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| NPRR Number | [1186](https://www.ercot.com/mktrules/issues/NPRR1186) | NPRR Title | Improvements Prior to the RTC+B Project for Better ESR State of Charge Awareness, Accounting, and Monitoring |
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| Date | August 21, 2023 |
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| Submitter’s Information |
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| Cell Number |  |
| Market Segment | Independent Generator |

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| Comments |

Plus Power LLC, Eolian LP, and Jupiter Power LLC (Joint Commenters) submit these comments to Nodal Protocol Revision Request (NPRR) 1186, as [recommended for approval](https://www.ercot.com/files/docs/2023/08/11/1186NPRR-16%20PRS%20Report%20081023.docx) by the Protocol Revision Subcommittee (PRS) on August 10, 2023.[[1]](#footnote-2) Since NPRR1186 was filed by ERCOT on June 22, 2023, Joint Commenters, individually and collectively, as well as other ERCOT Market Participants, have filed comments highlighting concerns regarding NPRR1186 and have offered numerous alternatives to ERCOT’s iterations of NPRR1186.[[2]](#footnote-3)

As noted here and in those prior comments, Joint Commenters remain very concerned that NPRR1186, in its [current form](https://www.ercot.com/files/docs/2023/08/11/1186NPRR-16%20PRS%20Report%20081023.docx), will:

1. Negatively impact the reliability of the grid by preventing Energy Storage Resources (ESRs) from providing energy to the ERCOT System during scarcity conditions by withholding more energy than is needed to meet current hour State of Charge (SOC) obligations, including during the actual deployment of Ancillary Services — i.e., NPRR1186 will ***require an ESR to*** ***withhold energy for*** ***future hours regardless of whether it has future Ancillary Service Resource Responsibilities and to charge during ECRS and Non-Spin deployments before providing full amount of capacity***. This will exacerbate tight system conditions by requiring ESRs to charge regardless of grid conditions or needs in order to meet administratively imposed SOC limits and new compliance obligations.
2. Impose inequitable and unnecessary compliance requirements on (i) a subset of Resources (i.e., ESRs that provide Ancillary Services) and their Qualified Scheduling Entities (QSEs), which are not based on Resource/QSE performance, and (ii) an even smaller subset of Resources (i.e., ESRs qualified to provide ERCOT Contingency Reserve Service (ECRS) and Non-Spinning Reserve (Non-Spin)) that have already met the qualification requirements for providing ECRS and Non-Spin and are, at present, subject to compliance metrics specifically designed “to verify the [SOC] being reserved to provide the ECRS and/or non-Spin responsibility;”[[3]](#footnote-4) and
3. Disincentivize the installation and expansion of longer duration ESRs needed to diversify energy supply and help manage growing evening ramp and intra-day variability because administratively applied withholding requirements will not allow ERCOT and Market Participants to realize the additional value of ESRs capable of providing multi-hour Ancillary Service products if available excess energy is withheld by protocol.

In an effort to work with ERCOT to reach a solution that will satisfy ERCOT’s primary goal of NPRR1186—"to improve the awareness, accounting, and monitoring of the [SOC]” before Real-Time Co-optimization (RTC) is implemented (i.e., a single-model Resource category for ESRs is available in ERCOT’s systems) and allow the system changes to be coded prior to commencing RTC plus batteries (RTC+B),[[4]](#footnote-5) Joint Commenters respectfully request that ERCOT and stakeholders consider the proposal set forth herein.

Joint Commenters offer this straightforward proposal to achieve ERCOT’s stated objectives and its practical need to implement system changes in the near term due to staffing constraints while allowing a fuller and more complete discussion of the complex market and operational issues relating to ECRS and Non-Spin that both ERCOT and stakeholders have acknowledged exist and that these issues warrant. Joint Commenters believe this proposal will provide ERCOT with a tool to manage SOC prior to and until the implementation of RTC. It will also provide ERCOT and Market Participants with an opportunity to have a more complete discussion and review of duration requirements for Ancillary Service products and SOC management.

Specifically, Joint Commenters’ Comments modify NPRR1186 to:

1. Add a variable ‘Y’ to the calculation of ECRS and Non-Spin SOC requirements, at the top of an Operating Hour, to match the awarded hourly volume of the respective Ancillary Service in each Operating Hour, whilst preserving the flexibility for further consideration of the implications of SOC restrictions through a more wide-ranging stakeholder process;[[5]](#footnote-6)
2. Eliminate the obligation for a Resource deployed to provide ECRS or Non-Spin to stop discharging energy in the middle of the deployment to recharge in order to meet administratively applied SOC requirements at the top of each Operating Hour during deployment; and
3. Ensure that compliance obligations address ERCOT’s SOC monitoring goals and mitigate known and undiscovered unintended consequences of NPRR1186.

Approval of these comments will serve to:

1. Provide ERCOT with sufficient additional SOC telemetry and operating transparency, including hour-ahead information, to improve ERCOT and ESR awareness regarding SOC and Ancillary Service Resource Responsibilities;
2. Mitigate ERCOT’s expressed reliability concerns regarding the influx of additional ESRs on the ERCOT System because Joint Commenters’ proposal unequivocally requires every ESR, regardless of size or duration, to provide the requisite amount of capacity to meet awarded Ancillary Service Obligations;
3. Allow ERCOT to code parameters, including the ‘X’ variable for a time limit at the end of an hour (originally proposed to stop Ancillary Service deployment) to preserve SOC for the Resource’s Ancillary Service obligation in the following Operating Hour (currently set to zero (0));
4. Include a parameter—i.e., ‘Y’ multiplier variable—that sets the amount of top-of-the-hour charge required for ECRS and Non-Spin awards, that is initially set to one (1) but reduced to zero (0) when ECRS and Non-Spin are deployed, allowing ESRs to (a) meet Ancillary Service Resource Responsibilities, and (b) avoid a requirement that ESRs stop deployment and charge while deployed in an Operating Hour; and
5. Provide ERCOT and Market Participants with an avenue to consider holistic market implications associated with the participation of qualified Resources in multi-hour Ancillary Services.

Accordingly, Joint Commenters request that the ERCOT Technical Advisory Committee (TAC) endorse and recommend approval of these comments to the ERCOT Board of Directors (Board).

**SOC Requirements Based on Ancillary Service Obligations**

In ERCOT’s first workshop regarding NPRR1186, ERCOT identified its intent to modify a Business Practice Manual (BPM) to account for an ‘X’ parameter/variable that would require an ESR with an Ancillary Service Resource Responsibility in an upcoming Operating Hour to begin ramping to its requisite SOC by a certain number of minutes prior to the beginning of that Operating Hour. Numerous Market Participants opposed the ‘X’ variable due to potential (a) reliability consequences (e.g., preventing ESRs from participating in the ERCOT market for certain time periods regardless of qualification), and (b) unintended consequences. As a result, in its second set of NPRR1186 comments, ERCOT added Protocol language to include the ‘X’ variable, where ‘X’ would initially be set to zero (0) but potentially modified with a future NPRR—per ERCOT: “Introducing this functionality now will ensure that it can be implemented in the future, if these concerns arise.”

Given that ERCOT proposes to set the value of ‘X’ to zero (0), and any changes thereto would require a future NPRR, Joint Commenters propose that ERCOT similarly establish a ‘Y’ variable to address the multiplier determining SOC requirements for different Ancillary Service products.

As noted in prior comments by Joint Commenters, applying excess hourly SOC requirements to ESRs providing ECRS and Non-Spin, as currently contemplated under NPRR1186, will result in unintended consequences such as capacity withholding and SOC mismanagement, which would undermine the reliable operation of the ERCOT grid. For example, in the event that an ESR has a Non-Spin award of 25 MW in HE15, NPRR1186 as currently proposed, would require the ESR to hold a minimum of SOC-level of 100 MWh (4 x 25) at the start of Hour Ending 15 (a) ***even though*** the maximum Non-Spin energy for which the ESR could be dispatched to match its award for that Operating Hour is 25 MWh, and (b) ***regardless*** of whether the ESR has higher, lower, or zero (0) awarded obligations in next Operating Hour. In the event the ESR had a lesser (or zero (0)) Non-Spin award in the next Operating Hour, the additional 75 MWh above its awarded quantity that the ESR is forced to hold in Hour Ending15 cannot be used by ERCOT–i.e., in its current form, NPRR 1186 essentially forces this energy to be unavailable even if ERCOT System conditions warrant that more available capacity is needed for dispatch.

Establishing a ‘Y’ variable to represent an SOC requirement recognizes the limited window available for configuration changes to ERCOT systems, while also allowing time for further analysis and discussion on this issue. Joint Commenters propose that the ‘Y’ variable be set to one (1), similar to how ERCOT proposed to set variable ‘X’ to zero (0). This will set ECRS and Non-Spin minimum SOC requirements at the top of an Operating Hour to match the volume of the ESR’s awarded Ancillary Service Resource Responsibility for each Operating Hour, enforcing the expectation from the outset that ECRS and Non-Spin obligations are satisfied for each hour that ERCOT has procured the respective Ancillary Services from an ESR, similar to the requirements imposed on all other Resources, but with no change to the two (2)- or four (4)-hour duration requirements adopted in NPRR1096. Additionally, configuring ‘Y’ as a variable also allows for further consideration of a more dynamic SOC calculation, which should this be deemed an overall benefit to grid management.

**2. Eliminate Requirement for ESR Charging During ECRS or Non-Spin Deployment**

As proposed, NPRR1186 requires an ESR that has been awarded hours of ECRS or Non-Spin to demonstrate SOC at the top of each Operating Hour ***in excess of*** the amount of Ancillary Service Obligations that it is carrying for a given Operating hour. This requirement could have an unintended impact of forcing an ESR to stop discharging energy in the middle of a deployment to charge to meet an administrative obligation at the top of every Operating Hour. In the event of conditions that lead to the need to deploy ECRS or Non-Spin initially, an arbitrary obligation to start charging before ERCOT has recalled ECRS or Non-Spin in order to meet administratively imposed SOC levels could lead to a tightening of already compressed grid conditions and increased potential for Emergency Operations. Removing this administrative requirement removes this potential reliability concern. This further supports the addition of a ‘Y’ variable. Under deployment conditions, ‘Y’ should be set to zero (0) to allow ERCOT to fully deploy the amount of ECRS and Non-Spin awarded and not require ESRs to stop providing ECRS and Non-Spin and commence charging to blindly meet an administrative compliance requirement.

Based on the current language, NPRR1186 will never allow an ESR to fully deploy the initial energy maintained to meet its two (2)- or four (4)-hour duration capability established for ECRS and Non-Spin. If adopted, NPRR1186 must take into account the deployment of ECRS and Non-Spin in the SOC requirements and preserve the use of existing SOC management mechanisms, as well as the QSE’s ability under the Protocols to manage its Ancillary Service supply obligations.

**3. Monthly Compliance Structure**

As proposed, ERCOT’s compliance requirements could penalize an ESR that fails to telemeter the appropriate SOC due to a single SCED run at the top of an hour. Please see Graph 1, below.[[6]](#footnote-7) These comments propose a monthly enforcement mechanism similar to the monitoring and enforcement of performance through the Existing Protocols (*see e.g.,* GREDP, CLREDP, Unannounced Testing).

Graph 1.

Joint Commenters appreciate the opportunity to provide these comments and request that TAC endorse and recommend approval of these comments to the ERCOT Board.

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| Revised Cover Page Language |

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| Nodal Protocol Sections Requiring Revision  | 2.1, Definitions2.2, Acronyms and Abbreviations3.8.1, Split Generation Resources3.9.1, Current Operating Plan (COP) Criteria4.5.1, DAM Clearing Process5.5.2, Reliability Unit Commitment (RUC) Process6.3.2, Activities for Real-Time Operations6.4.9.2.2, SASM Clearing Process6.5.5.2, Operational Data Requirements6.5.7.2, Resource Limit Calculator8.1, QSE and Resource Performance Monitoring8.1.1.2, General Capacity Testing Requirements |
| Revision Description | This NPRR is the first of two NPRRs that ERCOT has prepared to improve the awareness, accounting, and monitoring of the State of Charge (SOC) for an ESR. This particular NPRR is for the interim period which is described as the time period before the RTC+B project goes live. The target go-live date for the RTC+B project is expected to be several years away and the language and changes in this first NPRR are aimed to strategically improve SOC awareness, accounting, and monitoring with minimal system changes so that the improvements can be in place while the RTC+B project is completed.This NPRR:* Adds definitions and telemetry requirements related to ESR SOC information that was specified in the fall of 2018. Most of the definitions added to the Protocols with this NPRR are simply a lift of language that was previously provided;
* For Real-Time, High Ancillary Service Limit (HASL) calculations are modified to account for SOC required to support an ESR’s Ancillary Service Resource Responsibility;
* Clarifies that Non-Frequency Responsive Capacity (NFRC) will be accounted for in the HASL calculation when Responsive Reserve (RRS) responsibility is non-zero;
* Introduces the requirement for a Qualified Scheduling Entity (QSE) representing an ESR to telemeter a new quantity representing the next Operating Hour’s Ancillary Service Resource Responsibility for the ESR. This requirement of next Operating Hour’s Ancillary Service Resource Responsibility will be deprecated after RTC+B project goes live;
* Introduces the requirement for a QSE representing an ESR to complete three new values in the Current Operating Plan (COP), including the Hour Beginning Planned SOC, Minimum State of Charge (MinSOC), and Maximum State of Charge (MaxSOC). The COP information is needed in the interim period and will also be used once the RTC+B project goes live;
* Specifies how the Hour Beginning Planned SOC values provided by a QSE through COP submittals will be accounted for in Reliability Unit Commitment (RUC) studies; and
* Specifies that a QSE is expected manage the SOC of an ESR to ensure that each ESR has sufficient energy to meet its Ancillary Service Resource Responsibilities.

This NPRR specifies existing and new information to be provided by the QSE so that ERCOT can better understand each ESR’s and ESR portfolio’s current energy capability and expected energy capability in future hours.Grey-boxed language related to DC-Coupled Resources was not revised with this NPRR.The purpose of the second NPRR is to implement similar improvements in the awareness, accounting and monitoring of the SOC for an ESR along with the other features of the RTC+B project and specifically the Single-Model ESR implementation. In most cases the work done to implement this NPRR will carry over to the second NPRR.  |
| Business Case | As of June 1, 2023 there were approximately 3,300 MW of batteries energized on the ERCOT System. Assuming all of the projects in the queue that have an “IA signed and Financial Security Posted” progress as indicated; the total is estimated to be 9,500 MW of batteries by October 2024.This NPRR strategically provides improvements on the awareness, accounting, and monitoring of SOC for ESRs while the RTC+B project is being implemented. The NPRR also provides information and guidelines to the QSEs representing the ESRs so that they can more accurately inform ERCOT of the capability of each ESR.The implementation of this NPRR will allow ERCOT to confidently evaluate the capability of ESRs and their portfolios for the key hours in which the need for dispatchable generation is needed.Much of the work done to implement this NPRR is carried over to the RTC+B project. |

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| Revised Proposed Protocol Language |

**2.1 DEFINITIONS**

**State of Charge (SOC)**

The stored energy in MWh, of an ESR, that can be injected into the grid at the Point of Interconnection (POI) or Point of Common Coupling (POCC).

***Hour Beginning Planned SOC***

The planned State of Charge, in MWh, at the beginning of an hour, as communicated to ERCOT by the QSE for the Resource.

***Minimum State of Charge (MinSOC)***

The minimum amount of State of Charge, in MWh of an ESR.

***Maximum State of Charge (MaxSOC)***

The maximum amount of State of Charge, in MWh of an ESR.

**2.2 ACRONYMS AND ABBREVIATIONS**

**SOC** State of Charge

**MinSOC** Minimum State of Charge

**MaxSOC** Maximum State of Charge

**MWhh** Megawatt Hour Hour

***3.8.1 Split Generation Resources***

(1) When a generation meter is split, as provided for in Section 10.3.2.1, Generation Resource Meter Splitting, two or more independent Generation Resources must be created in the ERCOT Network Operations Model according to Section 3.10.7.2, Modeling of Resources and Transmission Loads, to function in all respects as Split Generation Resources in ERCOT System operation. A Combined Cycle Train may not be registered in ERCOT as a Split Generation Resource. A Distribution Generation Resource (DGR) or Distribution Energy Storage Resource (DESR) may not be registered in ERCOT as a Split Generation Resource. An Energy Storage Resource (ESR) may not be registered in ERCOT as a Split Generation Resource.

(2) Each Qualified Scheduling Entity (QSE) representing a Split Generation Resource shall collect and shall submit to ERCOT the Resource Parameters defined under Section 3.7, Resource Parameters, for the Split Generation Resource it represents. The parameters provided must be consistent with the parameters submitted by each other QSE that represents a Split Generation Resource from the same Generation Resource. The parameters submitted for each Split Generation Resource for limits and ramp rates must be according to the capability of the Split Generation Resource represented by the QSE. Startup and shutdown times, time to change status and number of starts must be identical for all the Split Generation Resources from the same Generation Resource submitted by each QSE. ERCOT shall review data submitted by each QSE representing Split Generation Resources for consistency and notify each QSE of any errors.

(3) Each Split Generation Resource may be represented by a different QSE. The Resource Entities that own or control the Split Generation Resources from a single Generation Resource must designate a Master QSE. Each QSE representing a Split Generation Resource must comply in all respects to the requirements of a Generation Resource specified under these Protocols.

(4) The Master QSE shall:

(a) Serve as the Single Point of Contact for the Generation Resource, as required by Section 3.1.4.1, Single Point of Contact;

(b) Provide real-time telemetry for the total Generation Resource, as specified in Section 6.5.5.2, Operational Data Requirements; and

(c) Receive Verbal Dispatch Instructions (VDIs) from ERCOT, as specified in Section 6.5.7.8, Dispatch Procedures.

(5) Each QSE is responsible for representing its Split Generation Resource in its Current Operating Plan (COP). During the Reliability Unit Commitment (RUC) Study Periods, any conflict in the Resource Status of a Split Generation Resource in the COP is resolved according to the following:

(a) If a Split Generation Resource has a Resource Status of OUT for any hour in the COP, then any other QSEs’ COP entries for their Split Generation Resources from the same Generation Resource are also considered unavailable for the hour;

(b) If the QSEs for all Split Generation Resources from the same Generation Resource have submitted a COP and at least one of the QSEs has an On-Line Resource Status in a given hour, then the status for all Split Generation Resources for the Generation Resource is considered to be On-Line for that hour, except if any of the QSEs has indicated in the COP a Resource Status of OUT.

(6) Each QSE representing a Split Generation Resource shall update its individual Resource Status appropriately.

(7) Each QSE representing a Split Generation Resource may independently submit Energy Offer Curves and Three-Part Supply Offers. ERCOT shall treat each Split Generation Resource offer as a separate offer, except that all Split Generation Resources in a single Generation Resource must be committed or decommitted together.

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| ***[NPRR1007: Replace paragraph (7) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***(7) Each QSE representing a Split Generation Resource may independently submit Energy Offer Curves, Ancillary Service Offers, and Three-Part Supply Offers. ERCOT shall treat each Split Generation Resource offer as a separate offer, except that all Split Generation Resources in a single Generation Resource must be committed or decommitted together. |

(8) Each QSE submitting verifiable cost data to ERCOT shall coordinate among all owners of a single Generation Resource to provide individual Split Generation Resource data consistent with the total verifiable cost of the entire Generation Resource. ERCOT may compare the total verifiable costs with other similarly situated Generation Resources to determine the reasonability of the cost.

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

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

(2) Each QSE that represents a Resource shall update its COP reflecting changes in availability of any Resource as soon as reasonably practicable, but in no event later than 60 minutes after the event that caused the change. Each QSE shall timely update its COP unless in the reasonable judgment of the QSE, such compliance would create an undue threat to safety, undue risk of bodily harm, or undue damage to equipment. The QSE is excused from updating the COP only for so long as the undue threat to safety, undue risk of bodily harm, or undue damage to equipment exists. The time for updating the COP begins once the undue threat to safety, undue risk of bodily harm, or undue damage to equipment no longer exists.

(3) The Resource capacity in a QSE’s COP must be sufficient to supply the Ancillary Service Supply Responsibility of that QSE. Additionally, for a COP provided for an ESR, the QSE shall ensure that the Hour Beginning Planned State of Charge (SOC) for any two consecutive hours shall be feasible based on the ESR’s maximum rate of charge or discharge.

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

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

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

(a) The name of the Resource;

(b) The expected Resource Status:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(L) ONECRS – On-Line as a synchronous condenser providing ERCOT Contingency Response Service (ECRS) but unavailable for Dispatch by SCED and available for commitment by RUC;

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

(M) ONOPTOUT – On-Line and the hour is a RUC Buy-Back Hour;

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

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

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

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

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

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

(Q) ONFFRRRS – Available for Dispatch of RRS when providing Fast Frequency Response (FFR) from Generation Resources. This Resource Status is only to be used for Real-Time telemetry purposes. A Resource with this Resource Status may also be providing Ancillary Services other than FFR; and

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

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

(R) ONHOLD – Resource is On-Line but temporarily unavailable for Dispatch by SCED or for participating in Ancillary Services. This Resource Status is only to be used for Real-Time telemetry purposes. For SCED, Resource Base Points will be set equal to the telemetered net real power of the Resource available at the time of the SCED execution.

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| ***[NPRR1007, NPRR1014, and NPRR1029: Replace item (R) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1007; or upon system implementation for NPRR1014 or NPRR1029:]***(R) ONHOLD – Resource is On-Line but temporarily unavailable for Dispatch by SCED or Ancillary Service awards. This Resource Status is only to be used for Real-Time telemetry purposes. For SCED, Resource Base Points will be set equal to the telemetered net real power of the Resource available at the time of the SCED execution. |

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

(A) OUT – Off-Line and unavailable, or not connected to the ERCOT System and operating in a Private Microgrid Island (PMI);

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

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

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

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

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

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

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

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

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

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

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

(E) ONRL – Available for Dispatch of RRS or Non-Spin, excluding Controllable Load Resources. A Load Resource, excluding Controllable Load Resources, may not provide ECRS with this Resource Status;

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

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

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

(G) OUTL – Not available;

(H) ONFFRRRSL – Available for Dispatch of RRS when providing FFR, excluding Controllable Load Resources. This Resource Status is only to be used for Real-Time telemetry purposes;

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

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

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

(c) The HSL;

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

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

(d) The LSL;

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

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

(e) The High Emergency Limit (HEL);

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

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

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

(i) Regulation Up (Reg-Up);

(ii) Regulation Down (Reg-Down);

(iii) RRS;

(iv) ECRS; and

(v) Non-Spin.

(h) For ESRs:

(i) Minimum State of Charge (MinSOC);

(ii) Maximum State of Charge (MaxSOC); and

(iii) Hour Beginning Planned SOC.

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

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

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

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

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

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

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

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

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

(7) ERCOT may accept COPs only from QSEs.

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

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

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

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

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

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

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

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

(b) A hydro unit.

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

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

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

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

(17) A QSE representing an ESR shall ensure that COP values for a given hour follow the following rules:

(a) MinSOC is greater than or equal to the nameplate minimum MWh operating SOC limit;

(b) MaxSOC is less than or equal to the nameplate maximum MWh operating SOC limit; and

(c) Hour Beginning Planned SOC is a value between the corresponding COP values of MinSOC and MaxSOC.

***4.5.1 DAM Clearing Process***

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(iii) Other constraints –

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

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

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

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

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

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

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| ***[NPRR1008 and NPRR1014: Replace applicable portions of paragraph (4) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014:]***(4) The DAM uses a multi-hour mixed integer programming algorithm to maximize bid-based revenues, including revenues based on Ancillary Service Demand Curves (ASDCs), minus the offer-based costs over the Operating Day, subject to security and other constraints. (a) The bid-based revenues include revenues from ASDCs, DAM Energy Bids, bid portions of Energy Bid/Offer Curves, and Point-to-Point (PTP) Obligation bids. (b) The offer-based costs include costs from the Startup Offer, Minimum Energy Offer, and Energy Offer Curve of any Resource that submitted a Three-Part Supply Offer, DAM Energy-Only Offers, offer portions of Energy Bid/Offer Curves, Ancillary Service Only Offers, and Ancillary Service Offers. (c) Security constraints specified to prevent DAM solutions that would overload the elements of the ERCOT Transmission Grid include the following: (i) Transmission constraints – transfer limits on energy flows through the ERCOT Transmission Grid, e.g., thermal or stability limits. These limits must be satisfied by the intact network and for certain specified contingencies. These constraints may represent:(A) Thermal constraints – protect Transmission Facilities against thermal overload.(B) Generic constraints – protect the ERCOT Transmission Grid against transient instability, dynamic stability or voltage collapse.(C) Power flow constraints – the energy balance at required Electrical Buses in the ERCOT Transmission Grid must be maintained. (ii) Resource constraints – the physical and security limits on Resources that submit Three-Part Supply Offers or Energy Bid/Offer Curves:(A) Resource output constraints – the Low Sustained Limit (LSL) and High Sustained Limit (HSL) of each Resource; and (B) Resource operational constraints – includes minimum run time, minimum down time, and configuration constraints.(iii) Other constraints – (A) Linked offers – the DAM may not select any one part of that Resource capacity to provide more than one Ancillary Service or to provide both energy and an Ancillary Service in the same Operating Hour. The DAM may, however, select part of that Resource capacity to provide one Ancillary Service and another part of that capacity to provide a different Ancillary Service or energy in the same Operating Hour, provided that linked Energy and Off-Line Non-Spinning Reserve (Non-Spin) Resource-Specific Ancillary Service Offers are not awarded in the same Operating Hour.(B) The sum of the awarded Resource-Specific Ancillary Service Offer capacities for each Resource must be within the Resource limits specified in the Current Operating Plan (COP) and Section 3.18, Resource Limits in Providing Ancillary Service, and the Resource Parameters as described in Section 3.7, Resource Parameters.(C) Block Resource-Specific Ancillary Service Offers for a Load Resource – blocks will not be cleared unless the entire quantity block can be awarded. Because block Resource-Specific Ancillary Service Offers cannot set the Market Clearing Price for Capacity (MCPC), a block Ancillary Service Offer may clear below the Ancillary Service Offer price for that block.(D) Block DAM Energy Bids, DAM Energy-Only Offers, and PTP Obligation bids – blocks will not be cleared unless the entire time and/or quantity block can be awarded. Because quantity block bids and offers cannot set the Settlement Point Price, a quantity block bid or offer may clear in a manner inconsistent with the bid or offer price for that block.(E) Combined Cycle Generation Resources – The DAM may commit a Combined Cycle Generation Resource in a time period that includes the last hour of the Operating Day only if that Combined Cycle Generation Resource can transition to a shutdown condition in the DAM Operating Day.(F) Energy Storage Resources (ESRs) – The energy cleared for an ESR may be negative, indicating purchase of energy, or positive, indicating sale of energy. (d) Ancillary Service needs will be reflected in ASDCs for each Ancillary Service. Self-Arranged Ancillary Service Quantities will first be used to meet the ASDCs, and the remaining Ancillary Service needs are met from Ancillary Service Offers, as long as the costs do not exceed the ASDC value. ERCOT may not buy more of one Ancillary Service in place of the quantity of a different service. |

(5) ERCOT shall determine the appropriate Load distribution factors to allocate offers, bids, and source and sink of CRRs at a Load Zone across the energized power flow buses that are modeled with Load in that Load Zone. The non-Private Use Network Load distribution factors are based on historical State Estimator hourly distribution using a proxy day methodology representing anticipated weather conditions. The Private Use Network Load distribution factors are based on an estimated Load value considering historical net consumption at all Private Use Networks. If ERCOT decides, in its sole discretion, to change the Load distribution factors for reasons such as anticipated weather events or holidays, ERCOT shall select a State Estimator hourly distribution from a proxy day reasonably reflecting the anticipated Load in the Operating Day. ERCOT may also modify the Load distribution factors to account for predicted differences in network topology between the proxy day and Operating Day. ERCOT shall develop a methodology, subject to Technical Advisory Committee (TAC) approval, to describe the modification of the proxy day bus-load distribution for this purpose.

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| ***[NPRR1004: Replace paragraph (5) above with the following upon system implementation:]***(5) ERCOT shall determine the appropriate Load distribution factors to allocate offers, bids, and source and sink of PTP Obligations at a Load Zone across the energized power flow buses that are modeled with Load in that Load Zone. ERCOT shall derive DAM Load distribution factors with the set of Load distribution factors constructed in accordance with the ERCOT Load distribution factor methodology specified in paragraph (c) of Section 3.12, Load Forecasting. In the event the Load distribution factors are not available, the Load distribution factors for the most recent preceding Operating Day will be used. |

(6) ERCOT shall allocate offers, bids, and source and sink of CRRs at a Hub using the distribution factors specified in the definition of that Hub in Section 3.5.2, Hub Definitions.

(7) A Resource that has a Three-Part Supply Offer cleared in the DAM may be eligible for Make-Whole Payment of the Startup Offer and Minimum Energy Offer submitted by the Qualified Scheduling Entity (QSE) representing the Resource under Section 4.6, DAM Settlement.

(8) The DAM Settlement is based on hourly MW awards and on Day-Ahead hourly Settlement Point Prices. All PTP Options settled in the DAM are settled based on the Day-Ahead Settlement Point Prices (DASPPs). ERCOT shall assign a Locational Marginal Price (LMP) to de-energized Electrical Buses for use in the calculation of the DASPPs by using heuristic rules applied in the following order:

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

(b) Use the following rules in order:

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

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

(iii) Use System Lambda.

(9) The Day-Ahead MCPC for each hour for each Ancillary Service is the Shadow Price for that Ancillary Service for the hour as determined by the DAM algorithm.

(10) Day-Ahead MCPCs shall not exceed the System-Wide Offer Cap (SWCAP). Ancillary Service Offers higher than corresponding Ancillary Service penalty factors, as defined in Appendix 2, Day-Ahead Market Optimization Control Parameters, of the Other Binding Document titled “Methodology for Setting Maximum Shadow Prices for Network and Power Balance Constraints,” will not be awarded.

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| ***[NPRR1080: Delete paragraph (10) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014; and renumber accordingly.]*** |

(11) If the Day-Ahead MCPC cannot be calculated by ERCOT, the Day-Ahead MCPC for the particular Ancillary Service is equal to the Day-Ahead MCPC for that Ancillary Service in the same Settlement Interval of the preceding Operating Day.

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| ***[NPRR1008 and NPR1014: Delete paragraph (11) above upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1008; or upon system implementation for NPRR1014; and renumber accordingly.]*** |

(12) If the DASPPs cannot be calculated by ERCOT, all CRRs shall be settled based on Real-Time prices. Settlements for all CRRs shall be reflected on the Real-Time Settlement Statement.

(13) Constraints can exist between the generator’s Resource Connectivity Node and the Resource Node, in which case the awarded quantity of energy may be inconsistent with the clearing price when the constraint between the Resource Connectivity Node and the Resource Node is binding.

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| ***[NPRR1014: Replace paragraph (13) above with the following upon system implementation:]***(13) Constraints can exist between a Resource’s Resource Connectivity Node and its Resource Node, in which case the awarded quantity of energy may be inconsistent with the clearing price when the constraint between the Resource Connectivity Node and the Resource Node is binding. |

(14) PTP Obligation bids shall not be awarded where the DAM clearing price for the PTP Obligation is greater than the PTP Obligation bid price plus $0.01/MW per hour.

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

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

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

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

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

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

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

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

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

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

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

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

The above parameter is defined as follows:

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Current Value\*** |
| 1HRLESSCOSTSCALING | Percentage | Maximum value of 100% |
| \* The current value for the parameter(s) referenced in this table above will be recommended by the Technical Advisory Committee (TAC) and approved by the ERCOT Board. ERCOT shall update parameter value(s) on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. |

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

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

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

(c) Ask ERCOT to replace the capacity.

(11) Factors included in the RUC process are:

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

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

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

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

(c) Planned transmission topology;

(d) Energy sufficiency constraints;

(e) Inputs from the COP, as appropriate;

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

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

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

(i) Forced Outage information; and

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

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

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

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

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

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

(14) A QSE with a Resource that is not a Reliability Must-Run (RMR) Unit or has not received an Outage Schedule Adjustment (OSA) that has been committed in a RUC process or by a RUC Verbal Dispatch Instruction (VDI) may opt out of the RUC Settlement (or “buy back” the commitment) by setting the telemetered Resource Status of the RUC-committed Resource to ONOPTOUT for the first SCED run that the Resource is On-Line and available for SCED dispatch during the first hour of a contiguous block of RUC-Committed Hours. All the configurations of the same Combined Cycle Train shall be treated as the same Resource for the purpose of creating the block of RUC-Committed Hours. A RUC-committed Combined Cycle Generation Resource may opt out of the RUC Settlement by setting the telemetered Resource Status to ONOPTOUT for any On-Line configuration of the same Combined Cycle Train for the first SCED run that the Combined Cycle Train is On-Line and available for SCED Dispatch during the first hour of a contiguous block of RUC-Committed Hours. A Combined Cycle Generation Resource that is RUC-committed from one On-Line configuration in order to transition to a different configuration with additional capacity may opt out of the RUC Settlement following the same rule for RUC-committed Combined Cycle Generation Resources described above. A QSE that opts out of RUC Settlement forfeits RUC Settlement for the affected Resource for a given block of RUC Buy-Back Hours. A QSE that opts out of RUC Settlement treatment must make the Resource available to SCED for all RUC Buy-Back Hours. All hours in a contiguous block of RUC-Committed Hours that includes the RUC Buy-Back Hour shall be considered RUC Buy-Back Hours. However, if a contiguous block of RUC-Committed Hours spans more than one Operating Day, each contiguous block of RUC-Committed Hours within each Operating Day shall be treated as an independent block for purposes of opting out, and a QSE that wishes to opt out of RUC Settlement for the RUC-Committed Hours in the next Operating Day must set its telemetered Resource Status to ONOPTOUT for the first SCED run the next Operating Day.

(15) If a QSE-committed Resource experiences a Forced Outage or Startup Loading Failure in an hour for which another Resource under the control of the same QSE is committed by a RUC instruction, the QSE may opt out of RUC Settlement for the RUC-committed Resource in accordance with paragraph (14) above, or if the Forced Outage or Startup Loading Failure occurs after the beginning of the first RUC-Committed Interval, the QSE may opt out of RUC Settlement by submitting a dispute pursuant to Section 9.14, Settlement and Billing Dispute Process, requesting a correction of the RUC Settlement treatment for the RUC-committed Resource.

(16) ERCOT shall, as soon as practicable, post to the MIS Secure Area a report identifying those hours that were considered RUC Buy-Back Hours, along with the name of each RUC-committed Resource whose QSE opted out of RUC Settlement.

(17) A Resource that has a Three-Part Supply Offer cleared in the Day-Ahead Market (DAM) and subsequently receives a RUC commitment for the Operating Hour for which it was awarded will be treated as if the telemetered Resource Status was ONOPTOUT for purposes of Section 6.5.7.3, Security Constrained Economic Dispatch, and Section 6.5.7.3.1, Determination of Real-Time On-Line Reliability Deployment Price Adder.

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| --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1009, NPRR1032, and NPRR1092: Replace applicable portions of Section 5.5.2 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009; or upon system implementation for NPRR1032 or NPRR1092:]******5.5.2 Reliability Unit Commitment (RUC) Process***(1) The RUC process recommends commitment of Generation Resources, to match ERCOT’s forecasted Load including Direct Current Tie (DC Tie) Schedules and RUC Ancillary Service Demand Curves (ASDCs), subject to all transmission constraints and Resource performance characteristics. The RUC process takes into account Resources already committed in the Current Operating Plans (COPs), Resources already committed in previous RUCs, and Off-Line Available Resources having a start-up time of one hour or less. The formulation of the RUC objective function must employ penalty factors on violations of security constraints. The objective of the RUC process is to minimize costs based on the Resource costs described in paragraphs (9) through (13) below. (2) ERCOT shall create an ASDC for each Ancillary Service for use in RUC. ERCOT shall post the ASDCs to the ERCOT website as soon as practicable after any change to the ASDCs.(3) For all hours of the RUC Study Period within the RUC process, Quick Start Generation Resources (QSGRs) with a COP Resource Status of OFFQS shall be considered as On-Line with Low Sustained Limit (LSL) at zero MW. QSGRs with a Resource Status of OFFQS shall only be committed by ERCOT through a RUC instruction in instances when a reliability issue would not otherwise be managed through Dispatch Instructions from Security-Constrained Economic Dispatch (SCED). (4) In addition to On-Line qualified Resources, the RUC engine shall consider a COP Resource status of OFFQS for QSGRs that are qualified for ERCOT Contingency Reserve Service (ECRS), as being eligible to provide ECRS constrained by the Ancillary Service capability in the COP.(5) In addition to On-Line qualified Resources, the RUC engine shall consider a COP Resource Status of OFFQS for QSGRs that are qualified for Non-Spinning Reserve (Non-Spin), as being eligible to provide Non-Spin constrained by the Ancillary Service Capability in the COP. The RUC engine shall also consider a COP Resource Status of OFF (Off-Line but available for commitment in the DAM and RUC) for a Resource that is qualified for Non-Spin, as being eligible to provide Non-Spin constrained by the Ancillary Service capability in the COP.(6) The RUC process can recommend Resource decommitment. ERCOT may only decommit a Resource to resolve transmission constraints that are otherwise unresolvable. Qualifying Facilities (QFs) may be decommitted only after all other types of Resources have been assessed for decommitment. In addition, the HRUC process provides decision support to ERCOT regarding a Resource decommitment requested by a Qualified Scheduling Entity (QSE). (7) ERCOT shall review the RUC-recommended Resource commitments and the list of Off-Line Available Resources having a start-up time of one hour or less to assess feasibility and shall make any changes that it considers necessary, in its sole discretion. During the RUC process, ERCOT may also review and commit, through a RUC instruction, Combined Cycle Generation Resources that are currently planned to be On-Line but are capable of transitioning to a configuration with additional capacity. ERCOT may deselect Resources recommended in DRUC and in all HRUC processes if in ERCOT’s sole discretion there is enough time to commit those Resources in the future HRUC processes, taking into account the Resources’ start-up times, to meet ERCOT System reliability. After each RUC run, ERCOT shall post the amount of capacity deselected per hour in the RUC Study Period to the MIS Secure Area. A Generation Resource shown as On-Line and available for SCED dispatch for an hour in its COP prior to a DRUC or HRUC process execution, according to Section 5.3, ERCOT Security Sequence Responsibilities, will be considered self-committed for that hour. For purpose of Settlement, snapshot data will be used as specified in paragraph (2) of Section 5.3. (8) ERCOT shall issue RUC instructions to each QSE specifying its Resources that have been committed as a result of the RUC process. ERCOT shall, within one day after making any changes to the RUC-recommended commitments, post to the MIS Secure Area any changes that ERCOT made to the RUC-recommended commitments with an explanation of the changes.(9) ERCOT shall use the RUC process to evaluate the need to commit Resources for which a QSE has submitted Three-Part Supply Offers and other available Off-Line Resources in addition to Resources that are planned to be On-Line during the RUC Study Period. All of the above commitment information must be as specified in the QSE’s COP. For available Off-Line Resources with a cold start time of one hour or less that have not been removed from special consideration under paragraph (15) below pursuant to paragraph (4) of Section 8.1.2, Current Operating Plan (COP) Performance Requirements, the Startup Offers and Minimum-Energy Offer from a Resource’s Three-Part Supply Offer shall not be used in the RUC process. (10) ERCOT shall create Three-Part Supply Offers for all Resources that did not submit a Three-Part Supply Offer, but are specified as available but Off-Line, excluding Resources with a Resource Status of EMR, in a QSE’s COP. For such Resources, excluding available Off-Line Resources with a cold start time of one hour or less that have not been removed from special consideration under paragraph (13) below pursuant to paragraph (4) of Section 8.1.2, ERCOT shall use in the RUC process 150% of any approved verifiable Startup Cost and verifiable minimum-energy cost or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as described specified in Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, registered with ERCOT. However for Settlement purposes, ERCOT shall use any approved verifiable Startup Costs and verifiable minimum-energy cost for such Resources, or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and Generic Minimum-Energy Offer Cost.(11) A QSE shall notify the ERCOT Operator of any physical limitation that impacts its Resource’s ability to start that is not reflected in the Resource’s COP or the Resource’s startup time, minimum On-Line time, or minimum Off-Line time. The following shall apply:(a) If a Resource receives a RUC Dispatch Instruction that it cannot meet due to a physical limitation described in paragraph (4) above, the QSE representing the Resource shall notify the ERCOT Operator of the inability to fully comply with the instruction and shall comply with the instruction to the best of the Resource’s ability. If the QSE has provided the ERCOT Operator notice of that limitation at least seven days prior to the Operating Day in which the instruction occurs, the QSE shall be excused from complying with the portion of the RUC Dispatch Instruction that it could not meet due to the identified limitation. (b) If a QSE provides notice pursuant to paragraph (a) above of a physical limitation that will delay the RUC-committed Resource’s ability to reach its LSL in accordance with a RUC Dispatch Instruction, ERCOT shall extend the RUC Dispatch Instruction so that the Resource’s minimum run time is respected. However, if the Resource will not be available in time to address the issue for which it received the RUC instruction, ERCOT may instead cancel the RUC Dispatch Instruction.(12) A QSE shall be excused from complying with any portion of a RUC Dispatch Instruction that it could not meet due to a physical limitation that was reflected, at the time of the RUC Dispatch Instruction, in the Resource’s COP, startup time, minimum On-Line time, or minimum Off-Line time.(13) To determine the projected energy output level of each Resource and to project potential congestion patterns for each hour of the RUC, ERCOT shall calculate proxy Energy Offer Curves based on the Mitigated Offer Caps (MOCs) for the type of Resource as specified in Section 4.4.9.4, Mitigated Offer Cap and Mitigated Offer Floor, for use in the RUC. Proxy Energy Offer Curves are calculated by multiplying the MOC by a constant selected by ERCOT from time to time that is no more than 0.10% and applying the cost for all Generation Resource output between High Sustained Limit (HSL) and LSL. The intent of this process is to minimize the effect of the proxy Energy Offer Curves on optimization.(14) ERCOT shall calculate proxy Ancillary Service Offer Curves for use in RUC based on validated Ancillary Service Offers as specified in Section 4.4.7.2, Ancillary Service Offers. For all Resources that do not have a valid Ancillary Service Offer but are qualified to provide an Ancillary Service, ERCOT shall create an Ancillary Service Offer Curve for use in RUC as described in Section 6.5.7.3, Security Constrained Economic Dispatch. Proxy Ancillary Service Offer Curves for use in RUC are calculated by multiplying the Ancillary Service Offer by a constant selected by ERCOT from time to time that is no more than 0.1%, and are extended between the HSL and LSL. Notwithstanding the presence or absence of a proxy Ancillary Service Offer, Ancillary Service provision in RUC shall be limited by the Resource’s Ancillary Service capabilities as reflected in the COP.(15) For all available Off-Line Resources having a cold start time of one hour or less and not removed from special consideration pursuant to paragraph (4) of Section 8.1.2, ERCOT shall scale any approved verifiable Startup Cost and verifiable minimum-energy cost or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as specified in Section 4.4.9.2.3 for use in the RUC process. The above parameter is defined as follows:

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Current Value\*** |
| 1HRLESSCOSTSCALING | Percentage | Maximum value of 100% |
| \* The current value for the parameter(s) referenced in this table above will be recommended by the Technical Advisory Committee (TAC) and approved by the ERCOT Board. ERCOT shall update parameter value(s) on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. |

(16) Factors included in the RUC process are: (a) ERCOT System-wide hourly Load forecast allocated appropriately over Load buses;(b) ERCOT’s Ancillary Service Plans in the form of ASDCs;(c) Transmission constraints – Transfer limits on energy flows through the electricity network;(i) Thermal constraints – protect transmission facilities against thermal overload;(ii) Generic constraints – protect the transmission system against transient instability, dynamic instability or voltage collapse;(d) Planned transmission topology;(e) Energy sufficiency constraints;(f) Inputs from the COP, as appropriate;(g) Inputs from Resource Parameters, including a list of Off-Line Available Resources having a start-up time of one hour or less, as appropriate;(h) Each Generation Resource’s Minimum-Energy Offer and Startup Offer, from its Three-Part Supply Offer;(i) Any Generation Resource that is Off-Line and available but does not have a Three-Part Supply Offer;(j) Forced Outage information; and(k) Inputs from the eight-day look ahead planning tool, which may potentially keep a unit On-Line (or start a unit for the next day) so that a unit minimum duration between starts does not limit the availability of the unit (for security reasons). (17) The HRUC process and the DRUC process are as follows:(a) The HRUC process uses current Resource Status for the initial condition for the first hour of the RUC Study Period. All HRUC processes use the projected status of transmission breakers and switches starting with current status and updated for each remaining hour in the study as indicated in the COP for Resources and in the Outage Scheduler for transmission elements. (b) The DRUC process uses the current hourly forecast of total ERCOT Load including DC Tie Schedules up to the physical rating of the DC Tie for each hour of the Operating Day. The HRUC process uses the current hourly forecast of total ERCOT Load including DC Tie Schedules up to the physical rating of the DC Tie for each hour in the RUC Study Period.(c) The DRUC process uses the Day-Ahead weather forecast for each hour of the Operating Day. The HRUC process uses the weather forecast information for each hour of the balance of the RUC Study Period.(18) A QSE with a Resource that is not a Reliability Must-Run (RMR) Unit or has not received an Outage Schedule Adjustment (OSA) that has been committed in a DRUC or HRUC process may opt out of the RUC Settlement (or “buy back” the commitment) by setting the COP status of the RUC-committed Resource to ONOPTOUT for the first hour of a contiguous block of RUC-Committed Hours in the Opt Out Snapshot. All the configurations of the same Combined Cycle Train shall be treated as the same Resource for the purpose of creating the block of RUC-Committed Hours. A RUC-committed Combined Cycle Generation Resource may opt out of the RUC Settlement by setting the COP status of any Combined Cycle Generation Resource within the same Combined Cycle Train as the RUC-committed Resource to ONOPTOUT for the first hour of a contiguous block of RUC-Committed Hours in the Opt Out Snapshot. A Combined Cycle Generation Resource that is RUC-committed from one On-Line configuration in order to transition to a different configuration with additional capacity may opt out of the RUC Settlement following the same rule for RUC-committed Combined Cycle Generation Resources described above. A QSE that opts out of RUC Settlement forfeits RUC Settlement for the affected Resource for a given block of RUC Buy-Back Hours. A QSE that opts out of RUC Settlement treatment must make the Resource available to SCED for all RUC Buy-Back Hours. All hours in a contiguous block of RUC-Committed Hours that includes the RUC Buy-Back Hour shall be considered RUC Buy-Back Hours. If a contiguous block of RUC-Committed Hours spans more than one Operating Day and a QSE wishes to opt out of RUC Settlement for the RUC-Committed Hours in the second or subsequent Operating Day, the QSE must set its COP status to ONOPTOUT for the first hour of that the first Operating Day in the Opt Out Snapshot of the first Operating Day.(19) ERCOT shall, as soon as practicable, post to the MIS Secure Area a report identifying those hours that were considered RUC Buy-Back Hours, along with the name of each RUC-committed Resource whose QSE opted out of RUC Settlement.(20) A Resource that has a Three-Part Supply Offer cleared in the Day-Ahead Market (DAM) and subsequently receives a RUC commitment for the Operating Hour for which it was awarded will be treated as if the Resource Status was ONOPTOUT for purposes of Section 6.5.7.3 and Section 6.5.7.3.1, Determination of Real-Time Reliability Deployment Price Adders.(21) A Resource that has self-committed for an Operating Hour after the RUC Snapshot was taken but before the RUC commitment has been communicated through an XML message for that RUC process and that Operating Hour is included in a block of RUC-committed hours for that RUC process will be treated as if the Resource Status was ONOPTOUT for purposes of Section 6.5.7.3, Section 6.5.7.3.1, Operating Reserve Demand Curve (ORDC) calculations, and RUC Settlement for the entire block of RUC-committed hours. A QSE that has a Resource that meets these conditions must make the Resource available to SCED for the entire block of RUC-committed hours. ERCOT will send the QSE a notification stating the Operating Day and block of hours for which this occurred. |

***6.3.2 Activities for Real-Time Operations***

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

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

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

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| ***[NPRR829, NPRR904, NPRR995, NPRR1000, NPRR1006, NPRR1010, NPRR1058, NPRR1077, and NPRR1149: Replace applicable portions of paragraph (2) above with the following upon system implementation for NPRR829, NPRR904, NPRR995, NPRR1000, NPRR1006, NPRR1058, NPRR1077, or NPRR1149; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]***(2) The following table summarizes the timeline for the Operating Period and the activities of QSEs and ERCOT during Real-Time operations where “T” represents any instant within the Operating Hour. The table is intended to be only a general guide and not controlling language, and any conflict between this table and another section of the Protocols is controlled by the other section:

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

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

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

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

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

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

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

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

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

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

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

***6.4.9.2.2 SASM Clearing Process***

(1) SASM procurement requirements are:

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

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

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

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

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

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

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

(e) SASM MCPCs for any Ancillary Service shall not exceed the SWCAP. Ancillary Service Offers higher than corresponding Ancillary Service penalty factors, as defined in Appendix 2, Day-Ahead Market Optimization Control Parameters, of the Other Binding Document titled “Methodology for Setting Maximum Shadow Prices for Network and Power Balance Constraints,” will not be awarded.

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| ***[NPRR1010: Delete Section 6.4.9.2.2 above upon system implementation of the Real-Time Co-Optimization (RTC) project.]*** |

**6.5.5.2 Operational Data Requirements**

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

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

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

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

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

(d) Net Reactive Power (in MVAr);

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

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

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

(h) Generation Resource breaker and switch status;

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

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

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

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

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

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

(m) LSL;

(n) Configuration identification for Combined Cycle Generation Resources;

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

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

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

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

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

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

(s) For an ESR, the next Operating Hour’s Ancillary Service Resource Responsibility for each quantity of Reg-Up, Reg-Down, ECRS, RRS and Non-Spin.

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

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

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

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

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

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

(c) Load Resource breaker status, if applicable;

(d) LPC (in MW);

(e) MPC (in MW);

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

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

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

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

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

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

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

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

(n) For an ESR, the next Operating Hour’s Ancillary Service Resource Responsibility for each quantity of Reg-Up, Reg-Down, ECRS, RRS and Non-Spin.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(a) Combustion turbine inlet air cooling methods;

(b) Duct firing;

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

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

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

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

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

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

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

(c) State of Charge (SOC), in MWh;

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

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

(13) The QSE shall ensure that the State of Charge (SOC) is greater than or equal to the Minimum State of Charge (MinSOC) and less than or equal to the Maximum State of Charge (MaxSOC).

(14) For each ESR, ERCOT shall include in the High Ancillary Service Limit (HASL) calculation the SOC that is available for an injection Base Point or the additional energy that the ESR can charge in the next SCED interval. For the purposes of paragraph (14), X equals 0 and Y equals an SOC multiple applied to the SOC requirement for each Ancillary Service. Excluding Reg-Up and Reg-Down, during active deployment of a respective Ancillary Service, Y shall equal 0, and at all other times, Y shall equal 1.

(a) SOC available for an injection Base Point in the next SCED interval is the:

(i) Telemetered SOC;

(ii) Minus the sum of the individual SOC requirements for each up Ancillary Service (ERCOT Contingency Reserve Service (ECRS), Non-Spinning Reserve (Non-Spin), Responsive Reserve (RRS), or Regulation Up Service (Reg-Up)) the ESR is carrying at that time;

(A) The SOC required for each up Ancillary Service when Y equals 0 shall be 0, otherwise:

(B) The SOC required for each up Ancillary Service, excluding RRS from Fast Frequency Response (FFR) and Fast Responding Regulation Service (FRRS), is equal to the ESR’s Ancillary Service Resource Responsibility multiplied by the remaining time in the Operating Hour, in hours, plus the product of the Ancillary Service Resource Responsibility and the difference between the SOC multiple of each Ancillary Service, in Y hours, and one hour. Prior to X minutes before the end of current Operating Hour, this requirement may increase to account for the up Ancillary Services that the ESR is required to provide in the next Operating Hour. The SOC requirement for an ESR providing RRS from FFR is equal to the ESR’s Ancillary Service Resource Responsibility for FFR multiplied by 0.25 hours. If FFR is deployed, an SOC credit will be given such that:

(1) Until FFR is recalled, the SOC credit is equal to the ESR’s Ancillary Service Resource Responsibility for FFR at the time of deployment multiplied by the lower of the elapsed time since the beginning of the deployment and 0.25 hours;

(2) For the 15 minutes following the recall of FFR, the SOC credit is equal to the lower of the SOC credit just prior to FFR recall and the ESR’s Ancillary Service Resource Responsibility for FFR for the current hour multiplied by 0.25 hours;

(3) Beginning 15 minutes after FFR recall, the SOC credit is zero; and

(4) If another FFR event occurs within 15 minutes after a previous FFR event has been recalled, the SOC credit for the first event calculated in paragraph (2) above will be applied to the SOC credit for each additional FFR event.

(iii) Minus the telemetered MinSOC.

(b) The additional energy that the ESR can charge in the next SCED interval is the:

(i) Telemetered Maximum SOC (MaxSOC);

(ii) Minus the SOC margin required for the Regulation Down Service (Reg-Down) Ancillary Service Resource Responsibility the ESR is carrying at that time, which is calculated as the ESR’s Reg-Down Ancillary Service Resource Responsibility multiplied by the remaining time in the Operating Hour, in hours. Prior to X minutes before the end of current Operating Hour, this SOC margin requirement may increase to account for the Regulation Down the ESR is planning to provide in the next Operating Hour;

(iii) Minus telemetered SOC.

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

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| ***[NPRR1077: Insert paragraphs (16)-(18) below upon system implementation:]***(16) Except as provided in paragraph (15) below, a QSE representing a Settlement Only Generator (SOG) shall provide ERCOT the following Real-Time telemetry:(a) Net real power injection at the Point of Interconnection (POI) or Point of Common Coupling (POCC) for each site with one or more SOGs;(b) For any site with one or more ESSs that are registered as an SOG, net real power withdrawal at the POI or POCC;(c) For each inverter at the site, gross real power output measured at the generator terminals for all SOGs that are located behind that inverter, separately aggregated by fuel type;(d) For SOGs at the same site that are not located behind an inverter, gross real power output measured at the generator terminals for all SOGs, separately aggregated by fuel type;(e) For any site with one or more ESSs registered as an SOG, for each inverter, gross real power withdrawal by all such ESSs that are located behind that inverter, as measured at the generator terminals; and(f) Generator breaker status.(17) A QSE is not required to provide telemetry for a Settlement Only Distribution Generator (SODG) if:(a) The site that includes the SODG has not exported more than 10 MWh in any calendar year, exclusive of any energy exported during any Settlement Interval in which an ERCOT-declared Energy Emergency Alert (EEA) is in effect; (b) The QSE or Resource Entity for the SODG has submitted a written request to ERCOT seeking an exemption from the telemetry requirements under this paragraph; and(c) ERCOT has provided the QSE or Resource Entity written confirmation that the SODG is exempt from providing telemetry under this paragraph. (18) If ERCOT determines that a site that includes an SODG has exported more than 10 MWh in a given calendar year, it shall notify the SODG’s QSE that the SODG is no longer eligible for the telemetry exemption. Within 90 days of receiving this notification, the QSE for the SODG shall comply with the telemetry requirements of paragraph (15) above.  |

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| ***[NPRR885: Insert paragraph (19) below upon system implementation:]***(19) A QSE representing a Must-Run Alternative (MRA) shall telemeter the MRA MW currently available (unloaded) and not included in the HSL. |

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| ***[NPRR1029: Insert paragraph (20) below upon system implementation:]***(20) A QSE representing a DC-Coupled Resource shall provide the following Real-Time telemetry data in addition to that required for other ESRs:(a) Gross AC MW production of the intermittent renewable generation component of the DC-Coupled Resource, which includes the portion of the intermittent renewable generation used to charge the ESS and/or serve auxiliary Load on the DC side of the inverter; and(b) Gross AC MW capability of the intermittent renewable generation component of the DC-Coupled Resource, based on Real-Time conditions. |

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| ***[NPRR995: Insert paragraph (20) below upon system implementation:]***(20) A QSE representing a Settlement Only Energy Storage System (SOESS) that elects to include the net generation and/or net withdrawals of the SOESS in the estimate of Real-Time Liability (RTL) shall provide ERCOT Real-Time telemetry of the net generation and/or net withdrawals of the SOESS. |

**6.5.7.2 Resource Limit Calculator**

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

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

Generation Resources:

LSL

HSL

Time

LSL

-

LASL

-

HASL

-

Generation

Increase

Services

Provided: Reg

Down

Provided: Reg Up,

RRS, ECRS, Non-Spin

Current

Telemetry

HDL

LDL

Ramp

Rate

5 Minutes

**Generation**

Quantity

Offer Curve Generation

LSL

HSL

-

-

-

Generation

Increase

Ramp

Rate

5 Minutes

-

0

-

-

Increase

Generation

Decrease

Ramp

Rate

5 Minutes

Ancillary

Load Resources:

Time

LSL = LPC -

LASL -

HASL -

Ancillary Services Provided: Reg-Down

Current Load

Telemetry

HDL

LDL

5-30 Minutes

**Load**

Quantity

Bid Curve Load

LSL/LPC

HSL/MPC

0

Increasing

Consumption

Decreasing

Consumption

Ramp

Rate

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

HSL = MPC -

Normal Load
Fluctuation

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

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

For a modeled Generation Resource that represents the injection component of an ESR, HASL is calculated as follows:

**HASL = Max (LASL, Min ((HSLTELEM – (RRSTELEM + RUSTELEM + ECRSTELEM + NSRSTELEM +NFRCTELEM)), MaxBP))**

**MaxBP = (SOCTELEM – MINSOCTELEM – REQASSOC) / TSCED**

|  |  |
| --- | --- |
| **Variable** | **Description** |
| HASL | High Ancillary Service Limit. |
| HSLTELEM | High Sustained Limit provided via telemetry – per Section 6.5.5.2.  |
| LASL | Low Ancillary Service Limit. |
| RRSTELEM | RRS Ancillary Service Schedule provided via telemetry.  |
| RUSTELEM | Reg-Up Ancillary Service Resource Responsibility designation provided by telemetry. |
| NSRSTELEM | Non-Spin Ancillary Service Schedule provided via telemetry. |
| ECRSTELEM | ECRS Ancillary Service Schedule provided by telemetry.  |
| NFRCTELEM | NFRC currently available (unloaded) and included in the HSL of the Generation Resource with non-zero RRS Ancillary Service Schedule telemetry. |
| MaxBP | Calculated maximum SCED Base Point possible from available SOC after discounting for SOC required to support telemetered Ancillary Service Resource Responsibilities. |
| REQASSOC | Calculated required SOC needed to support Ancillary Service Supply Resource Responsibilities taking into account Ancillary Services SOC multiple requirements. |
| SOCTELEM | Current SOC via telemetry. |
| MINSOCTELEM | MinSOC via telemetry. |
| TSCED | Nominal SCED interval duration = 1/12 hour. |

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

**LASL = LSLTELEM + RDSTELEM**

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

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

**SURAMP = RAMPRATE – (1 – RDSDEPLP) \* (RUSTELEM / 7)**

|  |  |
| --- | --- |
| **Variable** | **Description** |
| SURAMP | SCED Up Ramp Rate. |
| RAMPRATE | Normal Ramp Rate up, as telemetered by the QSE, when ECRS is not deployed or when the subject Resource is not providing ECRS.Emergency Ramp Rate up, as telemetered by the QSE, for Resources deploying ECRS. |
| RUSTELEM | Reg-Up Ancillary Service Resource Responsibility designation provided by telemetry. |
| RDSDEPLP | Percentage of system-wide Reg-Down Ancillary Resource Responsibility deployed by LFC. This value shall not exceed 100% and controls the amount of ramp rate reserved for Regulation Service in Real-Time. |

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

**SDRAMP = NORMRAMP – (1 – RUSDEPLP) \* (RDSTELEM / 7)**

| **Variable** | **Description** |
| --- | --- |
| SDRAMP | SCED Down Ramp Rate. |
| NORMRAMP | Normal Ramp Rate down, as telemetered by the QSE. |
| RDSTELEM | Reg-Down Ancillary Service Resource Responsibility designation by Resource provided via telemetry. |
| RUSDEPLP | Percentage of system-wide Reg-Up Ancillary Resource Responsibility deployed by LFC. This value shall not exceed 100% and controls the amount of ramp rate reserved for Regulation Service in Real-Time. |

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

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

**HDL = POWERTELEM – (SDRAMP \* 5)**

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

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

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

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

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

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

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

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

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

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

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

For a modeled Controllable Load Resource that represents the charging component of an ESR, HASL is calculated as follows:

**HASL = Max (LPCTELEM, Min ((MPCTELEM – RDSTELEM), MaxBP))**

**MaxBP = (MAXSOCTELEM – SOCTELEM –REQHDRMASSOC) / TSCED**

|  |  |
| --- | --- |
| **Variable** | **Description** |
| HASL | High Ancillary Service Limit. |
| LPCTELEM | Low Power Consumption provided via telemetry.  |
| MPCTELEM | Maximum Power Consumption provided via telemetry.  |
| RDSTELEM | Reg-Down Ancillary Service Resource Responsibility designation provided by telemetry. |
| MaxBP | Calculated maximum SCED Base Point possible from available SOC headroom after discounting for SOC required to support telemetered Ancillary Service Resource Responsibilities. |
| REQHDRMASSOC | Calculated required SOC headroom needed to support Ancillary Service Resource Responsibilities taking into account Ancillary Service SOC multiple requirements. |
| SOCTELEM | Current SOC via telemetry. |
| MAXSOCTELEM | MaxSOC via telemetry. |
| TSCED | Nominal SCED interval duration = 1/12 hour. |

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

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

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

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

**SURAMP = RAMPRATE – (1 – RDSDEPLP) \* (RUSTELEM / 7)**

|  |  |
| --- | --- |
| **Variable** | **Description** |
| SURAMP | SCED Up Ramp Rate.  |
| RAMPRATE | Normal Ramp Rate up, as telemetered by the QSE, when ECRS is not deployed or when the subject Load Resource is not providing ECRS.Emergency Ramp Rate up, as telemetered by the QSE, for Load Resources deploying ECRS. |
| RUSTELEM | Reg-Up Ancillary Service Resource Responsibility designation provided by telemetry. |
| RDSDEPLP | Percentage of system-wide Reg-Down Ancillary Resource Responsibility deployed by LFC. This value shall not exceed 100% and controls the amount of ramp rate reserved for Regulation Service in Real-Time. |

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

**SDRAMP = NORMRAMP – (1 – RUSDEPLP) \* (RDSTELEM / 7)**

| **Variable** | **Description** |
| --- | --- |
| SDRAMP | SCED Down Ramp Rate. |
| NORMRAMP | Normal Ramp Rate down, as telemetered by the QSE.  |
| RDSTELEM | Reg-Down Ancillary Service Resource Responsibility designation by Resource provided via telemetry.  |
| RUSDEPLP | Percentage of system-wide Reg-Up Ancillary Resource Responsibility deployed by LFC. This value shall not exceed 100% and controls the amount of ramp rate reserved for Regulation Service in Real-Time. |

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

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

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

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

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

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

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| ***[NPRR879, NPRR1010, and NPRR1014: Replace applicable portions of Section 6.5.7.2 above with the following upon system implementation for NPRR879 or NPRR1014; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]*****6.5.7.2 Resource Limit Calculator**(1) ERCOT shall calculate the HDL and LDL within four seconds after a change of the Resource-specific attributes provided as part of the QSE’s SCADA telemetry under Section 6.5.5.2, Operational Data Requirements. The formulas described below define which Resource-specific attributes must be used to calculate each Resource limit. The Resource limits are used as inputs into both the SCED process and the Ancillary Service Capacity Monitor as described in Section 6.5.7.6, Load Frequency Control. These Resource limits help ensure that the deployments produced by the SCED and Load Frequency Control (LFC) processes will respect individual Resource physical limitations.(2) For SCED-dispatchable Generation Resources, HDL is calculated as follows:(a) If the telemetered Resource Status is SHUTDOWN, then**HDL = POWERTELEM – (NORMRAMPDN \* 5)**(b) If the telemetered Resource Status is any status code specified in item (5)(b)(i) of Section 3.9.1, Current Operating Plan (COP) Criteria, other than SHUTDOWN, then**HDL = Min (POWERTELEM + (NORMRAMPUP \* 5), HSLTELEM)**

|  |  |
| --- | --- |
| **Variable** | **Description** |
| HDL | High Dispatch Limit. |
| POWERTELEM | Gross or net real power provided via telemetry.  |
| NORMRAMPDN | 5-minute blended Normal Ramp Rate down, as telemetered by the QSE. |
| NORMRAMPUP | 5-minute blended Normal Ramp Rate up, as telemetered by the QSE. |
| HSLTELEM | For IRRs qualified to provide an Ancillary Service and telemetering a non-zero capability to provide that Ancillary Service, and all IRRs within an IRR Group where any IRR within the IRR Group is qualified to provide an Ancillary Service and telemetering a non-zero capability to provide that Ancillary Service, HSLTELEM shall be the five-minute intra-hour forecast for the Resource. For all other Resources, HSLTELEM shall be the Resource’s HSL provided to ERCOT via telemetry, in accordance with Section 6.5.5.2. |

(3) For SCED-dispatchable Generation Resources, LDL is calculated as follows:(a) If the telemetered Resource Status is STARTUP, then**LDL = POWERTELEM + (NORMRAMPUP \* 5)**(b) If the telemetered Resource Status is any status code specified in item (5)(b)(i) of Section 3.9.1 other than STARTUP, then**LDL = Max (POWERTELEM - (NORMRAMPDN \* 5), LSLTELEM)**

|  |  |
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| **Variable** | **Description** |
| LDL | Low Dispatch Limit. |
| POWERTELEM | Gross or net real power provided via telemetry. |
| LSLTELEM | Low Sustained Limit (LSL) provided via telemetry. |
| NORMRAMPDN | 5-minute blended Normal Ramp Rate down, as telemetered by the QSE. |
| NORMRAMPUP | 5-minute blended Normal Ramp Rate up, as telemetered by the QSE. |

(4) For ESRs, HDL is calculated as follows:(a) If the telemetered Resource Status is ONHOLD, then**HDL = 0**(b) If the telemetered Resource Status is ONTEST, then**HDL** = **Max (Min (POWERTELEM, HSLTELEM), LSLTELEM)**(c) If the telemetered Resource Status is any status code specified in item (5)(b)(iv) of Section 3.9.1, Current Operating Plan (COP) Criteria, other than OUT, EMR, EMRSWGR, ONHOLD, or ONTEST, then**HDL = Min (POWERTELEM + (NORMRAMPUP\* 5), HSLTELEM)**

|  |  |
| --- | --- |
| **Variable** | **Description** |
| HDL | High Dispatch Limit. |
| POWERTELEM | Net real power provided via telemetry.  |
| NORMRAMPUP | 5-minute blended Normal Ramp Rate up, as telemetered by the QSE. |
| HSLTELEM | High Sustained Limit (HSL) provided via telemetry – per Section 6.5.5.2.  |

(5) For ESRs, LDL is calculated as follows:(a) If the telemetered Resource Status is ONHOLD, then**LDL = 0**(b) If the telemetered Resource Status is ONTEST, then**LDL** = **Max (Min (POWERTELEM, HSLTELEM), LSLTELEM)**(c) If the telemetered Resource Status is any status code specified in item (5)(b)(iv) of Section 3.9.1, Current Operating Plan (COP) Criteria, other than OUT, or EMR, or EMRSWGR, or ONHOLD, or ONTEST, then**LDL = Max (POWERTELEM - (NORMRAMPDN \* 5), LSLTELEM)**

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| **Variable** | **Description** |
| LDL | Low Dispatch Limit. |
| POWERTELEM | Net real power provided via telemetry. |
| LSLTELEM | Low Sustained Limit provided via telemetry. |
| NORMRAMPDN | 5-minute blended Normal Ramp Rate down, as telemetered by the QSE. |

(6) For SCED-dispatchable Load Resources, HDL is calculated as follows:**HDL = Min (POWERTELEM + (NORMRAMPDN \* 5), HSLTELEM)**

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| **Variable** | **Description** |
| HDL | High Dispatch Limit. |
| POWERTELEM | Net real power flow provided via telemetry.  |
| NORMRAMPDN | Normal Ramp Rate down, as telemetered by the QSE.  |
| HSLTELEM | HSL provided via telemetry. |

(7) For SCED-dispatchable Load Resources, LDL is calculated as follows:**LDL = Max (POWERTELEM - (NORMRAMPUP \* 5), LSLTELEM)**

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| **Variable** | **Description** |
| LDL | Low Dispatch Limit. |
| POWERTELEM | Net real power flow provided via telemetry.  |
| NORMRAMPUP | Normal Ramp Rate up, as telemetered by the QSE. |
| LSLTELEM | LSL provided via telemetry. |

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**8.1 QSE and Resource Performance Monitoring**

(1) ERCOT shall develop a Technical Advisory Committee (TAC)- and ERCOT Board-approved Qualified Scheduling Entity (QSE) and Resource monitoring program to be included in the Operating Guides. Nothing in this Section changes the process for amending the Operating Guides. The metrics developed by ERCOT and approved by TAC and the ERCOT Board must include the provisions of this Section.

(2) Each QSE and Resource shall meet performance measures as described in this Section and in the Operating Guides.

(3) ERCOT shall monitor and post the following categories of performance:

(a) Real-Time data, for QSEs:

(i) Telemetry performance

(b) Regulation control performance, for QSEs and as applicable, Resource-specific performance (see also Section 8.1.1, QSE Ancillary Service Performance Standards);

(c) Hydro responsive testing for Generation Resources;

(d) Supplying and validating data for generator models, as requested by ERCOT, for Generation Resources;

(e) Outage scheduling and coordination, for QSEs and Resources;

(f) Resource-specific Responsive Reserve (RRS) performance for QSEs and Resources;

(g) Resource-specific Non-Spinning Reserve (Non-Spin) performance, for QSEs and Resources;

(h) Resource-specific ERCOT Contingency Reserve Service (ECRS) performance for QSEs and Resources;

(i) Outage reporting, by QSEs for Resources;

(j) Current Operating Plan (COP) metrics, for QSEs; and

(k) Day-Ahead Reliability Unit Commitment (DRUC) and Hourly Reliability Unit Commitment (HRUC) commitment performance by QSEs and Generation Resources.

(4) A QSE shall manage the State of Charge (SOC) for each Energy Storage Resource (ESR) that it represents to ensure that the ESR is capable of complying with its SOC requirements in (a) and (b) below for 98.75% of the Operating Hour intervals in a month during which the SOC requirement was calculated. The Operating Hour SOC interval calculation is the integrated shortfall in comparison to the minimum required SOC over the course of an Operating Hour that exceeds the greater of 2 MWhh or the lower of 8 MWhh or 20% of the integrated SOC requirement for the Operating Hour or the integrated excess in comparison to the maximum required SOC exceeds the greater of 2 MWhh or the lower of 8 MWhh or 20% of the integrated SOC requirement for the Operating Hour.

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| ***[NPRR1186: Replace paragraph (4) above with the following upon Phase 2 system implementation but no earlier than three months after Phase 1 implementation:]***(4) A QSE shall manage the State of Charge (SOC) for each Energy Storage Resource (ESR) that it represents to ensure that the ESR is capable of complying with its SOC requirements in (a) and (b) below for 98.75% of the Operating Hour intervals in a month during which the SOC requirement was calculated. The Operating Hour SOC interval calculation is the integrated shortfall in comparison to the minimum required SOC over the course of an Operating Hour that exceeds the greater of 2 MWhh or the lower of 8 MWhh or 20% of the integrated SOC requirement for the Operating Hour or the integrated excess in comparison to the maximum required SOC exceeds the greater of 2 MWhh or the lower of 8 MWhh or 20% of the integrated SOC requirement for the Operating Hour. ERCOT shall report any identified instances of non-compliance of the monthly SOC requirement to the Reliability Monitor for review. |

(a) Telemetered SOC at any time within the Operating Hour must be greater than or equal to:

(i) The Minimum SOC (MinSOC) that the ESR is telemetering;

(ii) Plus the sum of the individual SOC required for each up Ancillary Service (ERCOT Contingency Reserve Service (ECRS), Non-Spinning Reserve (Non-Spin), Responsive Reserve (RRS), or Regulation Up Service (Reg-Up)) the ESR is carrying at that time;

(A) The SOC required for each up Ancillary Service when Y equals 0 shall be 0, otherwise:

(B) The SOC required for each up Ancillary Service, excluding RRS from Fast Frequency Response (FFR) and Fast Responding Regulation Service (FRRS), is equal to the ESR’s Ancillary Service Resource Responsibility multiplied by the remaining time in the Operating Hour, in hours, plus the product of the Ancillary Service Resource Responsibility and the difference between the SOC multiple of each Ancillary Service, in Y hours, and 1 hour. The SOC requirement for an ESR providing RRS from FFR is equal to the ESR’s Ancillary Service Resource Responsibility for FFR multiplied by 0.25 hours. If FFR is deployed, an SOC credit will be given such that:

(1) Until FFR is recalled, the SOC credit is equal to the ESR’s Ancillary Service Resource Responsibility for FFR at the time of deployment multiplied by the lower of the elapsed time since the beginning of the deployment and 0.25 hours;

(2) For the next 15 minutes following the recall of FFR, the SOC credit is equal to the lower of the SOC credit just prior to FFR recall and the ESR’s Ancillary Service Resource Responsibility for FFR for the current hour multiplied by 0.25 hours;

(3) Beginning 15 minutes after FFR recall, the SOC credit is zero; and

(4) If another FFR event occurs within 15 minutes after a previous FFR event has been recalled, the SOC credit for the first event calculated in paragraph (2) above will be applied to the SOC credit for each additional FFR event.

(iii) Plus the SOC reduction in the SCED interval due to the ESR’s current injection Base Point;

(iv) Minus an energy credit associated with the ESR’s current withdrawal Base Point.

(b) Telemetered SOC at any time within the Operating Hour must be less than or equal to:

(i) The Maximum SOC (MaxSOC) the ESR is telemetering;

(ii) Minus the SOC charging margin required for the Regulation Down Service (Reg-Down) Ancillary Service Resource Responsibility the ESR is carrying at that time, which is calculated as the ESR’s Regulation Down Resource Responsibility multiplied by the remaining time in the Operating Hour, in hours;

(iii) Minus the SOC the ESR will gain in the SCED interval due to the ESR’s current withdrawal Base Point;

(iv) Plus an energy debit associated with the ESR’s current injection Base Point.

**8.1.1.2 General Capacity Testing Requirements**

(1) Within the first 15 days of each Season, each QSE shall provide ERCOT a Seasonal HSL for any Generation Resource with a capacity greater than ten MW that will be operated during that Season. ERCOT shall provide an appropriate form for QSEs to submit their Seasonal HSL data. The Seasonal HSL form shall take into account auxiliary Load and gross and net real power capability of the Generation Resource. Each QSE shall update its COP and telemetry, as necessary, to reflect the HSL of each of its Generation Resources in a given operating interval as well as other operational limitations. The HSL shown in the COP for a Generation Resource may not be ramp rate-limited while the Real-Time telemetered value of HSL for the Generation Resource may be ramp rate-limited by the QSE representing the Generation Resource in order for the Generation Resource to meet its HSL using the testing process described in paragraph (2) below.

(2) To verify that the HSL reported by telemetry is achievable, ERCOT may, at its discretion, conduct an unannounced Generation Resource test. At a time determined solely by ERCOT, ERCOT will issue a Verbal Dispatch Instruction (VDI) to the QSE to operate the designated Generation Resource at its HSL as shown in the QSE’s telemetry at the time the test is initiated. The QSE shall immediately upon receiving the VDI release all Ancillary Service Obligations carried by the unit to be tested and shall telemeter Resource Status as “ONTEST.” The QSE shall not be required to start the designated Generation Resource if it is not already On-Line when ERCOT announces its intent to test the Resource. If the designated Generation Resource is operating at its LSL when ERCOT sends the VDI to begin the test, the QSE shall have up to 60 minutes to allow the Resource to reach 90% of its HSL as shown by telemetry and up to an additional 20 minutes for the Resource to reach the HSL shown by telemetry at the time the test is initiated. This time requirement does not apply to nuclear-fueled Generation Resources. If the designated Generation Resource is operating between its LSL and 50% of its HSL shown by telemetry when ERCOT begins the test, the QSE shall have 60 minutes for the Resource to reach its HSL. If the Resource is operating at or above 50% of its HSL shown by telemetry when ERCOT begins the test, the QSE shall have 30 minutes for the Resource to reach its HSL. Once the designated Generation Resource reaches its HSL, the QSE shall hold it at that output level for a minimum of 30 minutes. The HSL for the designated Generation Resource shall be determined based on the Real-Time averaged MW telemetered by the Resource during the 30 minutes of constant output. After each test, the QSE representing the Generation Resource will complete and submit the test form using the Net Dependable Capability and Reactive Capability (NDCRC) application located on the Market Information System (MIS) Secure Area within two Business Days.

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| ***[NPRR1011: Replace paragraph (2) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***(2) To verify that the HSL reported by telemetry is achievable, ERCOT may, at its discretion, conduct an unannounced Generation Resource test. At a time determined solely by ERCOT, ERCOT will issue a Verbal Dispatch Instruction (VDI) to the QSE to operate the designated Generation Resource at its HSL as shown in the QSE’s telemetry at the time the test is initiated. Immediately upon receiving the VDI, the QSE shall telemeter Resource Status as “ONTEST.” The QSE shall not be required to start the designated Generation Resource if it is not already On-Line when ERCOT announces its intent to test the Resource. If the designated Generation Resource is operating at its LSL when ERCOT sends the VDI to begin the test, the QSE shall have up to 60 minutes to allow the Resource to reach 90% of its HSL as shown by telemetry and up to an additional 20 minutes for the Resource to reach the HSL shown by telemetry at the time the test is initiated. This time requirement does not apply to nuclear-fueled Generation Resources. If the designated Generation Resource is operating between its LSL and 50% of its HSL shown by telemetry when ERCOT begins the test, the QSE shall have 60 minutes for the Resource to reach its HSL. If the Resource is operating at or above 50% of its HSL shown by telemetry when ERCOT begins the test, the QSE shall have 30 minutes for the Resource to reach its HSL. Once the designated Generation Resource reaches its HSL, the QSE shall hold it at that output level for a minimum of 30 minutes. The HSL for the designated Generation Resource shall be determined based on the Real-Time averaged MW telemetered by the Resource during the 30 minutes of constant output. After each test, the QSE representing the Generation Resource will complete and submit the test form using the Net Dependable Capability and Reactive Capability (NDCRC) application located on the Market Information System (MIS) Secure Area within two Business Days. |

(3) ERCOT may test multiple Generation Resources within a single QSE within a single 24-hour period. However, in no case shall ERCOT test more than two Generation Resources within one QSE simultaneously. All Resources On-Line in a Combined-Cycle Configuration will be measured on an aggregate capacity basis. All QSEs associated with a jointly owned unit will be tested simultaneously. Hydro, wind, and PhotoVoltaic (PV) generation will be excluded from unannounced generation capacity testing. ERCOT shall not perform an unannounced Generation Resource test during a Watch or Energy Emergency Alert (EEA) event. If an unannounced Generation Resource test is underway when a Watch or EEA event commences, ERCOT may cancel the test.

(4) Should the designated Generation Resource fail to reach its HSL shown in its telemetry within the time frame set forth herein, the Real-Time averaged MW telemetered during the test shall be the basis for the new HSL for the designated Generation Resource for that Season. The QSE shall have the opportunity to request another test as quickly as possible (at a time determined by ERCOT) and may retest up to two times per month. The QSE may also demonstrate an increased value of HSL by operating the Generation Resource at an Output Schedule for at least 30 minutes. In order to raise an Output Schedule above the Seasonal HSL, the QSE may set the Resource telemetered HSL equal to its output temporarily for the purposes of the demonstration tests. After either a retest or a demonstration test, the MW capability of the Generation Resource based on the average of the MW production telemetered during the test shall be the basis for the new HSL for the designated Generation Resource for that Season. Any requested retest must take place within three Business Days after the request for retest.

(5) The telemetered value of HSL for the Generation Resource shall only be used for testing purposes as described in this Section or for system reliability calculations.

(6) A Resource Entity owning a Generation Resource operating in the synchronous condenser fast response mode to provide RRS or ECRS shall evaluate the maximum capability of the Resource each Season.

(7) ERCOT shall maintain historical records of unannounced Generation Resource test results, using the information contained therein to adjust the Reserve Discount Factor (RDF) subject to the approval of the appropriate TAC subcommittee. ERCOT shall report to the Reliability and Operations Subcommittee (ROS) annually or as requested by ROS the aggregated results of such unannounced testing (excluding retests), including, but not limited to, the number and total capacity of Resources tested, the percentage of Resources that met or exceeded their HSL reported by telemetry, the percentage that failed to meet their HSL reported by telemetry, and the total MW capacity shortfall of those Resources that failed to meet their HSL reported by telemetry.

(8) QSEs who receive a VDI to operate the designated Generation Resource for an unannounced Generation Resource test may be considered for additional compensation under Section 6.6.9, Emergency Operations Settlement. Any unannounced Generation Resource test VDI that ERCOT issues as a result of a QSE-requested retest will not be considered for additional compensation under Section 6.6.9.

(9) All unannounced Generation Resource test VDIs will be considered as an instructed deviation for compliance purposes.

(10) Before the start of each Season, a QSE shall provide ERCOT a list identifying each Controllable Load Resource that is expected to operate in a Season as a provider of Ancillary Service. Prior to the beginning of each Season, QSEs shall identify the Controllable Load Resources to be tested during the Season and the specific week of the test if known. Any Controllable Load Resource for which the QSE desires qualification to provide Ancillary Services shall have its Net Dependable Capability verified prior to providing Ancillary Services.

(11) ERCOT shall verify the telemetry attributes of each qualified Load Resource as follows:

(a) ERCOT shall annually verify the telemetry attributes of each Load Resource providing RRS or ECRS using a high-set under-frequency relay. In addition, once every two years, any Load Resource qualified to provide RRS or ECRS using a high-set under-frequency relay shall test the correct operation of the under-frequency relay or the output from the solid-state switch, whichever applies. However, if a Load Resource’s performance has been verified through response to an actual event, the data from the event can be used to meet the annual telemetry verification requirement for that year and the biennial relay-testing requirement.

(b) ERCOT shall periodically validate the telemetry attributes of each Controllable Load Resource. In the case of an Aggregate Load Resource (ALR), ERCOT will follow the validation procedures described in the document titled “Requirements for Aggregate Load Resource Participation in the ERCOT Markets.” If a QSE fails to meet its telemetry validation requirements, ERCOT may suspend the QSE and/or the Controllable Load Resource from participation in the applicable services or markets. If disqualified pursuant to this paragraph, a QSE or Controllable Load Resource may reestablish its qualification by submitting a corrective action plan to ERCOT that identifies actions taken to correct performance deficiencies and by successfully passing a new ERCOT telemetry validation test.

(12) Telemetry values of a Load Resource may be adjusted to reflect Distribution Losses, based on the ERCOT-forecasted Distribution Loss Factors (DLFs). Load Resources may be adjusted for Distribution Losses using the same distribution loss code as assigned to the ESI ID.

(13) A specific Load Resource to be used for the first time to provide Regulation Service, RRS, ECRS, Non-Spin, or energy by following Security-Constrained Economic Dispatch (SCED) Base Points, must be tested to ERCOT’s reasonable satisfaction using actual Demand response as part of its qualification. The test must take place at a time mutually selected by the QSE representing the Load Resource and ERCOT. ERCOT shall make available its standard test document for Load Resource qualification required under this Section on the ERCOT website.

(14) Any changes to a Load Resource including changes to its capability to provide Ancillary Service requires updates by the Load Resource to the registration information detailing the change. For Non-Opt-In Entities (NOIEs) representing specific Load Resources that are located behind the NOIE Settlement Metering points, the NOIE shall provide an alternative unique descriptor of the qualified Load Resource for ERCOT’s records.

(15) Qualification of a Resource, including a Load Resource, remains valid for that Resource in the event of a change of QSE for the Resource, provided that the new QSE demonstrates to ERCOT’s reasonable satisfaction that the new QSE has adequate communications and control capability for the Resource.

(16) For purposes of qualifying Quick Start Generation Resources (QSGRs), ERCOT shall issue a unit-specific VDI for the MW amount that the QSE is requesting to qualify its QSGR to provide. The QSE shall telemeter an ONTEST Resource Status. The QSGR will only be qualified to provide an amount not to exceed the observed output at the end of a ten-minute test period.

(17) ERCOT may revoke the QSGR qualification of any QSGR for failure to comply with the following performance standard:

(a) A QSGR, available for deployment by SCED, is deemed to have failed to start for the purpose of this performance measure if the QSGR fails to achieve at least 90% of the minimum ERCOT SCED Base Point, including zero Base Points, within ten minutes of the initial ERCOT SCED Base Point that dispatched the QSGR above zero MW output.

(b) ERCOT may revoke a QSGR’s qualification if within a rolling 90-day period the number of QSGR failures to start, as determined by paragraph (a) above, exceeds the higher of three failures or 10% of the number of quick start mode startups made in response to SCED deployments.

(18) If disqualified pursuant to paragraph (17) above, a QSGR may reestablish its QSGR qualification by submitting a corrective action plan to ERCOT that identifies actions taken to correct performance deficiencies and by successfully passing a new ERCOT QSGR test.

(19) If an Energy Storage Resource (ESR) is telemetering a non-zero ECRS Ancillary Service Responsibility and/or non-zero Non-Spin Ancillary Service Responsibility, to verify that the Ancillary Service Responsibility reported by telemetry is achievable based on the state of charge the Resource is maintaining in Real-Time, ERCOT may, at its discretion outside of active deployment or during the post-deployment recovery period which is equal to the duration of the respective Ancillary Service, conduct an unannounced ECRS/Non-Spin capability test. At a time determined solely by ERCOT, ERCOT will issue a VDI to the QSE to operate the designated ESR an output level that delivers the total state of charge the ESR was obligated to provide based on sum of the ECRS Ancillary Service Responsibility and Non-Spin Ancillary Service Responsibility as shown in the ESR’s telemetry at the time the test is initiated. The QSE shall immediately upon receiving the VDI release all Ancillary Service Obligations carried by the ESR to be tested and shall telemeter Resource Status as “ONTEST.” Once the designated ESR reaches the target output level, the QSE shall hold at that output level for a minimum duration required to verify ESR’s state of charge capability to meet the ECRS Ancillary Service Responsibility and Non-Spin Ancillary Service Responsibility. The two-hour and/or four-hour capability for the designated ESR shall be determined based on the Real-Time averaged MW telemetered by the Resource during the constant output (i.e., hold) phase of the test. After each test, the QSE representing the ESR will complete and submit the test form using the NDCRC application located on the MIS Secure Area within two Business Days. Should the designated ESR fail to demonstrate the state of charge level needed to meet the sum of ECRS Ancillary Service Responsibility and Non-Spin Ancillary Service Responsibility shown in its telemetry within the time frame set forth herein, the Real-Time averaged MW telemetered during the test shall be the basis for the ECRS and Non-Spin capacity that the Resource may provide. The QSE shall have the opportunity to request another test as quickly as possible (at a time determined by ERCOT) and may retest up to two times per month. After either a retest or a demonstration test, the average of the MW output telemetered during the test shall be the basis for the new ECRS and Non-Spin capability for the designated ESR. Any requested retest must take place within three Business Days after the request for retest or a mutually agreeable date.

1. On August 10, 2023, PRS voted to recommend approval of NPRR1186, as amended by the Comments of Key Capture Energy, LLC and Broad Reach Power LLC on Aug. 9, 2023. *See* [PRS Report](https://www.ercot.com/files/docs/2023/08/11/1186NPRR-16%20PRS%20Report%20081023.docx) (Aug. 10, 2023). [↑](#footnote-ref-2)
2. *See e.g.,* [Eolian Comments](https://www.ercot.com/files/docs/2023/07/06/1186NPRR-03%20Eolian%20Comments%20070623.docx) (Jul. 6, 2023); [Plus Power and Tesla, Inc. Comments](https://www.ercot.com/files/docs/2023/07/07/1186NPRR-04%20Joint%20Commenters%20Comments%20070723.docx) (Jul. 7, 2023); [Jupiter Comments](https://www.ercot.com/files/docs/2023/07/12/1186NPRR-05%20Jupiter%20Power%20Comments%20071223.docx) (Jul. 12, 2023); [Plus Power and Eolian Comments](https://www.ercot.com/files/docs/2023/08/09/1186NPRR-11%20Joint%20Commenters%20Comments%20080923%20v2%20CORRECTED.docx) (Aug. 9, 2023); and [Jupiter Comments](https://www.ercot.com/files/docs/2023/08/09/1186NPRR-13%20Jupiter%20Power%20Comments%20080923.docx) (Aug. 9, 2023). *See also*, [Hunt Energy Network (HEN) Comments](https://www.ercot.com/files/docs/2023/08/08/1186NPRR-10%20HEN%20Comments%20080823.docx) (Aug. 8, 2023); [Texas Advanced Energy Business Alliance (TAEBA) Comments](https://www.ercot.com/files/docs/2023/08/09/1186NPRR-14%20TAEBA%20Comments%20080923.docx) (Aug. 9, 2023). [↑](#footnote-ref-3)
3. *See* NPRR1096,*Require Sustained Two-Hour Capability for ECRS and Four-Hour Capability for Non-Spin***,** [ERCOT Comments](https://www.ercot.com/files/docs/2021/11/03/1096NPRR-05_ERCOT_Comments_110321.docx) at pg. 2, para. 1 (Nov. 3, 2021). [↑](#footnote-ref-4)
4. *See* NPRR1186, *Improvements Prior to the RTC+B Project for Better ESR State of Charge Awareness, Accounting, and Monitoring*, [ERCOT's Revision Description](https://www.ercot.com/files/docs/2023/06/22/1186NPRR-01%20Improvements%20Prior%20to%20the%20RTCB%20Project%20for%20Better%20ESR%20State%20of%20Charge%20Awareness%20062223.docx) (Jun. 22, 2023). [↑](#footnote-ref-5)
5. An appropriate variable ‘Y’ for each of the ancillary services could be applied to RRS, ECRS, and Non-Spin. [↑](#footnote-ref-6)
6. In this example, a 100 MW resource has a five (5)-minute unplanned SCADA issue and telemeters 0 MWh SOC at the top of the Operating Hour.  Integrating the error at the top of the Operating Hour results in non-compliance at the 8MWhh threshold in five (5) minutes.  [↑](#footnote-ref-7)