERCOT shall generate a linear bid curve defined by a price/quantity pair of $300/MWh for the first MW of Load Resources deployed and a price/quantity pair of $700/MWh for the last MW of Load Resources deployed in each SCED execution. After recall instruction, the restoration period length and amount of MW added to GTBD during the restoration period will be determined by validated telemetry and the type of Ancillary Service deployed from the Resource. The TAC shall review the validity of the prices for the bid curve at least annually. (g) Add the deployed MW from ERS to GTBD. The amount of deployed MW is determined from the XML messages and ERS contracted capacities for the ERS Time Periods when ERS is deployed. After recall, an approximation of the amount of un-restored ERS shall be used. After ERCOT recalls each group, GTBD shall be adjusted to reflect restoration on a linear curve over the assumed restoration period (“RHours”).The above parameter is defined as follows:

| **Parameter** | **Unit** | **Current Value\*** |
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| 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) Model the MW from ERCOT-directed 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 the corresponding DC Tie Resource Node(s) as negative LSL(s) of pseudo Energy Storage Resource(s) with HSL(s) at 0 and Energy Bid/Offer Curves at the Real-Time System-Wide Offer Cap. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator.(i) Model the MW from ERCOT-directed 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 the corresponding DC Tie Resource Node(s) as negative LSL(s) of pseudo Energy Storage Resource(s) with HSL(s) at 0 and Energy Bid/Offer Curves at the Real-Time System-Wide Offer Cap. 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) Model the MW from ERCOT-directed DC Tie exports to address emergency conditions in the receiving electric grid from the corresponding DC Tie Resource Node(s) as HSL(s) of pseudo Energy Storage Resource(s) with LSL(s) at 0 and Energy Bid/Offer Curves at -$250/MWh. 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) Model the MW from ERCOT-directed DC Tie import curtailments to address local transmission system limitations or emergency conditions in the receiving electric grid from the corresponding DC Tie Resource Node(s) as HSL(s) of pseudo Energy Storage Resource(s) with LSL(s) at 0 and Energy Bid/Offer Curves at -$250/MWh. 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 (CDR), unless modified as specified in this paragraph. If ERCOT is informed that all or a portion of a TDSP’s standard offer Load management program has been fully exhausted, or has been expanded as the result of a Public Utility Commission of Texas (PUCT) proceeding, ERCOT will remove the associated MW value of any exhausted capacity from the amount of deployed MW or, in the case of an expansion, ERCOT will request an updated MW value from the relevant TDSPs to use in place of the May CDR 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 at each Settlement Point is equal to the difference between that Settlement Point’s LMP from item (q) above and LMP 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.  |

***6.7.5 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 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;

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| ***[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 ECRS or RRS controlled by high-set under-frequency relay or Non-Spin, and the capacity from Controllable Load Resources available to SCED;

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| ***[NPRR987: Replace 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, ECRS, RRS and Non-Spin for the QSE for the 15-minute Settlement Interval.

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

(a) Nuclear Resources;

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

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

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| ***[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;

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

(d) Any RUC Resource committed by a RUC Dispatch Instruction where that Resource’s QSE subsequently opted out of RUC Settlement pursuant to paragraph (14) of Section 5.5.2.

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| ***[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;(c) Any Combined Cycle Generation Resource that was RUC-committed from one On-Line configuration to a different configuration with additional capacity, as described in paragraph (3) of Section 5.5.2, Reliability Unit Commitment (RUC) Process; or(d) Any RUC Resource committed by a RUC Dispatch Instruction where that Resource’s QSE subsequently opted out of RUC Settlement pursuant to paragraph (14) of Section 5.5.2. |

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

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

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| ***[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* – RTNCLRNSRESP *q* – RTRMRRESP *q*]

Where:

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

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

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

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*

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| ***[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), (RTNCLRECRS *q +* RTNCLRRRS *q*)\* 1.5)

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

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*

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| ***[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* + RTCLRREG *q*

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

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

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

Where:

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

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

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

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

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

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

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

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

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| ***[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. |
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| 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* | $/MWh | *Real-Time Off-Line Reserve Price Adder per interval*⎯The Real-Time Price Adder for Off-Line Reserves for the SCED interval *y*. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y*. |
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| RTRDP$/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.

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| ***[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, ECRS, RRS and Non-Spin pursuant to Section 4.4.7.4, Ancillary Service Supply Responsibility, for the QSE *q*, for the 15-minute Settlement Interval. |
| RTCLRCAP *q* | MWh | *Real-Time Capacity from Controllable Load Resources for the QSE*—The Real-Time capacity and Reg-Up minus Non-Spin available from all Controllable Load Resources available to SCED for the QSE *q*, integrated over the 15-minute Settlement Interval.

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

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| ***[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.

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| ***[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.

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| ***[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.

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

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

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| ***[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. |

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

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| 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. |

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 |
| 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.

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| ***[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.

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| ***[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 Off-Line Generation Resources that have telemetered an OFFNS Resource Status for the QSE *q*, time-weighted over the 15-minute Settlement Interval.

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| ***[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 Off-Line Generation Resources, not including modeled Generation Resources associated with ESRs, that have telemetered an OFFNS Resource Status for the QSE *q*, time-weighted over the 15-minute Settlement Interval. |

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

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| ***[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. |
| 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 COP and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval. |
| HRUADJ *q, r, p* | MW | *Ancillary Service Resource Responsibility Capacity for Reg-Up at Adjustment Period—*The Regulation Up Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last COP and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval. |
| HNSADJ *q, r, p* | MW | *Ancillary Service Resource Responsibility Capacity for Non-Spin at Adjustment Period—*The Non-Spin Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last COP and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval. |
| RTRUCNBBRESP *q* | MWh | *Real-Time RUC Ancillary Service Supply Responsibility for the QSE in Non-Buy-Back hours*⎯The Real-Time Ancillary Service Supply Responsibility for Reg-Up, 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, 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.* |
| 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, 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. |
| 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. |
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| ***[NPRR987: Insert the variables “UPESR q, r, p” and “UPESRA q, r, p” below upon system implementation:]***

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| --- | --- | --- |
| 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. |

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

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| *g* | none | An ESR. |

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

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

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

Where:

RTRUCRESP *q* =  RTRUCASA *q, r* \* ¼

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RTRUCRSVAMT*q* | $ | *Real-Time RUC Ancillary Service Reserve Amount*—The total payment |to QSE *q* for the Real-Time RUC Ancillary Service Reserve payment associated with ORDC for each 15-minute Settlement Interval. |
|  |  |  |
| RTRDRUCRSVAMT *q* $*Real-Time Reliability Deployment RUC Ancillary Service Reserve Amount*—The total payment |to QSE *q* for the Real-Time RUC Ancillary Service Reserve payment associated with reliability deployments for each 15-minute Settlement Interval.RTRUCRESP *q* | MWh | *Real-Time RUC Ancillary Service Supply Responsibility for the QSE*⎯The Real-Time Ancillary Service Supply Responsibility pursuant to the Ancillary Service awards for Reg-Up, ECRS, RRS, and Non-Spin for all RUC Resources that have opted out per paragraph (14) of Section 5.5.2 for the QSE *q*, for the 15-minute Settlement Interval. |
| RTRUCASA *q, r* | MW | *Real-Time RUC Ancillary Service Awards*⎯The Real-Time Ancillary Service award to the RUC Resource *r* for Reg-Up, ECRS, RRS, and Non-Spin for the 15-minute Settlement Interval that falls within a RUC-Committed Hour for the QSE *q.* |
| RTRSVPOR | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval. |
|  |  |  |
| RTRDP$/MWh*Real-Time On-Line Reliability Deployment Price* ⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder.*q* | none | A QSE. |
| *r* | none | A Generation Resource. |

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| ***[NPRR1010: Replace Section 6.7.5 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]******6.7.5 Real-Time Ancillary Service Charges and Payments*** |

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

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

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

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

Where:

RTASIAMTTOT = RTASIAMT *q*

RTRUCRSVAMTTOT =  RTRUCRSVAMT *q*

RTRDASIAMTTOT = RTRDASIAMT *q*

RTRDRUCRSVAMTTOT=  RTRDRUCRSVAMT *q*

The above variables are defined as follows:

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

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

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

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

| Variable | **Unit** | **Description** |
| --- | --- | --- |
| LARTRDAMT *q* | $ | *Load-Allocated Real-Time Reg-Down Amount for the QSE* ⎯ 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. |

 |

**6.9 Reliability Deployment Indifference Payment and Allocation**

***6.9.1 Reliability Deployment Indifference Payment***

(1) ERCOT shall calculate Reliability Deployment Indifference Payment, which will make Resources indifferent to any difference between their dispatch levels from the Security-Constrained Economic Dispatch (SCED) dispatch run and the SCED pricing run.

(2) The payment to each Qualified Scheduling Entity (QSE) for Reliability Deployment Indifference Payment for each Settlement Interval is calculated based on the Settlement Point Price at each Settlement Point of the QSE’s Generation Resources, Energy Storage Resources and Controllable Load Resources and the following amounts for each QSE:

(a) The time weighted telemetered generation from all Generation Resources, represented by the QSE for the 15-minute Settlement Interval;

(b) The time weighted telemetered generation or consumption from all Energy Storage Resources, represented by the QSE for the 15-minute Settlement Interval;

(c) The average telemetered power consumption from all Controllable Load Resources, represented by the QSE for the 15-minute Settlement Interval; and

(d) The dispatch level from the SCED pricing run in 6.7.7.3.1, Determination of Real-Time On-Line Reliability Deployment, for all Resources represented by the QSE for the 15-minute Settlement Interval.

(3) The Reliability Deployment Indifference Payment for a Generation Resource or Energy Storage Resource that is dispatched higher or lower in the SCED pricing run than its Base Point for the 15-minute Settlement Interval is equal to the greater of (i) 0 or (ii) the product of (a) Real-Time Reliability Deployment Price for Energy and (b) the difference of its SCED pricing run dispatch level and its time weighted telemetered generation or consumption.

(4) The Reliability Deployment Indifference Payment for a Controllable Load Resource that is dispatched higher or lower in the SCED pricing run than its Base Point for the 15-minute Settlement Interval is equal to the greater of (i) 0 or (ii) the product of (a) Real-Time Reliability Deployment Price for Energy and (b) the difference of its average telemetered power consumption and its SCED pricing run dispatch level.

(5) The total Reliability Deployment Indifference Payment to a QSE *q* for a given 15-minute Settlement Interval is calculated as follows:

RDIAMT *q* =  [RDIGA *q,r,p* + RDILA *q,r,p*]

Where:

For a Generation Resource or an Energy Storage Resource:

RDIGA *q,r,p* = (-1) \* Max (0, RTRDP*p*\*(SPRDL *q, r,p*/4 – TWTG*q,r, p*))

For a Controllable Load Resource:

RDILA *q,r,p* = (-1) \* Max (0, RTRDP*p*\*(ATPC*q,r, p* – SPRDL*q,r, p*/4))

Where:

SPRDL*q,r,pr* =  (( TLMP *y* /TLMP *y*) \* SPRDLS*q,p,r,y*)

RTRDP*p* =  (( TLMP *y* /TLMP *y*) \* RTRDPA*p, y*)

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RDIAMT *q* | $ | *Reliability Deployment Indifference Total Amount per QSE*—The total Reliability Deployment Indifference Payment to QSE *q* for the 15-minute Settlement Interval. |
|  RDIGA *q,r,p* | $ |  *Reliability Deployment Indifference Amount per QSE per Generation or Energy Storage Resource*—The Reliability Deployment Indifference Payment to QSE *q* for Generation Resource or Energy Storage Resource *r* for the 15-minute Settlement Interval. |
|  RDILA *q,r,p* | $ |  *Reliability Deployment Indifference Amount per QSE per Controllable Load Resource*—The Reliability Deployment Indifference Payment to QSE *q* for Controllable Load Resource *r* for the 15-minute Settlement Interval. |
| RTRDP*p* | $/MWh | *Real-Time Reliability Deployment Price for Energy⎯*The Real-Time price for the 15-minute Settlement Interval at Settlement Point *p*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder*.* |
| TWTG *q, r, p* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation (negative generation when consuming) of Generation Resource or Energy Storage Resource *r* represented by QSE *q* at Settlement Point *p,* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| ATPC *q, r, p* | MWh | *Average Telemetered Power Consumption per QSE per Settlement Point per Controllable Load Resource*—The average telemetered power consumption of the Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval*.* |
| SPRDL *q r,p* | MW | *SCED Pricing Run Dispatch Level—*The SCED pricing run dispatch level of Resource r at Resource Node *p* represented by QSE *q* for the 15-minute Settlement Interval*.* |
| SPRDLS *q,p,r,y* | MW | *SCED Pricing Run Dispatch Level per SCED Interval—*The SCED pricing run dispatch level of Resource *r* at Resource Node *p* represented by QSE *q* for SCED interval *y*. |
| RTRDPA*p,y* | $/MWh | *Real-Time Reliability Deployment Price Adder for Energy*⎯The Real-Time price adder that captures the impact of reliability deployments on energy prices for Settlement Point *p* for SCED interval *y*. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. |
| *y* | none | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *r* | none | A Generation Resource, Energy Storage Resource, or Controllable Load Resource. |

***6.9.2 Reliability Deployment Indifference Allocation***

(1) The total cost for Reliability Deployment Indifference Payments is allocated to the QSEs representing Load based on Load Ratio Share (LRS). The Reliability Deployment Indifference Allocations to each QSE for a given 15-minute Settlement Interval are calculated as follows:

**LARDIAMT *q* = (-1) \* [(RDIAMTTOT) \* LRS *q*]**

Where:

RDIAMTTOT = RDIAMT *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| LARDIAMT *q* | $ | *Load-Allocated Reliability Deployment Indifference Amount per QSE*—The QSE *q*’s share of the total Real-Time Reliability Deployment Indifference amount for the 15-minute Settlement Interval. |
| RDIAMTTOT | $ | *Reliability Deployment Indifference Total Amount*—The total payment to all QSEs for the Reliability Deployment Indifference Payments for the 15-minute Settlement Interval. |
| RDIAMT *q* | $ | *Reliability Deployment Indifference Total Amount per QSE*—The total payment to QSE *q* for the Reliability Deployment Indifference Payments for the 15-minute Settlement Interval. |
| LRS *q* | none | The LRS calculated for QSE *q* for the 15-minute Settlement Interval. See Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval. |
| *q* | none | A QSE. |