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| NPRR Number | [1029](http://www.ercot.com/mktrules/issues/NPRR1029) | NPRR Title | BESTF-6 DC-Coupled Resources |
| Date of Decision | November 18, 2020 |
| Action | Recommended Approval |
| Timeline  | Urgent |
| Proposed Effective Date | Upon system implementation |
| Priority and Rank Assigned | Priority – 2020; Rank – 3015 |
| Nodal Protocol Sections Requiring Revision  | 2.1, Definitions3.2.1, Calculation of Aggregate Resource Capacity3.2.3, System Adequacy Reports3.8.7, DC-Coupled Resources (new)3.9.1, Current Operating Plan (COP) Criteria3.13, Renewable Production Potential Forecasts3.15, Voltage Support4.2.2, Wind-Powered Generation Resource Production Potential4.2.3, PhotoVoltaic Generation Resource Production Potential5.7.4.1.1, Capacity Shortfall Ratio Share6.5.5.2, Operational Data Requirements6.5.7.5, Ancillary Services Capacity Monitor6.5.7.11, DC-Coupled Resource Ramp Rate Limitations (new)6.6.5, Base Point Deviation Charge6.6.5.5, Energy Storage Resource Base Point Deviation Charge for Over Performance6.6.5.5.1, Energy Storage Resource Base Point Deviation Charge for Under Performance8.1.1.4.1, Regulation Service and Generation Resource/Controllable Load Resource Energy Deployment Performance25.5.2, Market Suspension Make-Whole Payment25.5.5, Market Suspension Charge Allocation25.5.6, Market Suspension Data Submissions |
| Related Documents Requiring Revision/Related Revision Requests | None |
| Revision Description | This Nodal Protocol Revision Request (NPRR) enables the integration of DC-Coupled Resources into ERCOT’s core systems. DC-Coupled Resources are defined as a type of Energy Storage Resource (ESR) and will be required to follow all rules associated with ESRs in addition to meeting the additional requirements in this NPRR. The language in this NPRR applies to both the current combo model era, in which ESRs are treated in ERCOT systems as two Resources—a Generation Resource and a Controllable Load Resource—as well as the future single model era described in NPRR1014, BESTF-4 Energy Storage Resource Single Model. This NPRR is consistent with Battery Energy Storage Task Force (BESTF) Key Topic and Concept (KTC) #11, which achieved consensus at the BESTF and was approved by the Technical Advisory Committee (TAC) in an email vote that concluded on April 3, 2020. ERCOT appreciates stakeholders’ collaboration in developing these provisions.  |
| Reason for Revision |  Addresses current operational issues. Meets Strategic goals (tied to the [ERCOT Strategic Plan](http://www.ercot.com/content/wcm/lists/144926/ERCOT_Strategic_Plan_2019-2023.pdf) or directed by the ERCOT Board). Market efficiencies or enhancements Administrative Regulatory requirements Other: (explain)*(please select all that apply)* |
| Business Case | A large number of projects in the ERCOT generation interconnection queue involve one or more Energy Storage Systems (ESSs) co-located behind a single inverter with one or more wind and/or PhotoVoltaic generators. ERCOT understands that these arrangements are driven in large part by federal tax advantages associated with the concept. This NPRR modifies ERCOT rules to enable market participation of such arrangements. |
| Credit Work Group Review | ERCOT Credit Staff and the Credit Work Group (Credit WG) have reviewed NPRR1029 and do not believe that it requires changes to credit monitoring activity or the calculation of liability. |
| PRS Decision | On 7/16/20, PRS unanimously voted via roll call to table NPRR1029. All Market Segments were present for the vote.On 11/11/20, PRS unanimously voted via roll call to grant NPRR1029 Urgent status; to recommend approval of NPRR1029 as amended by the 10/30/20 ERCOT comments; and forward to TAC NPRR1029 and the Impact Analysis with a recommended priority of 2020 and rank of 3015. All Market Segments were present for the vote. |
| Summary of PRS Discussion | On 7/16/20, there was no discussion.On 11/11/20, participants reviewed the 10/30/20 ERCOT comments and Impact Analysis, and discussed the appropriate priority and rank for NPRR1029. |
| TAC Decision | On 11/18/20, TAC unanimously voted via roll call to recommend approval of NPRR1029 as recommended by PRS in the 11/11/20 PRS Report. All Market Segments were present for the vote.  |
| Summary of TAC Discussion | On 11/18/20, there was no discussion. |
| ERCOT Opinion | ERCOT supports approval of NPRR1029. |

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| Market Segment | Not applicable |

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| **Comments Received** |
| **Comment Author** | **Comment Summary** |
| ERCOT 092420 | Proposed additional revisions reflecting consensus of the BESTF |
| ERCOT 103020 | Proposed additional revisions reflecting consensus of the BESTF |

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| **Market Rules Notes** |

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

* NPRR987, BESTF-3 Energy Storage Resource Contribution to Physical Responsive Capability and Real-Time On-Line Reserve Capacity Calculations (incorporated 7/1/20)
	+ Section 6.5.7.5
* NPRR989, BESTF-1 Energy Storage Resource Technical Requirements (incorporated 7/1/20)
	+ Section 3.15
* NPRR1000, Elimination of Dynamically Scheduled Resources (incorporated 9/1/20)
	+ Section 3.9.1
	+ Section 8.1.1.4.1
* NPRR1016, Clarify Requirements for Distribution Generation Resources (DGRs) and Distribution Energy Storage Resources (DESRs) (incorporated 9/1/20)
	+ Section 3.15
* NPRR1019, Pricing and Settlement Changes for Switchable Generation Resources (SWGRs) Instructed to Switch to ERCOT (incorporated 6/10/20)
	+ Section 3.9.1
* NPRR1038, BESTF-8 Limited Exemption from Reactive Power Requirements for Certain Energy Storage Resources (incorporated 11/1/20)
	+ Section 3.15

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

* NPRR1005, Clarify Definition of Point of Interconnection (POI) and Add Definition Point of Interconnection Bus (POIB)
	+ Section 3.15
* NPRR1007, RTC – NP 3: Management Activities for the ERCOT System
	+ Section 3.2.3
	+ Section 3.9.1
* NPRR1009, RTC – NP 5: Transmission Security Analysis and Reliability Unit Commitment
	+ Section 5.7.4.1.1
* NPRR1010, RTC – NP 6: Adjustment Period and Real-Time Operations
	+ Section 6.5.5.2
	+ Section 6.5.7.5
* NPRR1011, RTC – NP 8: Performance Monitoring
	+ Section 8.1.1.4.1
* NPRR1014, BESTF-4 Energy Storage Resource Single Model
	+ Section 3.2.1
	+ Section 3.9.1
	+ Section 6.5.5.2
	+ Section 6.5.7.5
	+ Section 6.6.5.5
	+ Section 6.6.5.5.1
	+ Section 8.1.1.4.1
* NPRR1026, BESTF-7 Self-Limiting Facilities
	+ Section 3.9.1
	+ Section 3.15
* NPRR1032, Consideration of Physical Limits of DC Ties in RUC Optimization and Settlements
	+ Section 5.7.4.1.1
* NPRR1039, Replace the Term MIS Public Area with ERCOT Website
	+ Section 3.2.1
	+ Section 3.2.3
	+ Section 4.2.2
	+ Section 4.2.3
	+ Section 6.5.7.5
	+ Section 8.1.1.4.1
* NPRR1040, Compliance Metrics for Ancillary Service Supply Responsibility
	+ Section 8.1.1.4.1
* NPRR1046, Additional Revisions to Remove Dynamically Scheduled Resource (DSR) from the Protocols
	+ Section 8.1.1.4.1
* NPRR1048, Clarification on NPRR978 Short-Term Adequacy Reports
	+ Section 3.2.3
* NPRR1054, Removal of Oklaunion Exemption Language
	+ Section 5.7.4.1.1

Please note that the baseline definition of “Resource” has been updated to reflect the incorporation of the following NPRR(s) into the Protocols:

* NPRR990, Relocation of Combined Cycle Train to Resource Attribute (incorporated 9/1/20)
* NPRR1016, Clarify Requirements for Distribution Generation Resources (DGRs) and Distribution Energy Storage Resources (DESRs) (incorporated 9/1/20)

Please note that the following NPRR(s) also propose revisions to the definition of “Resource”:

* NPRR995, RTF-6 Create Definition and Terms for Settlement Only Energy Storage

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| Proposed Protocol Language Revision |

## 2.1 DEFINITIONS

**Resource**

The term is used to refer to an Energy Storage Resource (ESR), a Generation Resource, or a Load Resource. The term “Resource” used by itself in these Protocols does not include a Settlement Only Generator (SOG) or an Emergency Response Service (ERS) Resource.

***Energy Storage Resource (ESR)***

An Energy Storage System (ESS) registered with ERCOT for the purpose of providing energy and/or Ancillary Service to the ERCOT System.

***DC-Coupled Resource***

A type of Energy Storage Resource (ESR) in which an Energy Storage System (ESS) is combined with wind and/or solar generation in the same modeled generation station and interconnected at the same Point of Interconnection (POI), and where these technologies are interconnected within the site using direct current (DC) equipment. The combined technologies are then connected to the ERCOT System using the same direct current-to-alternating current (DC-to-AC) inverter(s). To be classified as a DC-Coupled Resource, the generator(s) and ESS(s) at a site must meet the following conditions:

(1) The ESS component of the Resource must have a nameplate rating of at least ten MW and ten MWh, or the MW rating must equal or exceed 50% of the nameplate MW rating of the inverter; and

(2) All intermittent renewable generators must meet the conditions for aggregation stated in paragraph (12) of Section 3.10.7.2, Modeling of Resources and Transmission Loads, except to the extent any such condition requires the generator to be a Resource.

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| ***[NPRR1016: Insert the following definition “Distribution Energy Storage Resource (DESR)” upon system implementation:]******Distribution Energy Storage Resource (DESR)***An Energy Storage Resource (ESR) connected to the Distribution System that is either: (1) Greater than ten MW and not registered with the Public Utility Commission of Texas (PUCT) as a self-generator; or(2) Greater than one MW that chooses to register as a Resource with ERCOT to participate in the ERCOT markets. |

***Generation Resource***

A generator capable of providing energy or Ancillary Service to the ERCOT System and is registered with ERCOT as a Generation Resource.

***Distribution Generation Resource (DGR)***

A Generation Resource connected to the Distribution System that is either:

(1) Greater than ten MW and not registered with the Public Utility Commission of Texas (PUCT) as a self-generator; or

(2) Ten MW or less that chooses to register as a Generation Resource to participate in the ERCOT markets.

DGRs must be registered with ERCOT in accordance with Planning Guide Section 6.8.2, Resource Registration Process, and will be modeled in ERCOT systems in accordance with Section 3.10.7.2, Modeling of Resources and Transmission Loads.

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| ***[NPRR1016: Replace the definition “Distribution Generation Resource (DGR)” above with the following upon system implementation:]******Distribution Generation Resource (DGR)***A Generation Resource connected to the Distribution System that is either: (1) Greater than ten MW and not registered with the Public Utility Commission of Texas (PUCT) as a self-generator; or(2) Greater than one MW that chooses to register as a Generation Resource to participate in the ERCOT markets. |

***Transmission Generation Resource (TGR)***

A Generation Resource connected to the ERCOT transmission system that is either:

(1) Greater than ten MW and not registered with the Public Utility Commission of Texas (PUCT) as a self-generator; or

(2) Ten MW or less that chooses to register as a Generation Resource to participate in the ERCOT markets.

TGRs must be registered with ERCOT in accordance with Planning Guide Section 6.8.2, Resource Registration Process, and will be modeled in ERCOT systems in accordance with Section 3.10.7.2, Modeling of Resources and Transmission Loads.

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| ***[NPRR1016: Replace the definition “Transmission Generation Resource (TGR)” above with the following upon system implementation:]******Transmission Generation Resource (TGR)***A Generation Resource connected to the ERCOT transmission system that is either: (1) Greater than ten MW and not registered with the Public Utility Commission of Texas (PUCT) as a self-generator; or (2) Greater than one MW that chooses to register as a Generation Resource to participate in the ERCOT markets. |

***Load Resource***

A Load capable of providing Ancillary Service to the ERCOT System and/or energy in the form of Demand response and registered with ERCOT as a Load Resource.

***Aggregate Load Resource (ALR)***

A Load Resource that is an aggregation of individual metered sites, each of which has less than ten MW of Demand response capability and all of which are located within a single Load Zone.

***Controllable Load Resource***

A Load Resource capable of controllably reducing or increasing consumption under Dispatch control by ERCOT.

***Settlement Only Generator (SOG)***

A generator that is settled for exported energy only, but may not participate in the Ancillary Services market, Reliability Unit Commitment (RUC), Security-Constrained Economic Dispatch (SCED), or make energy offers. These units are comprised of:

***Settlement Only Distribution Generator (SODG)***

A generator that is connected to the Distribution System with a rating of:

(1) One MW or less that chooses to register as an SODG; or

(2) Greater than one and up to ten MW that is capable of providing a net export to the ERCOT System and does not register as a Distribution Generation Resource (DGR).

SODGs must be registered with ERCOT in accordance with Planning Guide Section 6.8.2, Resource Registration Process, and will be modeled in ERCOT systems for reliability in accordance with Section 3.10.7.2, Modeling of Resources and Transmission Loads.

***Settlement Only Transmission Generator (SOTG)***

A generator that is connected to the ERCOT transmission system with a rating of ten MW or less and is registered with the Public Utility Commission of Texas (PUCT) as a power generation company. SOTGs must be registered with ERCOT in accordance with Planning Guide Section 6.8.2, Resource Registration Process, and may be modeled in ERCOT systems for reliability in accordance with Section 3.10.7.2, Modeling of Resources and Transmission Loads.

***Settlement Only Transmission Self-Generator (SOTSG)***

A generator that is connected to the ERCOT transmission system with a rating of one MW or more and is registered with the Public Utility Commission of Texas (PUCT) as a self-generator. SOTSGs must be registered with ERCOT in accordance with Planning Guide Section 6.8.2, Resource Registration Process, and will be modeled in ERCOT systems for reliability in accordance with Section 3.10.7.3, Modeling of Private Use Networks.

3.2.1 Calculation of Aggregate Resource Capacity

(1) ERCOT shall use Outages in the Outage Scheduler and, when applicable, the Resource Status from the Current Operating Plan (COP) to calculate the aggregate capacity from Generation Resources, Energy Storage Resources (ESRs), and Load Resources projected to be available in the ERCOT Region and in Forecast Zones in ERCOT. “Forecast Zones” have the same boundaries as the 2003 ERCOT Congestion Management Zones (CMZs). Each Resource will be mapped to a Forecast Zone during the registration process.

(2) Monthly, ERCOT shall calculate the aggregate weekly Generation Resource capacity and ESR capacity for the ERCOT Region and the Forecast Zones projected to be available during the ERCOT Region peak Load hour of each week for the following 36 months, starting with the second week and the aggregate weekly Load Resource capacity for the ERCOT Region projected to be available during the ERCOT Region peak Load hour of each week for the following 36 months, starting with the second week.

(3) On a rolling hourly basis, ERCOT shall calculate the aggregate hourly Generation Resource capacity, ESR capacity, and Load Resource capacity in the ERCOT Region and Forecast Zones projected to be available during each hour for the following seven days.

(4) Projections of generation capacity from Intermittent Renewable Resources (IRRs) and the intermittent renewable generation components of DC-Coupled Resources shall be consistent with capacity availability estimates, such as the effective Load carrying capability of wind, developed jointly between ERCOT and the appropriate Technical Advisory Committee (TAC) subcommittee and approved by the ERCOT Board or typical production expectations consistent with expected wind profiles as appropriate for the scenario being studied.

(5) ERCOT shall publish procedures describing the IRR forecasting process on the Market Information System (MIS) Public Area.

***3.2.3 System Adequacy Reports***

(1) ERCOT shall publish system adequacy reports to assess the adequacy of Resources and Transmission Facilities to meet the projected Demand. ERCOT shall provide reports on a system-wide basis and by Forecast Zone, where applicable.

(2) ERCOT shall generate and post short-term adequacy reports on the MIS Public Area. ERCOT shall update these reports hourly following updates to the Seven-Day Load Forecast, except where noted otherwise. The short-term adequacy reports will provide:

(a) For Generation Resources, the available On-Line Resource capacity for each hour, using the COP for the first seven days and considering Resources with a COP Resource Status listed in paragraph (5)(b)(i) of Section 3.9.1, Current Operating Plan (COP) Criteria;

(b) ERCOT shall post a total system-wide capacity of Resource Outages as reflected in the Outage Scheduler that are accepted or approved. The Resource Outage capacity amount shall be based from each Resource’s current Seasonal High Sustained Limit (HSL) and posted each hour for the top of each Operating Hour for the next 168 hours. This posted information will exclude specific Resource information and Outages related to Mothballed or Decommissioned Generation Resources, and will be aggregated on a system-wide basis in three categories:

(i) IRRs and the intermittent renewable generation component of each DC-Coupled Resource with an Outage Scheduler nature of work other than “New Equipment Energization”;

(ii) Other Resources with an Outage Scheduler nature of work other than “New Equipment Energization”; and

(iii) Resources with an Outage Scheduler nature of work “New Equipment Energization”;

(c) For Load Resources, the available capacity for each hour using the COP for the first seven days and considering Resources with a COP Resource Status of ONL;

(d) The total capability of Resources available to provide the following Ancillary Service combinations, using COPs submitted by QSEs for the first seven days and capped by the COP limits for individual Resources. A Resource’s capability shall only be included in the sums below if the Resource Status allows the Resource to provide at least one of the Ancillary Services within the sum:

(i) Capacity to provide Reg-Up, irrespective of whether it is capable of providing any other Ancillary Service;

(ii) Capacity to provide RRS, irrespective of whether it is capable of providing any other Ancillary Service;

(iii) Capacity to provide ECRS, irrespective of whether it is capable of providing any other Ancillary Service;

(iv) Capacity to provide Non-Spin, irrespective of whether it is capable of providing any other Ancillary Service;

(v) Capacity to provide Reg-Up, RRS, or both, irrespective of whether it is capable of providing ECRS or Non-Spin;

(vi) Capacity to provide Reg-Up, RRS, ECRS, or any combination, irrespective of whether it is capable of providing Non-Spin;

(vii) Capacity to provide Reg-Up, RRS, ECRS, Non-Spin, or any combination; and

(viii) Capacity to provide Reg-Down;

(e) Forecast Demand for each hour described in Section 3.2.2, Demand Forecasts;

(f) Ancillary Service requirements for the Operating Day and subsequent days, updated daily;

(g) Transmission constraints that have a high probability of being binding in Security-Constrained Economic Dispatch (SCED) or Day-Ahead Market (DAM) given the forecasted system conditions for each week including the effects of any transmission or Resource Outages. The binding constraints may not be updated every hour;

(h) For Generation Resources, the available Off-Line Resource capacity that can be started for each hour, using the COP for the first seven days and considering Resources with a COP Resource Status of OFF and temporal constraints; and

(i) Following each Hourly Reliability Unit Commitment (HRUC), the available On-Line capacity from Generation Resources, based on Real-Time telemetry, for which the COP Resource Status is OFF, OUT, or EMR for all hours within the HRUC Study Period. The available On-Line capacity will consider those Resources with a Real-Time Resource Status listed in paragraph (5)(b)(i) of Section 3.9.1 excluding SHUTDOWN.

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| ***[NPRR962, NPRR974, and NPRR978: Replace applicable portions of Section 3.2.3 above with the following upon system implementation:]******3.2.3 Short-Term System Adequacy Reports***(1) ERCOT shall generate and post short-term adequacy reports on the MIS Public Area. ERCOT shall update these reports hourly following updates to the Seven-Day Load Forecast, except where noted otherwise. The short-term adequacy reports will provide:(a) For Generation Resources, the available On-Line Resource capacity for each hour, aggregated by Load Zone, using the COP for the first seven days and considering Resources with a COP Resource Status listed in paragraph (5)(b)(i) of Section 3.9.1, Current Operating Plan (COP) Criteria;(b) The total system-wide capacity of Resource Outages as reflected in the Outage Scheduler that are accepted or approved. The Resource Outage capacity amount shall be based from each Resource’s current Seasonal High Sustained Limit (HSL) and posted each hour for the top of each Operating Hour for the next 168 hours. This posted information will exclude specific Resource information and Outages related to Mothballed or Decommissioned Generation Resources, and will be aggregated on a Load Zone basis in three categories:(i) IRRs and the intermittent renewable generation component of each DC-Coupled Resource with an Outage Scheduler nature of work other than “New Equipment Energization”; (ii) Other Resources with an Outage Scheduler nature of work other than “New Equipment Energization”; and(iii) Resources with an Outage Scheduler nature of work “New Equipment Energization”;(c) For Load Resources, the available capacity for each hour aggregated by Load Zone, using the COP for the first seven days and considering Resources with a COP Resource Status of ONL;(d) The total capability of Resources available to provide the following Ancillary Service combinations, using COPs submitted by QSEs for the first seven days and capped by the COP limits for individual Resources. A Resource’s capability shall only be included in the sums below if the Resource Status allows the Resource to provide at least one of the Ancillary Services within the sum:(i) Capacity to provide Reg-Up, irrespective of whether it is capable of providing any other Ancillary Service;(ii) Capacity to provide RRS, irrespective of whether it is capable of providing any other Ancillary Service;(iii) Capacity to provide ECRS, irrespective of whether it is capable of providing any other Ancillary Service;(iv) Capacity to provide Non-Spin, irrespective of whether it is capable of providing any other Ancillary Service;(v) Capacity to provide Reg-Up, RRS, or both, irrespective of whether it is capable of providing ECRS or Non-Spin;(vi) Capacity to provide Reg-Up, RRS, ECRS, or any combination, irrespective of whether it is capable of providing Non-Spin;(vii) Capacity to provide Reg-Up, RRS, ECRS, Non-Spin, or any combination; and(viii) Capacity to provide Reg-Down;(e) Forecast Demand for each hour described in Section 3.2.2, Demand Forecasts;(f) For Generation Resources, the available Off-Line Resource capacity that can be started for each hour, aggregated by Load Zone, using the COP for the first seven days and considering Resources with a COP Resource Status of OFF and temporal constraints; and(g) Following each Hourly Reliability Unit Commitment (HRUC), the available On-Line capacity from Generation Resources, aggregated by Load Zone, based on Real-Time telemetry, for which the COP Resource Status is OFF, OUT, or EMR for all hours within the HRUC Study Period. The available On-Line capacity will consider those Resources with a Real-Time Resource Status listed in paragraph (5)(b)(i) of Section 3.9.1 excluding SHUTDOWN. (h) For each Direct Current Tie (DC Tie), the sum of any ERCOT-approved DC Tie Schedules for each 15-minute interval for the first seven days. The sum shall be displayed as an absolute value and classified as a net import or net export.(i) The available capacity for each hour for the next seven days. For day one, and for day two following the execution of the Day-Ahead Reliability Unit Commitment (DRUC) on day one, the available capacity will be the sum of the values calculated in paragraphs (a) and (e) above, except that for IRRs the forecasted output will be used instead of COP values, and DC Tie Exports will be subtracted. For the remaining hours of the seven days, the available capacity will be calculated as the sum of the Seasonal HSLs for non-IRR Generation Resources including seasonal Private Use Network capacity and the forecasted output for IRRs minus the total capacity of accepted or approved Resource Outages.(j) The available capacity for reserves for each hour, which will be the available capacity calculated in paragraph (h) above minus the forecasted Demand for that hour.  |

3.8.6 Energy Storage Resources

(1) The Resource Entity and QSE representing an Energy Storage Resource (ESR) which is

jointly registered with ERCOT as a Generation Resource and a Controllable Load

Resource, pursuant to paragraph (6) of Section 16.5, Registration of a Resource Entity,

are responsible for following all requirements in these Protocols associated with

Generation Resources and Controllable Load Resources.

***3.8.7 DC-Coupled Resources***

(1) A DC-Coupled Resource shall be treated in the same manner as an Energy Storage Resource (ESR) for the purposes of determining Set Point Deviation Charges, as described in Section 6.6.5, Set Point Deviation Charge, and Energy Storage Resource Energy Deployment Performance (ESREDP), as described in Section 8.1.1.4.1, Regulation Service and Generation Resource/Controllable Load Resource/Energy Storage Resource Energy Deployment Performance, under one of the following conditions:

(a) The Resource was awarded Ancillary Service;

(b) The Resource’s instantaneous MW Injection or MW Withdrawal includes non-zero MW from the ESS component of the DC-Coupled Resource; or

(c) The Resource’s telemetered HSL or LSL includes the ESS capability.

(2) At all other times, a DC-Coupled Resource shall be treated in the same manner as an IRR for the purposes of determining Set Point Deviation Charges, as described in Section 6.6.5, and ESREDP, as described in Section 8.1.1.4.1.

(3) A QSE representing a DC-Coupled Resource that does not meet any of the conditions in paragraph (1) above:

(a) Shall set the Resource’s telemetered HSL equal to the current net output capability of the intermittent renewable generation component of the DC-Coupled Resource; and

(b) Shall set the Resource’s output at or below the SCED Base Point telemetered by ERCOT if the Resource receives a flag indicating that SCED has dispatched it below the Resource’s HDL used by SCED.

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

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

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

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

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

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

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

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(E) 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);

(F) 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);

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

(H) SHUTDOWN – The Resource is On-Line and in a shutdown sequence, and is not eligible for an Ancillary Service award. This Resource Status is only to be used for Real-Time telemetry purposes;

(I) STARTUP – The Resource is On-Line and in a start-up sequence and is not eligible for an Ancillary Service award, unless coming On-Line in response to a manual deployment of ERCOT Contingency Reserve Service (ECRS) or Non-Spinning Reserve (Non-Spin). This Resource Status is only to be used for Real-Time telemetry purposes;

(J) OFFQS – Off-Line but available for SCED deployment and to provide ECRS and Non-Spin, if qualified and capable. Only qualified Quick Start Generation Resources (QSGRs) may utilize this status;

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(K) ONSC – Resource is On-Line operating as a synchronous condenser and available to provide Responsive Reserve (RRS) and ECRS, if qualified and capable, and for commitment by RUC, but is unavailable for Dispatch by SCED. For SCED, Resource Base Points will be set equal to the telemetered net real power of the Resource available at the time of the SCED execution; and

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

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

(A) OUT – Off-Line and unavailable;

(B) OFF – Off-Line but available for commitment in the Day-Ahead Market (DAM), RUC, and providing Non-Spin, if qualified and capable;

(C) EMR – Available for commitment as a Resource contracted by ERCOT under Section 3.14.1, Reliability Must Run, or under paragraph (2) of Section 6.5.1.1, ERCOT Control Area Authority, or available for commitment only for ERCOT-declared Emergency Condition events; the QSE may appropriately set LSL and HSL to reflect operating limits; and

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

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

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(A) OUTL – Not available;

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(B) ONL – On-Line and available for Dispatch by SCED or providing Ancillary Services.

(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;

(c) The HSL;

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

(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); and

(ii) For ESRs, the LSL may be positive;

(e) The High Emergency Limit (HEL);

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

(g) Ancillary Service capability in MW for each product and sub-type.

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(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 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). 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 (2) 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 (2) 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.

(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.

**3.13 Renewable Production Potential Forecasts**

(1) ERCOT shall produce forecasts of Renewable Production Potential (RPP) for Wind-powered Generation Resources (WGRs), PhotoVoltaic Generation Resources (PVGRs), and the intermittent renewable generation component of each DC-Coupled Resource to be used as an input into the Day-Ahead Reliability Unit Commitment (DRUC) and Hour-Ahead Reliability Unit Commitment (HRUC). ERCOT shall produce the forecasts using information provided by WGRs, PVGRs, and DC-Coupled Resources; meteorological information; and Supervisory Control and Data Acquisition (SCADA). A Resource Entity with a WGR, PVGR, or DC-Coupled Resource shall install equipment to enable telemetry of site-specific meteorological information that ERCOT determines is necessary to produce the RPP forecast, and the Resource Entity’s QSE shall telemeter such information and Resource status information to ERCOT. ERCOT shall post forecasts for each WGR and PVGR and for the intermittent renewable generation component of each DC-Coupled Resource to the MIS Certified Area for the Qualified Scheduling Entity (QSE) representing that WGR, PVGR, or DC-Coupled Resource. QSEs shall use the ERCOT-provided forecasts for WGRs, PVGRs, and DC-Coupled Resources in the Day-Ahead and throughout the Operating Day for applicable markets and Reliability Unit Commitments (RUCs). Similar requirements for run-of-the-river hydro must be developed as needed.

(2) ERCOT shall develop cost-effective tools or services to forecast energy production from Intermittent Renewable Resources (IRRs) and from the intermittent renewable generation component of each DC-Coupled Resource with technical assistance from QSEs representing such Resources. ERCOT shall use its best efforts to develop accurate and unbiased forecasts, as limited by the availability of relevant explanatory data. ERCOT shall post on the MIS Secure Area objective criteria and thresholds for unbiased, accurate forecasts within five Business Days of change.

**3.15 Voltage Support**

(1) ERCOT, in coordination with the Transmission Service Providers (TSPs), shall establish and update, as necessary, the ERCOT System Voltage Profile and shall post it on the Market Information System (MIS) Secure Area. ERCOT, the interconnecting TSP, or that TSP’s agent, may modify the Voltage Set Point described in the Voltage Profile based on current system conditions.

(2) All Generation Resources (including self-serve generating units) that have a gross generating unit rating greater than 20 MVA or those units connected at the same Point of Interconnection (POI) that have gross generating unit ratings aggregating to greater than 20 MVA, that supply power to the ERCOT Transmission Grid, shall provide Voltage Support Service (VSS).

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| ***[NPRR989 and NPRR1016: Replace applicable portions of paragraph (2) above with the following upon system implementation:]***(2) All Generation Resources (including self-serve generating units) and Energy Storage Resources (ESRs) that are connected to Transmission Facilities and that have a gross unit rating greater than 20 MVA or those units connected at the same Point of Interconnection (POI) that have gross unit ratings aggregating to greater than 20 MVA, that supply power to the ERCOT Transmission Grid, shall provide Voltage Support Service (VSS). |

(3) Except as reasonably necessary to ensure reliability or operational efficiency, TSPs should utilize available static reactive devices prior to requesting a Voltage Set Point change from a Generation Resource.

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| ***[NPRR989: Replace paragraph (3) above with the following upon system implementation:]***(3) Except as reasonably necessary to ensure reliability or operational efficiency, TSPs should utilize available static reactive devices prior to requesting a Voltage Set Point change from a Generation Resource or ESR. |

(4) Each Generation Resource required to provide VSS shall comply with the following Reactive Power requirements in Real-Time operations when issued a Voltage Set Point by a TSP or ERCOT:

(a) An over-excited (lagging or producing) power factor capability of 0.95 or less determined at the generating unit's maximum net power to be supplied to the ERCOT Transmission Grid and for any Voltage Set Point from 0.95 per unit to 1.04 per unit, as measured at the POI;

(b) An under-excited (leading or absorbing) power factor capability of 0.95 or less, determined at the generating unit's maximum net power to be supplied to the ERCOT Transmission Grid and for any Voltage Set Point from 1.0 per unit to 1.05 per unit, as measured at the POI;

(c) For any Voltage Set Point outside of the voltage ranges described in paragraphs (a) and (b) above, the Generation Resource shall supply or absorb the maximum amount of Reactive Power available within its inherent capability and the capability of any VAr-capable devices as necessary to achieve the Voltage Set Point;

(d) When a Generation Resource required to provide VSS is issued a new Voltage Set Point, that Generation Resource shall make adjustments in response to the new Voltage Set Point, regardless of whether the current voltage is within the tolerances identified in paragraph (4) of Nodal Operating Guide Section 2.7.3.5, Resource Entity Responsibilities and Generation Resource Requirements;

(e) Reactive Power capability shall be available at all MW output levels and may be met through a combination of the Generation Resource’s Unit Reactive Limit (URL), which is the generating unit’s dynamic leading and lagging operating capability, and/or dynamic VAr-capable devices. This Reactive Power profile is depicted graphically as a rectangle. For Intermittent Renewable Resources (IRRs), the Reactive Power requirements shall be available at all MW output levels at or above 10% of the IRR’s nameplate capacity. When an IRR is operating below 10% of its nameplate capacity and is unable to support voltage at the POI, ERCOT, the interconnecting TSP, or that TSP’s agent may require an IRR to disconnect from the ERCOT System for purposes of maintaining reliability;

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| ***[NPRR989: Replace paragraph (4) above with the following upon system implementation:]***(4) Each Generation Resource and ESR required to provide VSS shall comply with the following Reactive Power requirements in Real-Time operations when issued a Voltage Set Point by a TSP or ERCOT: (a) An over-excited (lagging or producing) power factor capability of 0.95 or less determined at the unit's maximum net power to be supplied to the ERCOT Transmission Grid and for any Voltage Set Point from 0.95 per unit to 1.04 per unit, as measured at the POI;(b) An under-excited (leading or absorbing) power factor capability of 0.95 or less, determined at the unit's maximum net power to be supplied to the ERCOT Transmission Grid and for any Voltage Set Point from 1.0 per unit to 1.05 per unit, as measured at the POI; (c) For any Voltage Set Point outside of the voltage ranges described in paragraphs (a) and (b) above, the Generation Resource or ESR shall supply or absorb the maximum amount of Reactive Power available within its inherent capability and the capability of any VAr-capable devices as necessary to achieve the Voltage Set Point;(d) When a Generation Resource or an ESR required to provide VSS is issued a new Voltage Set Point, that Generation Resource or ESR shall make adjustments in response to the new Voltage Set Point, regardless of whether the current voltage is within the tolerances identified in paragraph (4) of Nodal Operating Guide Section 2.7.3.5, Resource Entity Responsibilities and Generation Resource and Energy Storage Resource Requirements;(e) For Generation Resources, the Reactive Power capability shall be available at all MW output levels and may be met through a combination of the Generation Resource’s Corrected Unit Reactive Limit (CURL), which is the generating unit’s dynamic leading and lagging operating capability, and/or dynamic VAr-capable devices. This Reactive Power profile is depicted graphically as a rectangle. For Intermittent Renewable Resources (IRRs), the Reactive Power requirements shall be available at all MW output levels at or above 10% of the IRR’s nameplate capacity. When an IRR is operating below 10% of its nameplate capacity and is unable to support voltage at the POI, ERCOT, the interconnecting TSP, or that TSP’s agent may require an IRR to disconnect from the ERCOT System for purposes of maintaining reliability. For ESRs, the Reactive Power capability shall be available at all MW levels, when charging or discharging, and may be met through a combination of the ESR’s CURL, and/or dynamic VAr-capable devices. For any ESR that achieved Initial Synchronization before December 16, 2019, the requirement to have Reactive Power capability when charging does not apply if the Resource Entity for the ESR has submitted a notarized attestation to ERCOT stating that, since the date of Initial Synchronization, the ESR has been unable to comply with this requirement without physical or software changes/modifications, and ERCOT has provided written confirmation of the exemption to the Resource Entity. The exemption shall apply only to the extent of the ESR’s inability to comply with the requirement when the ESR is charging. |

(5) As part of the technical Resource testing requirements prior to the Resource Commissioning Date, all Generation Resources must conduct an engineering study, and demonstrate through performance testing, the ability to comply with the Reactive Power capability requirements in paragraph (4), (7), (8), or (9) of this Section, as applicable. Any study and testing results must be accepted by ERCOT prior to the Resource Commissioning Date.

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| ***[NPRR989: Replace paragraph (5) above with the following upon system implementation:]***(5) As part of the technical Resource testing requirements prior to the Resource Commissioning Date, all Generation Resources and ESRs must conduct an engineering study, and demonstrate through performance testing, the ability to comply with the Reactive Power capability requirements in paragraph (4), (7), (8), or (9) of this Section, as applicable. Any study and testing results must be accepted by ERCOT prior to the Resource Commissioning Date. |

(6) Except for a Generation Resource subject to Planning Guide Section 5.1.1, Applicability, a Generation Resource that has already been commissioned is not required to submit a new reactive study or conduct commissioning-related reactive testing, as described in paragraph (5) above.

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| ***[NPRR989: Replace paragraph (6) above with the following upon system implementation:]***(6) Except for a Generation Resource or an ESR subject to Planning Guide Section 5.1.1, Applicability, a Generation Resource or an ESR that has already been commissioned is not required to submit a new reactive study or conduct commissioning-related reactive testing, as described in paragraph (5) above. |

(7) Wind-powered Generation Resources (WGRs) that commenced operation on or after February 17, 2004, and have a signed Standard Generation Interconnection Agreement (SGIA) on or before December 1, 2009 (“Existing Non-Exempt WGRs”), must be capable of producing a defined quantity of Reactive Power to maintain a set point in the Voltage Profile established by ERCOT in accordance with the Reactive Power requirements established in paragraph (4) above, except in the circumstances described in paragraph (a) below.

(a) Existing Non-Exempt WGRs whose current design does not allow them to meet the Reactive Power requirements established in paragraph (4) above must conduct an engineering study using the Summer/Fall 2010 on-peak/off-peak Voltage Profiles, or conduct performance testing to determine their actual Reactive Power capability. Any study or testing results must be accepted by ERCOT. The Reactive Power requirements applicable to these Existing Non-Exempt WGRs will be the greater of: the leading and lagging Reactive Power capabilities established by the Existing Non-Exempt WGR’s engineering study or testing results; or Reactive Power proportional to the real power output of the Existing Non-Exempt WGR (this Reactive Power profile is depicted graphically as a triangle) sufficient to provide an over-excited (lagging) power factor capability of 0.95 or less and an under-excited (leading) power factor capability of 0.95 or less, both determined at the WGR’s set point in the Voltage Profile established by ERCOT, and both measured at the POI.

(i) Existing Non-Exempt WGRs shall submit the engineering study results or testing results to ERCOT no later than five Business Days after its completion.

(ii) Existing Non-Exempt WGRs shall update any and all Resource Registration data regarding their Reactive Power capability documented by the engineering study results or testing results.

(iii) If the Existing Non-Exempt WGR’s engineering study results or testing results indicate that the WGR is not able to provide Reactive Power capability that meets the triangle profile described in paragraph (a) above, then the Existing Non-Exempt WGR will take steps necessary to meet that Reactive Power requirement depicted graphically as a triangle by a date mutually agreed upon by the Existing Non-Exempt WGR and ERCOT. The Existing Non-Exempt WGR may meet the Reactive Power requirement through a combination of the WGR’s URL and/or automatically switchable static VAr-capable devices and/or dynamic VAr-capable devices. No later than five Business Days after completion of the steps to meet that Reactive Power requirement, the Existing Non-Exempt WGR will update any and all Resource Registration data regarding its Reactive Power and provide written notice to ERCOT that it has completed the steps necessary to meet its Reactive Power requirement.

(iv) For purposes of measuring future compliance with Reactive Power requirements for Existing Non-Exempt WGRs, results from performance testing or the Summer/Fall 2010 on-peak/off-peak Voltage Profiles utilized in the Existing Non-Exempt WGR’s engineering study shall be the basis for measuring compliance, even if the Voltage Profiles provided to the Existing Non-Exempt WGR are revised for other purposes.

(b) Existing Non-Exempt WGRs whose current design allows them to meet the Reactive Power requirements established in paragraph (4) above (depicted graphically as a rectangle) shall continue to comply with that requirement. ERCOT, with cause, may request that these Existing Non-Exempt WGRs provide further evidence, including an engineering study, or performance testing, to confirm accuracy of Resource Registration data supporting their Reactive Power capability.

(8) Qualified Renewable Generation Resources (as described in Section 14, State of Texas Renewable Energy Credit Trading Program) in operation before February 17, 2004, required to provide VSS and all other Generation Resources required to provide VSS that were in operation prior to September 1, 1999, whose current design does not allow them to meet the Reactive Power requirements established in paragraph (4) above, will be required to maintain a Reactive Power requirement as defined by the Generation Resource’s URL that was submitted to ERCOT and established per the criteria in the ERCOT Operating Guides.

(9) New generating units connected before May 17, 2005, whose owners demonstrate to ERCOT’s satisfaction that design and/or equipment procurement decisions were made prior to February 17, 2004, based upon previous standards, whose design does not allow them to meet the Reactive Power requirements established in paragraph (4) above, will be required to maintain a Reactive Power requirement as defined by the Generation Resource’s URL that was submitted to ERCOT and established per the criteria in the Operating Guides.

(10) For purposes of meeting the Reactive Power requirements in paragraphs (4) through (9) above, multiple generation units including IRRs shall, at a Generation Entity’s option, be treated as a single Generation Resource if the units are connected to the same transmission bus.

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| ***[NPRR989: Replace paragraph (10) above with the following upon system implementation:]***(10) For purposes of meeting the Reactive Power requirements in paragraphs (4) through (9) above, multiple units including IRRs shall, at a Resource Entity’s option, be treated as a single Resource if the units are connected to the same transmission bus. |

(11) Generation Entities may submit to ERCOT specific proposals to meet the Reactive Power requirements established in paragraph (4) above by employing a combination of the URL and added VAr capability, provided that the added VAr capability shall be automatically switchable static and/or dynamic VAr devices. A Generation Resource and TSP may enter into an agreement in which the proposed static VAr devices can be switchable using Supervisory Control and Data Acquisition (SCADA). ERCOT may, at its sole discretion, either approve or deny a specific proposal, provided that in either case, ERCOT shall provide the submitter an explanation of its decision.

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| ***[NPRR989: Replace paragraph (11) above with the following upon system implementation:]***(11) Resource Entities may submit to ERCOT specific proposals to meet the Reactive Power requirements established in paragraph (4) above by employing a combination of the CURL and added VAr capability, provided that the added VAr capability shall be automatically switchable static and/or dynamic VAr devices. A Resource Entity and TSP may enter into an agreement in which the proposed static VAr devices can be switchable using Supervisory Control and Data Acquisition (SCADA). ERCOT may, at its sole discretion, either approve or deny a specific proposal, provided that in either case, ERCOT shall provide the submitter an explanation of its decision. |

(12) A Generation Resource and TSP may enter into an agreement in which the Generation Resource compensates the TSP to provide VSS to meet the Reactive Power requirements of paragraph (4) above in part or in whole. The TSP shall certify to ERCOT that the agreement complies with the Reactive Power requirements of paragraph (4).

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| ***[NPRR989: Replace paragraph (12) above with the following upon system implementation:]***(12) A Resource Entity and TSP may enter into an agreement in which the Generation Resource or ESR compensates the TSP to provide VSS to meet the Reactive Power requirements of paragraph (4) above in part or in whole. The TSP shall certify to ERCOT that the agreement complies with the Reactive Power requirements of paragraph (4). |

(13) Unless specifically approved by ERCOT, no unit equipment replacement or modification at a Generation Resource shall reduce the capability of the unit below the Reactive Power requirements that applied prior to the replacement or modification.

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| ***[NPRR989: Replace paragraph (13) above with the following upon system implementation:]***(13) Unless specifically approved by ERCOT, no unit equipment replacement or modification at a Generation Resource or ESR shall reduce the capability of the unit below the Reactive Power requirements that applied prior to the replacement or modification. |

(14) Generation Resources shall not reduce high reactive loading on individual units during abnormal conditions without the consent of ERCOT unless equipment damage is imminent.

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| ***[NPRR989: Replace paragraph (14) above with the following upon system implementation:]***(14) Generation Resources or ESRs shall not reduce high reactive loading on individual units during abnormal conditions without the consent of ERCOT unless equipment damage is imminent. |

(15) All WGRs must provide a Real-Time SCADA point that communicates to ERCOT the number of wind turbines that are available for real power and/or Reactive Power injection into the ERCOT Transmission Grid. WGRs must also provide two other Real-Time SCADA points that communicate to ERCOT the following:

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| ***[NPRR989: Replace paragraph (15) above with the following upon system implementation:]***(15) All WGRs must provide a Real-Time SCADA point that communicates to ERCOT the number of wind turbines that are available for real power and Reactive Power injection into the ERCOT Transmission Grid. WGRs must also provide two other Real-Time SCADA points that communicate to ERCOT the following: |

(a) The number of wind turbines that are not able to communicate and whose status is unknown; and

(b) The number of wind turbines out of service and not available for operation.

(16) All PhotoVoltaic Generation Resources (PVGRs) must provide a Real-Time SCADA point that communicates to ERCOT the capacity of PhotoVoltaic (PV) equipment that is available for real power and/or Reactive Power injection into the ERCOT Transmission Grid. PVGRs must also provide two other Real-Time SCADA points that communicate to ERCOT the following:

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| ***[NPRR989: Replace paragraph (16) above with the following upon system implementation:]***(16) All PhotoVoltaic Generation Resources (PVGRs) must provide a Real-Time SCADA point that communicates to ERCOT the capacity of PhotoVoltaic (PV) equipment that is available for real power and Reactive Power injection into the ERCOT Transmission Grid. PVGRs must also provide two other Real-Time SCADA points that communicate to ERCOT the following: |

(a) The capacity of PV equipment that is not able to communicate and whose status is unknown; and

(b) The capacity of PV equipment that is out of service and not available for operation.

(17) Each DC-Coupled Resource must provide a Real-Time SCADA point that communicates to ERCOT the capacity of the intermittent renewable generation component of the Resource that is available for real power and/or Reactive Power injection into the ERCOT System. Each DC-Coupled Resource must also provide Real-Time SCADA points that communicate to ERCOT the following:

(a) The capacity of any PV generation equipment that is not able to communicate and whose status is unknown;

(b) The capacity of any PV generation equipment that is out of service and not available for operation;

(c) The number of any wind turbines that are not able to communicate and whose status is unknown; and

(d) The number of any wind turbines out of service and not available for operation.

 (18) For the purpose of complying with the Reactive Power requirements under this Section 3.15, Reactive Power losses that occur on privately-owned transmission lines behind the POI may be compensated by automatically switchable static VAr-capable devices.

***4.2.2 Wind-Powered Generation Resource Production Potential***

(1) ERCOT shall produce and update hourly a Short-Term Wind Power Forecast (STWPF) that provides a rolling 168-hour hourly forecast of wind production potential for each Wind-powered Generation Resource (WGR) and for each wind generation component of a DC-Coupled Resource. ERCOT shall produce and post to the MIS Public Area an Intra-Hour Wind Power Forecast (IHWPF) by wind region that provides a rolling two hour five minute forecast of ERCOT-wide wind production potential. ERCOT shall produce and update an hourly Total ERCOT Wind Power Forecast (TEWPF) providing a probability distribution of the hourly production potential from all wind-power in ERCOT for each of the next 168 hours. A Resource Entity with a WGR or DC-Coupled Resource that has a wind generation component shall install equipment to enable telemetry of site-specific meteorological information that ERCOT determines is necessary to produce the STWPF and TEWPF forecasts, and the Resource Entity’s QSE shall telemeter such information and Resource status information to ERCOT. ERCOT shall establish procedures specifying the accuracy requirements of meteorological information telemetry for WGRs and DC-Coupled Resources with a wind generation component.

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| ***[NPRR935: Replace paragraph (1) above with the following upon system implementation:]***(1) ERCOT shall produce and update hourly a Short-Term Wind Power Forecast (STWPF) that provides a rolling 168-hour hourly forecast of wind production potential for each Wind-powered Generation Resource (WGR) and for each wind generation component of a DC-Coupled Resource. ERCOT shall produce and post to the MIS Public Area every five minutes an Intra-Hour Wind Power Forecast (IHWPF) by wind region that provides a forecast of ERCOT-wide wind production potential for each five-minute interval over the next two hours from each forecast model. The posting shall indicate which forecast model was being used by ERCOT for Generation To Be Dispatched (GTBD) calculation purposes. ERCOT shall produce and update an hourly Total ERCOT Wind Power Forecast (TEWPF) providing a probability distribution of the hourly production potential from all wind-power in ERCOT for each of the next 168 hours. A Resource Entity with a WGR or DC-Coupled Resource that has a wind generation component shall install equipment to enable telemetry of site-specific meteorological information that ERCOT determines is necessary to produce the STWPF and TEWPF forecasts, and the Resource Entity’s QSE shall telemeter such information and Resource status information to ERCOT. ERCOT shall establish procedures specifying the accuracy requirements of meteorological information telemetry for WGRs and DC-Coupled Resources with a wind generation component. |

(2) ERCOT shall use the probabilistic TEWPF and select the forecast that the actual total ERCOT production of WGRs and the wind generation components of all DC-Coupled Resources is expected to exceed 50% of the time (50% probability of exceedance forecast). To produce the STWPF, ERCOT will allocate the TEWPF 50% probability of exceedance forecast to each WGR and each wind generation component of a DC-Coupled Resource such that the sum of the individual STWPF forecasts equal the TEWPF forecast. The updated STWPF forecasts for each hour for each WGR and each wind generation component of a DC-Coupled Resource are to be used as input into each Reliability Unit Commitment (RUC) process as per Section 5, Transmission Security Analysis and Reliability Unit Commitment.

(3) ERCOT shall produce the Wind-powered Generation Resource Production Potential (WGRPP) forecasts using the information provided by Resource Entities and QSEs representing WGRs and DC-Coupled Resources with wind generation components, including Resource availability, meteorological information, and Supervisory Control and Data Acquisition (SCADA).

(4) Each hour, ERCOT shall provide, through the Messaging System, the STWPF and WGRPP forecasts for each WGR and each wind generation component of a DC-Coupled Resource to the QSE that represents that WGR or DC-Coupled Resource and shall post each STWPF and WGRPP forecast on the MIS Certified Area.

(5) Each hour, ERCOT shall post to the MIS Public Area, on a system-wide and regional basis the hourly actual wind power production, STWPF, WGRPP, and aggregate Current Operating Plan (COP) High Sustained Limits (HSLs) for On-Line WGRs and the wind generation components of DC-Coupled Resources for a rolling historical 48-hour period. The system-wide and regional STWPF, WGRPP, and aggregate COP HSLs for On-Line WGRs and the wind generation components of DC-Coupled Resources will also be posted for the rolling future 168-hour period. ERCOT shall retain the STWPF and WGRPP for each hour.

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| ***[NPRR935: Insert paragraph (6) below upon system implementation and renumber accordingly:]***(6) Each hour, ERCOT shall post to the MIS Public Area the hourly system-wide and regional STWPF and WGRPP values produced by each forecast model for On-Line WGRs and the wind generation components of DC-Coupled Resources for the rolling historical 48-hour period and the rolling future 168-hour period. ERCOT’s posting shall also indicate which forecast model it is using for each region to populate COPs. |

(6) Every five minutes, ERCOT shall post to the MIS Public Area, on a system-wide and regional basis, five-minute actual wind power production for a rolling historical 60-minute period.

***4.2.3 PhotoVoltaic Generation Resource Production Potential***

(1) ERCOT shall produce and update hourly a Short-Term PhotoVoltaic Power Forecast (STPPF) that provides a rolling 168-hour hourly forecast of PhotoVoltaic (PV) production potential for each PhotoVoltaic Generation Resource (PVGR) and for each PV generation component of a DC-Coupled Resource. ERCOT shall produce and update an hourly Total ERCOT PhotoVoltaic Power Forecast (TEPPF) providing a probability distribution of the hourly production potential from all PhotoVoltaic Generation Resources and the PV components of all DC-Coupled Resources in ERCOT for each of the next 168 hours. A Resource Entity with a PVGR or DC-Coupled Resource that has a PV component shall install equipment to enable telemetry of site-specific meteorological information that ERCOT determines is necessary to produce the STPPF and TEPPF forecasts, and the Resource Entity’s QSE shall telemeter such information and Resource status information to ERCOT. ERCOT shall establish procedures specifying the accuracy requirements of meteorological information telemetry for PVGRs and DC-Coupled Resources with a PV component.

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| ***[NPRR935: Replace paragraph (1) above with the following upon system implementation:]***(1) ERCOT shall produce and update hourly a Short-Term PhotoVoltaic Power Forecast (STPPF) that provides a rolling 168-hour hourly forecast of PhotoVoltaic (PV) production potential for each PhotoVoltaic Generation Resource (PVGR) and for the PV component of each DC-Coupled Resource. ERCOT shall produce and post to the MIS Public Area every five minutes an Intra-Hour PhotoVoltaic Power Forecast (IHPPF) by PhotoVoltaic region that provides a forecast of ERCOT-wide PhotoVoltaic production potential for each five-minute interval over the next two hours from each forecast model. The posting shall indicate which forecast model was being used by ERCOT for GTBD calculation purposes. ERCOT shall produce and update an hourly Total ERCOT PhotoVoltaic Power Forecast (TEPPF) providing a probability distribution of the hourly production potential from all PhotoVoltaic Generation Resources and the PV components of all DC-Coupled Resources in ERCOT for each of the next 168 hours. A Resource Entity with a PVGR or DC-Coupled Resource that has a PV component shall install equipment to enable telemetry of site-specific meteorological information that ERCOT determines is necessary to produce the STPPF and TEPPF forecasts, and the Resource Entity’s QSE shall telemeter such information and Resource status information to ERCOT. ERCOT shall establish procedures specifying the accuracy requirements of meteorological information telemetry for PVGRs and DC-Coupled Resources with a PV component. |

(2) ERCOT shall use the probabilistic TEPPF and select the forecast that the actual total ERCOT production of PVGRs and the PV components of DC-Coupled Resources is expected to exceed 50% of the time (50% probability of exceedance forecast). To produce the STPPF, ERCOT will allocate the TEPPF 50% probability of exceedance forecast to each PVGR and each PV component of a DC-Coupled Resource such that the sum of the individual STPPF forecasts equal the TEPPF forecast. The updated STPPF forecasts for each hour for each PVGR and each PV component of a DC-Coupled Resource are to be used as input into each RUC process as per Section 5, Transmission Security Analysis and Reliability Unit Commitment.

(3) ERCOT shall produce the PhotoVoltaic Generation Resource Production Potential (PVGRPP) forecasts using the information provided by owners of PVGRs and DC-Coupled Resources with a PV component including Resource availability, meteorological information, and SCADA.

(4) Each hour, ERCOT shall provide, through the Messaging System, the STPPF and PVGRPP forecasts for each PVGR and each DC-Coupled Resource with a PV component to the QSE that represents that PVGR or DC-Coupled Resource and shall post each STPPF and PVGRPP forecast on the MIS Certified Area.

(5) Each hour ERCOT shall post to the MIS Public Area, on a system-wide basis the hourly actual PhotoVoltaic (PV) power production, STPPF, PVGRPP, and aggregate COP HSLs for On-Line PVGRs and PV components of DC-Coupled Resources for a rolling historical 48-hour period. The system-wide STPPF, PVGRPP, and aggregate COP HSLs for On-Line PVGRs and PV components of DC-Coupled Resourcesshall also be posted for the rolling future 168-hour period.

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| ***[NPRR935: Insert paragraph (6) below upon system implementation and renumber accordingly:]***(6) Each hour, ERCOT shall post to the MIS Public Area the hourly system-wide and regional STPPF and PVGRPP values produced by each forecast model for On-Line PVGRs and DC-Coupled Resources with a PV component for the rolling historical 48-hour period and the rolling future 168-hour period. ERCOT’s posting shall also indicate which forecast model it is using for each region to populate COPs. |

(6) Every five minutes, ERCOT shall post to the MIS Public Area, on a system-wide basis, five-minute actual PV power production from all PVGRs and PV components of DC-Coupled Resources for a rolling historical 60-minute period.

5.7.4.1.1 Capacity Shortfall Ratio Share

(1) In calculating the shortfall amount for each QSE, the Resource capacity (RCAP) is calculated for a Generation Resource or ESR, that is not a DC-Coupled Resource, and that meets any of the following conditions:

(a) QSE-committed;

(b) Planning to operate as a Quick Start Generation Resource (QSGR) for the Settlement Interval as shown by the COP Status of OFFQS in the RUC Snapshot for the RUC Process and/or Adjustment Period; or

(c) A Switchable Generation Resource (SWGR) that is released by a non-ERCOT Control Area Operator (CAO) to operate in the ERCOT Control Area due to an ERCOT RUC instruction for an actual or anticipated EEA condition and that is shown as On-Line in its COP; or

(d) If the Settlement Interval is a RUCAC-Interval, the Combined Cycle Generation Resource that was QSE-committed at the time the RUCAC was issued, excluding the condition for SWGRs as describe in paragraph (c) above.

(2) In calculating the amount short for each QSE, the available capacity of a DC-Coupled Resource shall be calculated for each RUC Snapshot, and at the end of the Adjustment Period, by adding the capacity value of the Energy Storage System (ESS) that is included in the HSL of the DC-Coupled Resource, as submitted in the COP, to the Wind-powered Generation Resource Production Potential (WGRPP), and/or the PhotoVoltaic Generation Resource Production Potential (PVGRPP), as follows:

The DCRCAPSNAP variable at the RUC Snapshot is calculated as:

DCRCAPSNAP *ruc, q, r, h =* RUCHSLESS*ruc, q, r, h* + (WGRPP*ruc, q, r, h* + PVGRPP*ruc, q, r, h*)

The DCRCAPADJ variable at the end of the Adjustment Period is calculated as:

DCRCAPADJ *ruc, q, r, h =* HSLESS *q, r, h* + (WGRPP*ruc, q, r, h* + PVGRPP*ruc, q, r, h*)

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| *DCRCAPSNAP ruc, q, r, h* | MW | *DC-Coupled Resource Capacity at Snapshot*—The Resource Capacity of DC-Coupled Resource *r* represented by the QSE *q* for the hour *h*, according to the RUC Snapshot for the RUC process.  |
| *RUCHSLESS ruc, q, r, h* | MW | *High Sustained Limit of ESS at Snapshot* —The portion of the HSL of the DC-Coupled Resource due to the ESS that is part of the DC-Coupled Resource *r* represented by QSE *q* for the hour *h*, according to the RUC Snapshot for the RUC process.  |
| *WGRPP ruc, q, r, h* | MW | *Wind-powered Generation Resource Production Potential at Snapshot* —The Wind-powered Generation Resource Production Potential (WGRPP) as described in Section 4.2.2, Wind-Powered Generation Resource Production Potential, for the DC-Coupled Resource *r* represented by QSE *q* for the hour *h*, as seen in the RUC Snapshot for the RUC process *ruc*.  |
| *PVGRPP ruc, q, r, h* | MW | *PhotoVoltaic Generation Resource Production Potential at Snapshot* — The PhotoVoltaic Generation Resource Production Potential (PVGRPP) as described in Section 4.2.3, PhotoVoltaic Generation Resource Production Potential, for the DC-Coupled Resource *r* represented by QSE *q* for the hour *h*, as seen in the RUC Snapshot for the RUC process *ruc*.  |
| *DCRCAPADJ ruc, q, r, h* | MW | *DC-Coupled Resource Capacity at Adjustment Period*—The Resource Capacity of DC-Coupled Resource *r* represented by the QSE *q* for the hour *h*, at the end of the Adjustment Period.  |
| *HSLESS q, r, h* | MW | *High Sustained Limit for ESS at Adjustment Period* —The portion of the HSL of the DC-Coupled Resource due to the ESS that is part of the DC-Coupled Resource *r* represented by QSE *q* for the hour *h*, at the end of the Adjustment Period.  |
| *q* | none | A QSE. |
| *r* | none | A DC-Coupled Resource that is QSE-committed or RUC-decommitted for the Settlement Interval (subject to paragraph (4) below) or a Switchable Generation Resource (SWGR) released by a non-ERCOT Control Area Operator (CAO) to operate in the ERCOT Control Area due to an ERCOT RUC instruction for an actual or anticipated EEA condition. |
| *h* | none | An hourly Settlement Interval.  |
| *ruc* | none | A RUC process for which this DC-Coupled Resource Capacity is calculated. |

(3) In calculating the amount short for each QSE, the Wind-powered Generation Resource Production Potential (WGRPP), as described in Section 4.2.2, Wind-Powered Generation Resource Production Potential, for a Wind-powered Generation Resource (WGR), or the PhotoVoltaic Generation Resource Production Potential (PVGRPP), as described in Section 4.2.3, PhotoVoltaic Generation Resource Production Potential, for a PhotoVoltaic Generation Resource (PVGR), at the time of RUC execution, shall be considered the available capacity of the WGR or PVGR when determining responsibility for the corresponding RUC charges, regardless of the Real-Time output of the WGR or PVGR. Therefore, the RCAPSNAP variable used below shall be equal to the WGRPP and PVGRPP described above.

(4) In calculating the amount short for each QSE, the QSE must be given a capacity credit if a Resource was given notice of decommitment within the two hours before the Operating Hour as a result of the RUC process as follows:

(a) Non-Intermittent Renewable Resources (IRRs) will have the RCAPSNAP and RCAPADJ variables used below set equal to the RCAPSNAP value for the Resource immediately before the decommitment instruction was given;

(b) DC-Coupled Resources will have the DCRCAPSNAP and DCRCAPADJ variables used below set equal to the DCRCAPSNAP value for the Resource immediately before the decommitment instruction was given.

(5) In calculating the short amount for each QSE, if the RCAPSNAP for a non-Intermittent Renewable Resource (IRR) was credited to the QSE during the RUC Snapshot but the Resource experiences a Forced Outage within two hours before the start of the Settlement Interval, then the RCAPSNAP for that Resource is also credited to the QSE in the RCAPADJ. If the Resource is a DC-Coupled Resource, then the DCRCAPSNAP for that Resource from the RUC Snapshot is credited to the QSE in the DCRCAPADJ.

(6) In calculating the short amount for each QSE, if the DCIMPSNAP was credited to the QSE during the RUC Snapshot but the entire Direct Current Tie (DC Tie) experiences a Forced Outage within two hours before the start of the Settlement Interval, then the DCIMPSNAP is also credited to the QSE in the DCIMPADJ.

(7) For Combined Cycle Generation Resources, if more than one Combined Cycle Generation Resource is shown On-Line in its COP for the same Settlement hour, then the provisions of paragraph (6)(a) of Section 3.9.1, Current Operating Plan (COP) Criteria, apply in the determination of the On-Line Combined Cycle Generation Resource for that Settlement hour.

(8) The capacity shortfall ratio share of a specific QSE for a particular RUC process is calculated, for a 15-minute Settlement Interval, as follows:

RUCSFRS *ruc, i, q* = RUCSF *ruc, i, q* / RUCSFTOT *ruc, i*

Where:

RUCSFTOT *ruc, i* = RUCSF *ruc, i, q*

(9) The RUC Shortfall in MW for one QSE for one 15-minute Settlement Interval is:

RUCSF *ruc, i, q* = Max (0, Max (RUCSFSNAP *ruc, q, i*, RUCSFADJ *ruc, q, i*) – RUCCAPCREDIT *q, i, z*)

(10) The RUC Shortfall in MW for one QSE for one 15-minute Settlement Interval, as measured at the RUC Snapshot, is:

RUCSFSNAP *ruc ,q ,i* = Max (RUCOSFSNAP *ruc, q, i* , RUCASFSNAP *ruc, q, i*)

(11) The overall shortfall in MW that a QSE had according to the RUC Snapshot for a 15-minute Settlement Interval is:

**RUCOSFSNAP *ruc, q, i* = Max (0, ((RTAML *q, p, i* \* 4) +  RTDCEXP *q, p, i* + ASONPOSSNAP *ruc, q, i* – RUCCAPSNAP *ruc, q, i*))**

The QSE’s On-Line Ancillary Service Position according to the RUC Snapshot for a 15 minute Settlement Interval is:

ASONPOSSNAP ***ruc, q, i***= RUPOSSNAP *ruc, q, h* + RRPOSSNAP *ruc, q, h* + Max (0, (ECRPOSSNAP *ruc, q, h* + NSPOSSNAP *ruc, q, h* – ASOFFOFRSNAP *ruc, q, r, h*))

The amount of capacity that a QSE had according to the RUC Snapshot for a 15-minute Settlement Interval is:

RUCCAPSNAP *ruc, q, i* = RCAPSNAP *ruc, q, r, h* + DCRCAPSNAP *ruc, q, r, h* + (RUCCPSNAP *ruc, q, h* – RUCCSSNAP *ruc, q, h*) + (DAEP *q, p, h* –DAES *q, p, h*) + (RTQQEPSNAP *ruc, q, p, i* – RTQQESSNAP *ruc, q, p, i*) +  DCIMPSNAP *ruc, q, p, i* + ASOFRLRSNAP *ruc, q, r, h*

(12) The Ancillary Service shortfall calculation compares the Ancillary Service capability of the QSE, measured by the submitted Ancillary Service Offers, to the Ancillary Service Position. Because the same Resource capacity can be represented in Ancillary Offers for multiple products, the aggregated capability is accounted for by grouping Ancillary Service types in the calculation below. The Ancillary Service shortfall in MW that a QSE had according to the RUC Snapshot for a 15-minute Settlement Interval is:

**RUCASFSNAP *ruc, q, i* = Max (0, ASCAP1SNAP *ruc, q, i* , ASCAP2SNAP *ruc, q, i*, ASCAP3SNAP *ruc, q, i* , ASCAP4SNAP *ruc, q, i*, ASCAP5SNAP *ruc, q, i*) + Max (0, ASCAP6SNAP *ruc, q, i*)**

Where,

ASCAP1SNAP *ruc, q, i* = RUPOSSNAP *ruc, q, h* – ASOFR1SNAP *ruc, q, r, h*

ASCAP2SNAP *ruc, q, i* = RRPOSSNAP*ruc, q, h* –  ASOFR2SNAP *ruc, q, r, h*

ASCAP3SNAP *ruc, q, i* = (RUPOSSNAP *ruc, q, h* + RRPOSSNAP *ruc, q, h*) – ASOFR3SNAP *ruc, q, r, h*

ASCAP4SNAP *ruc, q, i* = (RUPOSSNAP *ruc, q, h* + RRPOSSNAP *ruc, q, h*  + ECRPOSSNAP *ruc, q, h*) – ASOFR4SNAP *ruc, q, r, h*

ASCAP5SNAP *ruc, q, i* = (RUPOSSNAP *ruc, q, h* + RRPOSSNAP *ruc, q, h*+ ECRPOSSNAP *ruc, q, h* + NSPOSSNAP *ruc, q, h*) – ASOFR5SNAP *ruc, q, r, h*

ASCAP6SNAP *ruc, q, i =* RDPOSSNAP *ruc, q, h* – ASOFR6SNAP *ruc, q, r, h*

(13) The RUC Shortfall in MW for one QSE for one 15-minute Settlement Interval, as measured at the end of the Adjustment Period, , is:

RUCSFADJ *ruc, q, i* = Max (RUCOSFADJ *ruc, q, i*, RUCASFADJ *q, i* )

(14) The overall shortfall in MW that a QSE had at the end of the Adjustment Period for a 15-minute Settlement Interval, but including capacity from IRRs as seen in the RUC Snapshot and capacity from DC-Coupled Resources, is:

RUCOSFADJ *ruc, q, i*  = Max (0, ((RTAML *q, p, i* \*4) +  RTDCEXP *q, p, i* + ASONPOSADJ *q, i* – (RCAPSNAP *ruc, q, r, h* +  DCRCAPADJ *ruc, q, r, h* + RUCCAPADJ *q, i*)))

Where,

The On-Line Ancillary Service Position the QSE had at the end of the Adjustment Period for a 15-minute Settlement Interval is:

ASONPOSADJ *q ,i* = RUPOSADJ *q, h* + RRPOSADJ *q, h* + Max (0, (ECRPOSADJ *q, h* + NSPOSADJ *q,h* – ASOFFOFRADJ *q, r, h* ))

 The amount of capacity that a QSE had at the end of the Adjustment Period for a 15-minute Settlement Interval, excluding capacity from IRRs and DC-Coupled Resources, is:

RUCCAPADJ *q, i* = RCAPADJ *q, r, h* + (RUCCPADJ *q, h* – RUCCSADJ *q, h*) + (DAEP *q, p, h* – DAES *q, p, h*) + (RTQQEPADJ *q, p, i* – RTQQESADJ *q, p, i*) +  DCIMPADJ *q, p, i*  + ASOFRLRADJ *q, r, h*

(15) The Ancillary Service shortfall calculation compares the Ancillary Service capability of the QSE, measured by the submitted Ancillary Service Offers, to the Ancillary Service Position. Because the same Resource capacity can be represented in Ancillary Offers for multiple products, the aggregated capability is accounted for by grouping Ancillary Service types in the calculation below. The Ancillary Service shortfall in MW that a QSE had at the end of the Adjustment Period for a 15-minute Settlement Interval is:

**RUCASFADJ *q, i* = Max (0, ASCAP1ADJ *q, i* , ASCAP2ADJ *q, i* , ASCAP3ADJ *q, i* , ASCAP4ADJ *q, i* , ASCAP5ADJ *q, i*) + Max (0, ASCAP6ADJ *q, i* )**

Where,

ASCAP1ADJ *q, i* = RUPOSADJ *q, h* –  ASOFR1ADJ *q, r, h*

ASCAP2ADJ *q, i* = RRPOSADJ *q, h* –  ASOFR2ADJ *q, r, h*

ASCAP3ADJ *q, i* = (RUPOSADJ *q, h* + RRPOSADJ *q, h* ) –  ASOFR3ADJ *q, r,h*

ASCAP4ADJ *q, i* = (RUPOSADJ *q, h* + RRPOSADJ *q, h* + ECRPOSADJ *q, h*) –  ASOFR4ADJ *q, r, h*

ASCAP5ADJ *q, i* = (RUPOSADJ *q, h* + RRPOSADJ *q, h* + ECRPOSADJ *q, h* + NSPOSADJ *q, h* ) –  ASOFR5ADJ *q, r, h*

ASCAP6ADJ *q, i* = RDPOSADJ *q, h* – ASOFR6ADJ *q, r, h*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RUCSFRS *ruc, i, q* | none | *RUC Shortfall Ratio Share*—The ratio of the QSE *q*’s capacity shortfall to the sum of all QSEs’ capacity shortfalls, for the RUC process *ruc*, for the 15-minute Settlement Interval *i*. |
| RUCSF *ruc, i, q* | MW | *RUC Shortfall*—The QSE *q*’s capacity shortfall for the RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| RUCSFTOT *ruc, i* | MW | *RUC Shortfall Total*—The sum of all QSEs’ capacity shortfalls, for a RUC process *ruc*, for a 15-minute Settlement Interval *i*. |
| RUCSFSNAP *ruc, q, i* | MW | *RUC Shortfall at Snapshot*—The QSE *q*’s capacity shortfall will be the maximum of the QSE’s overall shortfall or Ancillary Service shortfall, as calculated for the RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| RUCSFADJ *ruc, q, i* | MW | *RUC Shortfall at End of Adjustment Period*—The QSE *q*’s end of Adjustment Period capacity shortfall will be the maximum of the QSE’s overall shortfall or Ancillary Service shortfall, as calculated for the RUC process *ruc*, for the 15-minute Settlement Interval *i*. |
| RUCCAPCREDIT *q, i, z* | MW | *RUC Capacity Credit*—The QSE *q*’s capacity credit resulting from capacity paid through the RUC Capacity-Short Amount for RUC process *z* for the 15-minute Settlement Interval *i*. |
| RUCOSFSNAP *ruc, q, i* | MW | *RUC Overall Shortfall at Snapshot* —The QSE *q*’s overall capacity shortfall according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| RUCASFSNAP *ruc, q, i* | MW | *RUC Ancillary Service Shortfall at Snapshot* —The QSE *q*’s Ancillary Service capacity shortfall according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| ASONPOSSNAP *ruc ,q ,i* | MW | *Ancillary Service On-Line Position at Snapshot –* The QSE *q’s* total On-Line Ancillary Service position according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i.*  |
| RUPOSSNAP *ruc, q, h* | MW | *Regulation Up Position at Snapshot* ⎯The QSE *q’s* Real-Time Reg-Up Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. |
| RRPOSSNAP *ruc, q, h* | MW | *Responsive Reserve Service Position at Snapshot* ⎯The QSE *q’s* Real-Time RRS Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. |
| ECRPOSSNAP *ruc, q, h* | MW | *ERCOT Contingency Reserve Service Position at Snapshot* ⎯The QSE *q’s* Real-Time ECRS Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. |
| NSPOSSNAP *ruc, q, h* | MW | *Non-Spin Reserve Service Position at Snapshot* ⎯The QSE *q’s* Real-Time Non-Spin Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. |
| RDPOSSNAP *ruc, q, h* | MW | *Regulation Down Position at Snapshot* ⎯The QSE *q’s* Real-Time Reg-Down Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. |
| ASOFFOFRSNAP *ruc, q, r, h* | MW | *Ancillary Service Offline Offers at Snapshot –*The capacity represented by validated Ancillary Service Offers for ECRS and Non-Spin for Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. |
| ASOFRLRSNAP *ruc, q, r, h* | MW | *Ancillary Service Offer per Load Resource at Snapshot –* The capacity represented by validated Ancillary Service Offers for Reg-Up, Non-Spin, RRS, and ECRS for the Load Resource *r*  represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. |
| ASCAP1SNAP *ruc, q, i* | MW | *Ancillary Service Net Capacity Level 1 at Snapshot* ⎯The net capacity for Reg-Up for QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| ASCAP2SNAP *ruc, q, i* | MW | *Ancillary Service Net Capacity Level 2 at Snapshot* ⎯The net capacity for RRS for QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| ASCAP3SNAP *ruc, q, i* | MW | *Ancillary Service Net Capacity Level 3 at Snapshot* ⎯The net capacity for Reg-Up and RRS for QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| ASCAP4SNAP *ruc, q, i* | MW | *Ancillary Service Net Capacity Level 4 at Snapshot* ⎯The net capacity for Reg-Up, RRS, and ECRS for QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| ASCAP5SNAP *ruc, q, i* | MW | *Ancillary Service Net Capacity Level 5 at Snapshot* ⎯The net capacity for Reg-Up, RRS, ECRS, and Non-Spinning Reserve (Non-Spin) for QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| ASCAP6SNAP *ruc, q, i* | MW | *Ancillary Service Net Capacity Level 6 at Snapshot* ⎯The net capacity for Regulation Down Service (Reg-Down) for QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| ASOFR1SNAP *ruc, q, r, h* | MW | *Ancillary Service Offer Level 1 at Snapshot –* The capacity represented by validated Reg-Up Ancillary Service Offers for Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. |
| ASOFR2SNAP *ruc, q, r, h* | MW | *Ancillary Service Offer Level 2 at Snapshot –* The capacity represented by validated RRS Ancillary Service Offers for Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.  |
| ASOFR3SNAP *ruc, q, r, h* | MW | *Ancillary Service Offer Level 3 at Snapshot –* The capacity represented by validated Reg-Up and RRS Ancillary Service Offers for Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. |
| ASOFR4SNAP *ruc, q, r, h* | MW | *Ancillary Service Offer Level 4 at Snapshot –* The capacity represented by validated Reg-Up, RRS, and ECRS Ancillary Service Offers for Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. |
| ASOFR5SNAP *ruc, q, r, h* | MW | *Ancillary Service Offer Level 5 at Snapshot –* The capacity represented by validated Reg-Up, RRS, ECRS, and Non-Spin Ancillary Service Offers for Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. |
| ASOFR6SNAP *ruc, q, r, h* | MW | *Ancillary Service Offer Level 6 at Snapshot –* The capacity represented by validated Reg-Down Ancillary Service Offers for Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. |
| RUCOSFADJ *ruc, q, i* | MW | *RUC Overall Shortfall at End of Adjustment Period* —The QSE *q’s* overall capacity shortfall at the end of the Adjustment Period, including capacity from IRRs as seen in the RUC Snapshot for the RUC process *ruc*, for the 15-minute Settlement Interval *i*. |
| RUCASFADJ *q, i* | MW | *RUC Ancillary Service Shortfall at End of Adjustment Period* —The QSE *q’s* Ancillary Service capacity shortfall at the end of the Adjustment Period for the 15-minute Settlement Interval *i*. |
| ASONPOSADJ *q ,i* | MW | *Ancillary Service On-Line Position at End of Adjustment Period –* The QSE *q’s* total On-Line Ancillary Service position at the end of the Adjustment Periodfor the 15-minute Settlement Interval *i.* |
| RUPOSADJ *q, h* | MW | *Regulation Up Position at End of Adjustment Period* ⎯The QSE *q’s* Reg-Up Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. |
| RRPOSADJ *q, h* | MW | *Responsive Reserve Service Position at End of Adjustment Period* ⎯The QSE *q’s* RRS Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. |
| ECRPOSADJ *q, h* | MW | *ERCOT Contingency Reserve Service Position at End of Adjustment Period* ⎯The QSE *q’s* ECRS Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. |
| NSPOSADJ *q, h* | MW | *Non-Spin Reserve Service Position at End of Adjustment Period* ⎯The QSE *q’s* Non-Spin Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. |
| RDPOSADJ *q, h* | MW | *Regulation Down Position at End of Adjustment Period* ⎯The QSE *q’s*  Reg-Down Ancillary Service Position at the end of the Adjustment period for the hour *h* that includes the 15-minute Settlement Interval. |
| ASOFFOFRADJ *q, r, h* | MW | *Ancillary Service Offline Offers at End of Adjustment Period –*The capacity represented by validated Ancillary Service Offers for ECRS and Non-Spin for Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. |
| ASOFRLRADJ *q, r, h* | MW | *Ancillary Service Offer per Load Resource at End of Adjustment Period –* The capacity represented by validated Ancillary Service Offers for Reg-Up, Non-Spin, RRS, and ECRS for the Load Resource *r*  represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h.* |
| ASCAP1ADJ *q, i* | MW | *Ancillary Service Net Capacity Level 1 at End of Adjustment Period* ⎯The net capacity at the end of the Adjustment Period for Reg-Up for QSE *q*, for the 15-minute Settlement Interval *i*. |
| ASCAP2ADJ *q, i* | MW | *Ancillary Service Net Capacity Level 2 at End of Adjustment Period* ⎯The net capacity at the end of the Adjustment Period for RRS for QSE *q*, for the 15-minute Settlement Interval *i*. |
| ASCAP3ADJ *q, i* | MW | *Ancillary Service Net Capacity Level 3 at End of Adjustment Period* ⎯The net capacity at the end of the Adjustment Period for Reg-Up and RRS for QSE *q*, for the 15-minute Settlement Interval *i*. |
| ASCAP4ADJ *q, i* | MW | *Ancillary Service Net Capacity Level 4 at End of Adjustment Period* ⎯The net capacity at the end of the Adjustment Period for Reg-Up, RRS, and ECRS for QSE *q*, for the 15-minute Settlement Interval *i*. |
| ASCAP5ADJ *q, i* | MW | *Ancillary Service Net Capacity Level 5 at End of Adjustment Period* ⎯The net capacity at the end of the Adjustment Period for Reg-Up, RRS, ECRS, and Non-Spin for QSE *q*, for the 15-minute Settlement Interval *i*. |
| ASCAP6ADJ *q, i* | MW | *Ancillary Service Net Capacity Level 6 at End of Adjustment Period* ⎯ The net capacity at the end of the Adjustment Period for Reg-Down for QSE *q*, for the 15-minute Settlement Interval *i*. |
| ASOFR1ADJ *q, r, h* | MW | *Ancillary Service Offer Level 1 at End of Adjustment Period –* The capacity represented by validated Reg-Up Ancillary Service Offers for Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. |
| ASOFR2ADJ *q, r, h* | MW | *Ancillary Service Offer Level 2 at End of Adjustment Period –* The capacity represented by validated RRS Ancillary Service Offers for Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. |
| ASOFR3ADJ *q, r, h* | MW | *Ancillary Service Offer Level 3 at End of Adjustment Period –* The capacity represented by validated Reg-Up and RRS Ancillary Service Offers for Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. |
| ASOFR4ADJ *q, r, h* | MW | *Ancillary Service Offer Level 4 at End of Adjustment Period –* The capacity represented by validated Reg-Up, RRS, and ECRS Ancillary Service Offers for Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. |
| ASOFR5ADJ *q, r, h* | MW | *Ancillary Service Offer Level 5 at End of Adjustment Period–* The capacity represented by validated Reg-Up, RRS, ECRS, and Non-Spin Ancillary Service Offers for Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. |
| ASOFR6ADJ *q, r, h* | MW | *Ancillary Service Offer Level 6 at End of Adjustment Period –* The capacity represented by validated Reg-Down Ancillary Service Offers for Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource’s offered capacity is only included in the sum to the extent that the Resource’s COP status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*. |
| RTAML *q, p, i* | MWh | *Real-Time Adjusted Metered Load*—The QSE *q*’s Adjusted Metered Load (AML) at the Settlement Point *p* for the 15-minute Settlement Interval *i*. |
| RUCCAPSNAP *ruc, q, i* | MW | *RUC Capacity Snapshot at time of RUC*—The amount of the QSE *q*’s calculated capacity in the RUC Snapshot for the RUC process *ruc* for a 15-minute Settlement Interval *i*.  |
| RCAPSNAP *ruc, q, r, h* | MW | *Resource Capacity at Snapshot*—The available capacity of Generation Resource or ESR *r,* that is not a DC-Coupled Resource, represented by the QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. For ESRs and Generation Resources that are not IRRs, the available capacity shall be equal to HSL. For WGRs and PVGRs, the available capacity shall be equal to the WGRPP and the PVGRPP, respectively. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.  |
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| RTDCEXP *q, p, i* | MW | *Real-Time DC Export*—The aggregated DC Tie Schedule through DC Tie *p* submitted by QSE *q* that is under the Oklaunion Exemption as an exporter from the ERCOT Region, for the 15-minute Settlement Interval *i*. |
| *DCRCAPSNAP ruc, q, r, h* | MW | *DC Coupled Resource Capacity at Snapshot*—The Resource Capacity of DC-Coupled Resource *r* represented by the QSE *q* for the hour *h*, according to the RUC Snapshot for the RUC process.  |
| DCRCAPADJ *ruc, q, r, h* | MW | *DC-Coupled Resource Capacity at Adjustment Period*—The Resource Capacity of DC-Coupled Resource *r* represented by the QSE *q* for the hour *h*, at the end of the Adjustment Period.  |
| DCIMPADJ *q, p, i* | MW | *DC Import at End of Adjustment Period*—The approved aggregated DC Tie Schedule submitted by QSE *q* as an importer into the ERCOT System through DC Tie *p* at the end of the Adjustment Period, for the 15-minute Settlement Interval *i*. |
| DCIMPSNAP *ruc, q, p, i* | MW | *DC Import at Snapshot*—The approved aggregated DC Tie Schedule submitted by QSE *q* as an importer into the ERCOT System through DC Tie *p*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*. |
| RUCCPSNAP *ruc, q, h* | MW | *RUC Capacity Purchase at Snapshot*—The QSE *q*’s capacity purchase, according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. |
| RUCCSSNAP *ruc, q, h* | MW | *RUC Capacity Sale at Snapshot*—The QSE *q*’s capacity sale, according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. |
| RUCCAPADJ *q, i* | MW | *RUC Capacity at End of Adjustment Period*—The amount of the QSE *q*’s calculated capacity, excluding capacity for IRRs, at the end of the Adjustment Period for a 15-minute Settlement Interval *i.* |
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| RCAPADJ *q, r, h* | MW | *Resource Capacity at End of Adjustment Period*—The HSL of a non-IRR Generation Resource or ESR *r,* that is not a DC-Coupled Resource, represented by the QSE *q* at the end of the Adjustment Period, for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.  |
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| RUCCPADJ *q, h* | MW | *RUC Capacity Purchase at End of Adjustment Period*—The QSE *q*’s capacity purchase, at the end of Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. |
| RUCCSADJ *q, h* | MW | *RUC Capacity Sale at End of Adjustment Period*—The QSE *q*’s capacity sale, at the end of Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. |
| DAEP *q, p, h* | MW | *Day-Ahead Energy Purchase*—The QSE *q*’s energy purchased in the DAM at the Settlement Point *p* for the hour *h* that includes the 15-minute Settlement Interval. |
| DAES *q, p, h* | MW | *Day-Ahead Energy Sale*—The QSE *q*’s energy sold in the DAM at the Settlement Point *p* for the hour *h* that includes the 15-minute Settlement Interval. |
| RTQQEPSNAP *ruc, q, p, i* | MW | *Real-Time QSE-to-QSE Energy Purchase at Snapshot*—The QSE *q*’s Energy Trades in which the QSE is the buyer at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, in the RUC Snapshot for the RUC process *ruc*. |
| RTQQESSNAP *ruc, q, p, i* | MW | *Real-Time QSE-to-QSE Energy Sale at Snapshot*—The QSE *q*’s Energy Trades in which the QSE is the seller at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, in the RUC Snapshot for the RUC process *ruc*. |
| RTQQEPADJ *q, p, i* | MW | *Real-Time QSE-to-QSE Energy Purchase at End of Adjustment Period*—The QSE *q*’s Energy Trades in which the QSE is the buyer at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, at the end of the Adjustment Period for that Settlement Interval. |
| RTQQESADJ *q, p, i* | MW | *Real-Time QSE-to-QSE Energy Sale at End of Adjustment Period*—The QSE *q*’s Energy Trades in which the QSE is the seller at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, at the end of the Adjustment Period for that Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *r* | none | A Generation Resource, an ESR, or a Load Resource. |
| *z* | none | A previous RUC process for the Operating Day. |
| *i* | none | A 15-minute Settlement Interval. |
| *h* | none | The hour that includes the Settlement Interval *i*.  |
| *ruc* | none | The RUC process for which this RUC Shortfall Ratio Share is calculated. |

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

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| [NPRR863: Replace item (ii) above with the following upon system implementation:](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 Frequency Responsive Capacity (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);

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(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;

(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;

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

(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 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;

(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).

(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.

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

(8) 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 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.

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

(10) 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.

(11) 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.

(12) 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.

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

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

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

(c) State of Charge, in MWh;

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

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

(14) 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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| [NPRR829: Insert paragraph (15) below upon system implementation:](15) A QSE representing a Settlement Only Generator (SOG) that elects to include the net generation of the SOG in the estimate of Real-Time Liability (RTL) shall provide ERCOT Real-Time telemetry of the net generation of the SOG. |

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| [NPRR885: Insert paragraph (16) below upon system implementation:](16) A QSE representing a Must-Run Alternative (MRA) shall telemeter the MRA MW currently available (unloaded) and not included in the HSL. |

(17) A QSE representing a DC-Coupled Resource shall provide the following Real-Time telemetry data in addition to that required for other Energy Storage Resources (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 Energy Storage System (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.

6.5.7.5 Ancillary Services Capacity Monitor

(1) Every ten seconds, ERCOT shall calculate the following and provide Real-Time summaries to ERCOT Operators and all Market Participants using ICCP and postings on the ERCOT website showing the Real-Time total system amount of:

(a) RRS capability from:

(i) Generation Resources and ESRs in the form of PFR;

(ii) Load Resources excluding Controllable Load Resources, capable of responding via under-frequency relay;

(iii) Controllable Load Resources in the form of PFR; and

(iv) Resources capable of Fast Frequency Response (FFR);

(b) Ancillary Service Resource awards for RRS to:

(i) Generation Resources and ESRs in the form of PFR;

(ii) Load Resources excluding Controllable Load Resources, capable of responding by under-frequency relay;

(iii) Controllable Load Resources in the form of PFR; and

(iv) Resources providing FFR;

(c) RRS manually deployed by Resources with a Resource Status of ONSC and Resources providing FFR;

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| ***[NPRR863: Replace item (c) above with the following upon system implementation and renumber accordingly:]***(c) ECRS capability from: (i) Generation Resources;(ii) Load Resources excluding Controllable Load Resources; (iii) Controllable Load Resources;(iv) Quick Start Generation Resources (QSGRs); and(v) ESRs.(d) Ancillary Service Resource awards for ECRS to: (i) Generation Resources;(ii) Load Resources excluding Controllable Load Resources; and(iii) Controllable Load Resources;(iv) QSGRs; and(v) ESRs.(e) ECRS manually deployed by Resources with a Resource Status of ONSC;  |

(d) Non-Spin available from:

(i) On-Line Generation Resources with Energy Offer Curves;

(ii) Undeployed Load Resources;

(iii) Off-Line Generation Resources and On-Line Generation Resources with power augmentation;

(iv) Resources with Output Schedules; and

(v) ESRs.

(e) Ancillary Service Resource awards for Non-Spin to:

(i) On-Line Generation Resources with Energy Offer Curves;

(ii) On-Line Generation Resources with Output Schedules;

(iii) Load Resources;

(iv) Off-Line Generation Resources excluding Quick Start Generation Resources (QSGRs), including Non-Spin awards on power augmentation capacity that is not active on On-Line Generation Resources;

(v) QSGRs; and

(vi) ESRs.

(f) Reg-Up and Reg-Down capability;

(g) Undeployed Reg-Up and Reg-Down;

(h) Ancillary Service Resource awards for Reg-Up and Reg-Down;

(i) Deployed Reg-Up and Reg-Down;

(j) Available capacity:

(i) With Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;

(ii) With Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED;

(iii) Without Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;

(iv) Without Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED;

(v) With RTM Energy Bid curves from available Controllable Load Resources in the ERCOT System that can be used to decrease Base Points (energy consumption) in SCED;

(vi) With RTM Energy Bid curves from available Controllable Load Resources in the ERCOT System that can be used to increase Base Points (energy consumption) in SCED;

(vii) With Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to increase ESR Base Points in SCED;

(viii) With Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to decrease ESR Base Points in SCED;

(ix) Without Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to increase ESR Base Points in SCED;

(x) Without Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to decrease ESR Base Points in SCED;

(xi) From Resources participating in SCED plus the Reg-Up and RRS from Load Resources and the Net Power Consumption minus the Low Power Consumption from Load Resources with validated Real-Time RRS awards;

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| ***[NPRR863: Replace item (xi) above with the following upon system implementation:]***(xi) From Resources participating in SCED plus the Reg-Up, RRS, and ECRS from Load Resources and the Net Power Consumption minus the Low Power Consumption from Load Resources with validated Real-Time RRS and ECRS awards; |

(xii) From Resources included in item (vii) above plus reserves from Resources that could be made available to SCED in 30 minutes;

(xiii) In the ERCOT System that can be used to increase Generation Resource Base Points in the next five minutes in SCED; and

(xiv) In the ERCOT System that can be used to decrease Generation Resource Base Points in the next five minutes in SCED;

(xv) The total capability of Resources available to provide the following combinations of Ancillary Services, based on the Resource telemetry from the QSE and capped by the limits of the Resource:

(A) Capacity to provide Reg-Up, RRS, or both, irrespective of whether it is capable of providing ECRS or Non-Spin;

(B) Capacity to provide Reg-Up, RRS, ECRS, or any combination, irrespective of whether it is capable of providing Non-Spin; and

(C) Capacity to provide Reg-Up, RRS, ECRS, or Non-Spin, in any combination;

(k) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of EMR;

(l) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of OUT;

(m) Aggregate net telemetered consumption for Resources with a telemetered Resource Status of OUTL; and

(n) The ERCOT-wide PRC calculated as follows:

**PRC1 = Min(Max((RDF\*FRCHL – FRCO)i , 0.0) , 0.2\*RDF\*FRCHLi),**

where the included On-Line Generation Resources do not include WGRs, nuclear Generation

Resources, or Generation Resources with an output less than or equal to 95% of telemetered LSL or

with a telemetered status of ONTEST, ONHOLD, STARTUP, or SHUTDOWN.

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***WGRs***

***online***

***All***

***WGR***

***online***

***i***

**PRC2 = Min(Max((RDFW\*HSL – Actual Net Telemetered Output)i , 0.0) , 0.2\*RDFW\*HSLi),**

where the included On-Line WGRs only include WGRs that are Primary Frequency Response-capable.

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**PRC3 = ((Hydro-synchronous condenser output)i as qualified by item (8) of Operating Guide Section 2.3.1.2, Additional Operational Details for Responsive Reserve Providers))**

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| ***[NPRR863: Replace the formula “PRC3“ above with the following upon system implementation:]*****PRC3 = ((Synchronous condenser output)i as qualified by item (8) of Operating Guide Section 2.3.1.2, Additional Operational Details for Responsive Reserve and ERCOT Contingency Reserve Service Providers))** |

**PRC4 = (Min(Max((Actual Net Telemetered Consumption – LPC), 0.0), RRS Ancillary Service Resource award \* 1.5) from all Load Resources controlled by high-set under frequency relays with an RRS Ancillary Service Resource award)i**

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***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***

|  |
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| ***[NPRR863: Replace the formula “PRC4“ above with the following upon system implementation:]******resources******load******online******All******resource******load******online******i*****PRC4 = (Min(Max((Actual Net Telemetered Consumption – LPC), 0.0), ECRS and RRS Ancillary Service Resource award \* 1.5) from all Load Resources controlled by high-set under frequency relays with an ECRS and/or RRS Ancillary Service Resource award)i** |

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***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***

**PRC5 = Min(Max((LRDF\_1\*Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_1 \* Actual Net Telemetered Consumption)) from all Controllable Load Resources active in SCED with an Ancillary Service Resource award**

**PRC6 = Min(Max((LRDF\_2 \* Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_2 \* Actual Net Telemetered Consumption)) from all Controllable Load Resources active in SCED without an Ancillary Service Resource award**

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***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***





***resources***

***FFR***

***online***

***All***

***resource***

***FFR***

***online***

***i***

**PRC7 = (Capacity from Resources capable of providing FFR)i**

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| ***[NPRR987: Insert the formula “PRC8” below upon system implementation:]*****PRC8 = (If discharging or idle, Min(X% of HSL based on droop, HSL-ESR-Gen “injection”, the capacity that can be sustained for 15 minutes per the State of Charge), else Min(X% of (HSL – LSL(ESR “charging”) based on droop, the capacity that can be sustained for 15 minutes per the State of Charge – LSL(ESR “charging”)))** ***ESR******online******All******ESR******online******i*****Excludes ESR capacity used to provide FFR** |

**PRC8 = (If discharging or idle, Min(X% of HSL based on droop, HSL-Gen “injection”, the sum of the MW headroom available from the intermittent renewable generation component and the MW capacity that can be sustained for 15 minutes per the ESS State of Charge), else Min(X% of Real-Time Total Capacity based on droop, the sum of the MW headroom available from the intermittent renewable generation component and the MW capacity that can be sustained for 15 minutes per the ESS State of Charge))**

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***DC-Coupled Resources***

***online***

***All***

***ESR***

***online***

***i***

**Excludes DC-Coupled Resource capacity used to provide FFR**

**PRC = PRC1 + PRC2 + PRC3+ PRC4 + PRC5 + PRC6 + PRC7 + PRC8**

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| ***[NPRR987: Replace the formula “PRC” above with the following upon system implementation:]*****PRC = PRC1 + PRC2 + PRC3 + PRC4 + PRC5 + PRC6 + PRC7 + PRC8 + PRC9** |

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| PRC1 | MW | Generation On-Line greater than 0 MW |
| PRC2 | MW | WGRs On-Line greater than 0 MW |
| PRC3 | MW | Hydro-synchronous condenser output

|  |
| --- |
| ***[NPRR863: Replace the description above with the following upon system implementation:]***Synchronous condenser output |

 |
| PRC4 | MW | Capacity from Load Resources controlled by high-set under-frequency relays with an RRS Ancillary Service Resource award

|  |
| --- |
| ***[NPRR863: Replace the description above with the following upon system implementation:]***Capacity from Load Resources with an ECRS Ancillary Service Resource award |

 |
| PRC5 | MW | Capacity from Controllable Load Resources active in SCED with an Ancillary Service Resource award |
| PRC6 | MW | Capacity from Controllable Load Resources active in SCED without an Ancillary Service Resource award |
| PRC7 | MW | Capacity from Resources capable of providing FFR |
|

|  |  |  |  |
| --- | --- | --- | --- |
| ***[NPRR987: Insert the variable “PRC8” below upon system implementation:]***

|  |  |  |
| --- | --- | --- |
| PRC8 | MW | ESR capacity capable of providing Primary Frequency Response |

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 |
| PRC8 | MW | Capacity from DC-Coupled Resources capable of providing Primary Frequency Response |
| PRC | MW | Physical Responsive Capability |
|

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

|  |  |  |
| --- | --- | --- |
| X | Percentage | Percent threshold based on the Governor droop setting of ESRs |

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 |
| RDF |  | The currently approved Reserve Discount Factor  |
| RDFW |  | The currently approved Reserve Discount Factor for WGRs |
| LRDF\_1 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources awarded an Ancillary Service Resource award |
| LRDF\_2 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources not awarded an Ancillary Service Resource award |
| FRCHL | MW | Telemetered High limit of the FRC for the Resource |
| FRCO | MW | Telemetered output of FRC portion of the Resource |

(2) The Load Resource Reserve Discount Factors (RDFs) for Controllable Load Resources (LRDF\_1 and LRDF\_2) shall be subject to review and approval by TAC.

(3) The RDFs used in the PRC calculation shall be posted to the MIS Public Area no later than three Business Days after approval.

(4) ERCOT shall display on the ERCOT website and update every ten seconds a rolling view of the ERCOT-wide PRC, as defined in paragraph (1)(n) above, for the current Operating Day.

**6.5.7.11 DC-Coupled Resource Ramp Rate Limitations**

(1) A DC-Coupled Resource that does not meet any of the conditions in paragraph (1) of Section 3.8.7, DC-Coupled Resources, shall adhere to the ramp rate restrictions established in Section 6.5.7.10, IRR Ramp Rate Limitations.

***6.6.5 Set Point Deviation Charge***

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR963: Insert Section 6.6.5.5 below upon system implementation and renumber accordingly:]*****6.6.5.5 Energy Storage Resource Set Point Deviation Charge for Over Performance**(1) ERCOT shall charge a QSE for an ESR a Set Point Deviation Charge for over-performance if the telemetered generation or consumption exceeds the specified tolerance.(2) The tolerance is the greater of 3% of the AASP for the ESR in the Settlement Interval, or three MW above the AASP for the ESR in the Settlement Interval, if the Resource meets the following conditions:(a) The ESR is not a DC-Coupled Resource; or (b) The ESR is a DC-Coupled Resource and meets the conditions to be treated in the same manner as an ESR as specified in paragraph (1) of Section 3.8.7, DC-Coupled Resources, anytime during the Settlement Interval.(3) The tolerance will be 10% of the AASP for a DC-Coupled Resource in the Settlement Interval if the ESR meets the conditions to be treated in the same manner as an IRR as specified in paragraph (2) of Section 3.8.7. (4) The deviation charge for over-performance for each QSE for each ESR at each Resource Node Settlement Point will be calculated as follows: If the ESR meets the conditions of paragraph (3) above and a flag signifying that the DC-Coupled Resource has received a Base Point below the HDL used by SCED is not set in all SCED intervals within the 15-minute Settlement Interval, then:**SPDAMT *q, r, p, i* = 0**Otherwise: **SPDAMT *q, r, p, i* = Max (PR3, RTSPP *p, i*) \* OPESR*q, r, p, i***Where: If the ESR meets the conditions of paragraph (2) above, then: OPESR *q, r, p, i*  = Max [0, (TWTG*q, r, p, i* – ¼ \* Max [(AASP *q, r, p,i +* ABS (K3\* AASP *q, r, p, i*)) *,* (AASP *q, r, p, i* + Q3)])] If the ESR meets the conditions of paragraph (3) above, then: OPESR *q, r, p, i*  = Max [0, (TWTG *q, r, p, i* – ¼ \* (AASP *q, r, p, i +* ABS (K5\* AASP *q, r, p, i* )))] Where:TWTG *q, r, p, i =*  ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼The above variables are defined as follows:

| Variable | **Unit** | **Definition** |
| --- | --- | --- |
| SPDAMT *q, r, p, i* | $ | *Set Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Resource *r* at Resource Node *p*, for its deviation from AASP, for the 15-minute Settlement Interval *i*.  |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
|  |  |  |
| TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation or consumption of Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i*.  |
| AASP *q, r, p, i* | MW | *Average Aggregated Set Point per QSE per Settlement Point per Resource*—The average of the Average Five Minute Clock Interval Set Point (AVGSP5M), of Resource *r* represented by QSE *q* at Settlement Point *p,* for the 15-minute Settlement Interval *i*.  |
|  |  |  |
|  |  |  |
| AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes*—The average telemetered generation or consumption of Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. |
|  |  |  |
|  |  |  |
| OPESR *q, r, p, i* | MWh | *Over-Performance Volumes per QSE per Settlement Point per Resource*—The amount the ESR *r* over-performed*,* represented by QSE *q* at Resource Node *p,* for the 15-minute Settlement Interval *i*. |
|  |  |  |
| PR3 | $/MWh | The price to use for the Set Point Deviation Charge for over-performance when RTSPP is less than $20/MWh, $20/MWh.  |
| K3 | none | The percentage tolerance for over-performance per paragraph (2) above, 3%.  |
| K5 | none | The percentage tolerance for over-performance per paragraph (3) above, 10%.  |
| Q3 | MW | The MW tolerance for over-performance, three MW. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *r* | none | An ESR.  |
|  |  |  |
| *y*  | none | A five-minute clock interval in the Settlement Interval.  |
| *i* | none | A 15-minute Settlement Interval. |

 |
| ***[NPRR963: Insert Section 6.6.5.5.1 below upon system implementation:]*****6.6.5.5.1 Energy Storage Resource Set Point Deviation Charge for Under Performance**(1) ERCOT shall charge a QSE for an ESR a Set Point Deviation Charge for under-performance if the telemetered generation or consumption is below the specified tolerance. (2) The tolerance is the lesser of 3% of the AASP for the ESR in the Settlement Interval, or three MW below the AASP for the ESR in the Settlement Interval, if the Resource meets the following conditions: (a) The ESR is not a DC-Coupled Resource; or(b) The ESR is a DC-Coupled Resource and meets the conditions to be treated in the same manner as an ESR as specified in paragraph (1) of Section 3.8.7, DC-Coupled Resources, anytime during the Settlement Interval.(3) The deviation charge for under-performance for each QSE for each ESR at each Resource Node Settlement Point will be calculated as follows:**SPDAMT *q, r, p, i* = (-1) \* Min (PR4, RTSPP *p, i*) \* Min (1, KP2) \* UPESR*q, r, p, i***Where: If the ESR meets the conditions of paragraph (2) above, then: UPESR *q, r, p, i*  = Max [0, ¼ \* Min [(AASP *q, r, p, i* - ABS (K4 \* AASP *q, r, p, i*)), (AASP *q, r, p, i* - Q4)] - TWTG *q, r, p, i*] Else: UPESR *q, r, p, i* = 0Where: TWTG *q, r, p, i =*  ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼The above variables are defined as follows:

| Variable | **Unit** | **Definition** |
| --- | --- | --- |
| SPDAMT *q, r, p, i* | $ | *Set Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Resource *r* at Resource Node *p*, for its deviation from AASP, for the 15-minute Settlement Interval *i*.  |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
|  |  |  |
| TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation or consumption of Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i*.  |
| AASP *q, r, p, i* | MW | *Average Aggregated Set Point per QSE per Settlement Point per Resource*—The average of the Average Five Minute Clock Interval Set Point (AVGSP5M), of Resource *r* represented by QSE *q* at Settlement Point *p,* for the 15-minute Settlement Interval *i*.  |
|  |  |  |
|  |  |  |
| AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes*—The average telemetered generation or consumption of Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. |
|  |  |  |
|  |  |  |
| UPESR *q, r, p, i* | MWh | *Under-Performance Volumes per QSE per Settlement Point per Resource*—The amount the ESR *r* under-performed*,* represented by QSE *q* at Resource Node *p,* for the 15-minute Settlement Interval *i*. |
|  |  |  |
| PR4 | $/MWh | The price to use for the Set Point Deviation Charge for under-performance when RTSPP is greater than -$20/MWh, -$20/MWh.  |
| K4 | none | The percentage tolerance for under-performance, 3%.  |
| Q4 | MW | The MW tolerance for under-performance, three MW. |
| KP2 | none | The coefficient applied to the Settlement Point Price for under-performance charge, 1.0. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *r* | none | An ESR.  |
|  |  |  |
| *y*  | none | A five-minute clock interval in the Settlement Interval.  |
| *i* | none | A 15-minute Settlement Interval. |

 |

8.1.1.4.1 Regulation Service and Generation Resource/Controllable Load Resource Energy Deployment Performance

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| ***[NPRR963: Replace the title for Section 8.1.1.4.1 above with the following upon system implementation:]*****8.1.1.4.1 Regulation Service and Generation Resource/Controllable Load Resource/Energy Storage Resource Energy Deployment Performance** |

(1) For those Resources that do not have a Resource Status of ONDSR or Intermittent Renewable Resource (IRR) Groups with no member IRR having a status of ONDSR, ERCOT shall compute the GREDP for each Generation Resource that is On-Line and released to SCED for Base Point Dispatch Instructions. The GREDP is calculated for each five-minute clock interval as a percentage and in MWs for those Resources with a Resource Status that is not ONDSR as follows:

|  |
| --- |
| ***[NPRR963: Replace paragraph (1) above with the following upon system implementation:]***(1) For those Resources that do not have a Resource Status of ONDSR and are not part of an ESR, or Intermittent Renewable Resource (IRR) Groups with no member IRR having a status of ONDSR, ERCOT shall compute the GREDP for each Generation Resource that is On-Line and released to SCED for Base Point Dispatch Instructions. The GREDP is calculated for each five-minute clock interval as a percentage and in MWs for those Resources with a Resource Status that is not ONDSR as follows: |

|  |
| --- |
| ***[NPRR1000: Replace paragraph (1) above with the following upon system implementation:]***(1) For those Resources that are not part of an ESR, ERCOT shall compute the GREDP for each Generation Resource that is On-Line and released to SCED for Base Point Dispatch Instructions. The GREDP is calculated for each five-minute clock interval as a percentage and in MWs as follows: |

**GREDP (%) = ABS[((ATG – AEPFR)/(ASP)) – 1.0] \* 100**

**GREDP (MW) = ABS(ATG – AEPFR – ASP)**

Where:

ATG = Average Telemetered Generation = the average telemetered generation of the Generation Resource or for the aggregate of the IRRs within a IRR Group for the five-minute clock interval

∆frequency is actual frequency minus 60 Hz

EPFR = Estimated Primary Frequency Response (MW) = if │∆frequency│≤ Governor Dead-Band then EPFR = zero, if not then if ∆frequency > zero, EPFR = (∆frequency - Governor Dead-Band)/((droop value \* 60) – Governor Dead-Band) \* HSL \* -1, if not then if ∆frequency < zero, EPFR = (∆frequency + Governor Dead-Band)/((droop value \* 60) – Governor Dead-Band) \* HSL \* -1

AEPFR = Average Estimated Primary Frequency Response = the Estimated Primary Frequency Response (MW) will be calculated every four seconds using a Resource specific droop value where 5% droop = 0.05 the Governor Dead-Band (Hz) and Resource HSL (MW) provided by the Resource Entity, and the frequency deviation (Hz) from 60 Hz and averaged for the five-minute clock interval. For Combined Cycle Generation Resources with Non-Frequency Responsive Capacity (NFRC), the HSL to calculate the EPFR will be based on the Resource’s high limit of the capacity that is frequency responsive. For Combined Cycle Generation Resources, 5.78% Governor droop shall be used. The Resource-specific calculations will be aggregated for IRR Groups.

ASP = Average Set Point = the time-weighted average of the Resource’s Updated Desired Set Point (UDSP) for the five-minute clock interval

(2) For all of a QSE’s Resources that have a Resource Status of ONDSR (“Dynamically Scheduled Resource (DSR) Portfolio”), ERCOT shall calculate an aggregate GREDP as a percentage and in MWs for those Resources as follows:

**GREDP (%) = ABS[(∑*DSR* ATG – ∑*DSR*DSPOS + Intra-QSE Purchase – Intra-QSE Sale – ARRDDSRLR – ANSDDSRLR – ∑*DSR* AEPFR) / (ATDSRL) – 1.0] \* 100**

**GREDP (MW) = ABS(∑*DSR*ATG – ∑*DSR* DSPOS – ATDSRL– ARRDDSRLR – ANSDDSRLR + Intra-QSE Purchase - Intra-QSE Sale – ∑*DSR* AEPFR)**

Where:

∑*DSR* ATG = Sum of Average Telemetered Generation for all Resources with a Resource Status of ONDSR or ONDSRREG of the QSE for the five-minute clock interval

ATDSRL = Average Telemetered DSR Load = the average telemetered DSR Load for the QSE for the five-minute clock interval

Intra-QSE Purchase = Energy Trade where the QSE is both the buyer and seller with the flag set to “Purchase”

Intra-QSE Sale = Energy Trade where the QSE is both the buyer and seller with the flag set to “Sale”

∑*DSR*AEPFR = Sum of Average Estimated Primary Frequency Response for all Resources with a Resource Status of ONDSR of the QSE for the five-minute clock interval

∑*DSR*DSPOS = the time-weighted average of UDSP minus Output Schedule for all Resources with a Resource Status of ONDSR of the QSE for the five-minute clock interval

ARRDDSRLR = Average Responsive Reserve Deployment DSR Load Resource = the average RRS energy deployment for the five-minute clock interval from Load Resources that are part of the DSR Load

ANSDDSRLR = Average Non-Spin Deployment DSR Load Resource = the average Non-Spin energy deployment for the five-minute clock interval from Load Resources that are part of the DSR Load

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| ***[NPRR863: Replace paragraph (2) above with the following upon system implementation:]***(2) For all of a QSE’s Resources that have a Resource Status of ONDSR (“Dynamically Scheduled Resource (DSR) Portfolio”), ERCOT shall calculate an aggregate GREDP as a percentage and in MWs for those Resources as follows:**GREDP (%) = ABS[(∑*DSR* ATG – ∑*DSR*DSPOS + Intra-QSE Purchase – Intra-QSE Sale – ARRDDSRLR - AECRDDSRLR – ANSDDSRLR – ∑*DSR* AEPFR) / (ATDSRL) – 1.0] \* 100****GREDP (MW) = ABS(∑*DSR*ATG – ∑*DSR* DSPOS – ATDSRL– ARRDDSRLR - AECRDDSRLR – ANSDDSRLR + Intra-QSE Purchase - Intra-QSE Sale – ∑*DSR* AEPFR)**Where:∑*DSR* ATG = Sum of Average Telemetered Generation for all Resources with a Resource Status of ONDSR of the QSE for the five-minute clock intervalATDSRL = Average Telemetered DSR Load = the average telemetered DSR Load for the QSE for the five-minute clock intervalIntra-QSE Purchase = Energy Trade where the QSE is both the buyer and seller with the flag set to “Purchase”Intra-QSE Sale = Energy Trade where the QSE is both the buyer and seller with the flag set to “Sale”∑*DSR*AEPFR = Sum of Average Estimated Primary Frequency Response for all Resources with a Resource Status of ONDSR of the QSE for the five-minute clock interval∑*DSR*DSPOS = the time-weighted average of UDSP minus Output Schedule for all Resources with a Resource Status of ONDSR of the QSE for the five-minute clock interval ARRDDSRLR = Average Responsive Reserve Deployment DSR Load Resource = the average RRS energy deployment for the five-minute clock interval from Load Resources that are part of the DSR LoadAECRDDSRLR = Average ERCOT Contingency Response Deployment DSR Load Resource = the average ECRS energy deployment for the five-minute clock interval from Load Resources that are part of the DSR LoadANSDDSRLR = Average Non-Spin Deployment DSR Load Resource = the average Non-Spin energy deployment for the five-minute clock interval from Load Resources that are part of the DSR Load |

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| ***[NPRR1000: Delete paragraph (3) above upon system implementation and renumber accordingly.]*** |

(3) For Controllable Load Resources that have a Resource Status of ONL and are acting as a Controllable Load Resource, ERCOT shall compute the CLREDP. The CLREDP will be calculated both as a percentage and in MWs as follows:

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| ***[NPRR963: Replace paragraph (3) above with the following upon system implementation:]***(3) For Controllable Load Resources that have a Resource Status of ONL and are acting as a Controllable Load Resource and are not part of an ESR, ERCOT shall compute the CLREDP. The CLREDP will be calculated both as a percentage and in MWs as follows: |

**CLREDP (%) = ABS[((ATPC + AEPFR)/(ASP)) – 1.0] \* 100**

**CLREDP (MW) = ABS(ATPC – (ASP – AEPFR))**

Where:

ATPC = Average Telemetered Power Consumption = the average telemetered power consumption of the Controllable Load Resource for the five-minute clock interval

AEPFR = Average Estimated Primary Frequency Response = the Estimated Primary Frequency Response (MW) will be calculated every four seconds using a Resource specific droop value where 5% droop = 0.05, the Governor Dead-Band (Hz) and Resource HSL (MW) provided by the Resource Entity, and the frequency deviation (Hz) from 60 Hz and averaged for the five-minute clock interval

ASP = Average Set Point = the time-weighted average of the Resource’s UDSP for the five-minute clock interval.

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| ***[NPRR963: Insert paragraph (4) below upon system implementation and renumber accordingly:]***(4) ERCOT shall compute the ESREDP for ESRs. The ESREDP is calculated for each five-minute clock interval as a percentage and in MWs as follows:**ESREDP (%) = ABS[((ATPF – AEPFR)/(ASP)) – 1.0] \* 100****ESREDP (MW) = ABS(ATPF – AEPFR – ASP)**Where:ATPF = Average Telemetered Power Flow = the average telemetered power flow of the Energy Storage Resource for the five-minute clock interval.ASP = Average Set Point = the time-weighted average of UDSP, for the five-minute clock interval. ∆frequency is actual frequency minus 60 Hz.EPFR = Estimated Primary Frequency Response (MW) = If │∆frequency│≤ Governor Dead-Band then EPFR = zero, if not then if ∆frequency > zero, EPFR = (∆frequency - Governor Dead-Band)/((droop value \* 60) – Governor Dead-Band) \* ABS(HSL-LSL) \* -1, if not then if ∆frequency < zero, EPFR = (∆frequency + Governor Dead-Band)/((droop value \* 60) – Governor Dead-Band) \* ABS(HSL-LSL) \* -1.AEPFR = Average Estimated Primary Frequency Response = the Estimated Primary Frequency Response (MW) will be calculated every four seconds using a Resource-specific droop value where 5% droop = 0.05, the Governor Dead-Band (Hz), Resource LSL (MW), and Resource HSL (MW) provided by the Resource Entity, and the frequency deviation (Hz) from 60 Hz and averaged for the five-minute clock interval.  |

(4) ERCOT shall post to the MIS Certified Area for each QSE and for all Generation Resources or Wind-powered Generation Resource (WGR) Groups that are not part of a DSR Portfolio, for the DSR Portfolios, and for all Controllable Load Resources:

(a) The percentage of the monthly five-minute clock intervals during which the Generation Resource or IRR Group was On-Line and released to SCED Base Point Dispatch Instructions;

(b) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL;

(c) The percentage of the monthly five-minute clock intervals during which the Generation Resource, IRR or Controllable Load Resource was awarded Regulation Service;

(d) The percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR Group, or the DSR Portfolio was released to SCED that the GREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR Group, or the DSR Portfolio was released to SCED that the GREDP was less than 2.5 MW;

(e) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was less than 2.5 MW;

(f) The percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR Group, or the DSR Portfolio was released to SCED that the GREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR Group, or the DSR Portfolio was released to SCED that the GREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;

(g) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;

(h) The percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR Group, or the DSR Portfolio was released to SCED that the GREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR Group, or the DSR Portfolio was released to SCED that the GREDP was greater than 5.0 MW;

(i) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was greater than 5.0 MW;

(j) The percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR, or the DSR Portfolio was awarded Regulation Service that the GREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR, or the DSR Portfolio was providing Regulation Service that the GREDP was less than 2.5 MW;

(k) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was less than 2.5 MW;

(l) The percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR, or the DSR Portfolio was awarded Regulation Service that the GREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR, or the DSR Portfolio was awarded Regulation Service that the GREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;

(m) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;

(n) The percent of the monthly five-minute clock intervals during which the Generation Resource, the IRR, or the DSR Portfolio was awarded Regulation Service that the GREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR, or the DSR Portfolio was awarded Regulation Service that the GREDP was greater than 5.0 MW; and

(o) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was greater than 5.0 MW.

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| ***[NPRR963: Replace paragraph (4) above with the following upon system implementation:]***(4) ERCOT shall post to the MIS Certified Area for each QSE and for all Generation Resources, ESRs, or Wind-powered Generation Resource (WGR) Groups that are not part of a DSR Portfolio, for the DSR Portfolios, and for all Controllable Load Resources:(a) The percentage of the monthly five-minute clock intervals during which the Generation Resource or IRR Group was On-Line and released to SCED Base Point Dispatch Instructions;(b) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL; (c) The percentage of the monthly five-minute clock intervals during which the ESR was On-Line;(d) The percentage of the monthly five-minute clock intervals during which the Generation Resource, IRR, ESR, or Controllable Load Resource was awarded Regulation Service;(e) The percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR Group, or the DSR Portfolio was released to SCED that the GREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR Group, or the DSR Portfolio was released to SCED that the GREDP was less than 2.5 MW;(f) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was less than 2.5 MW; (g) The percentage of the monthly five-minute clock intervals during which the ESR was released to SCED that the ESRESP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the ESR was released to SCED that the ESRESP was less than 2.5 MW;(h) The percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR Group, or the DSR Portfolio was released to SCED that the GREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR Group or the DSR Portfolio was released to SCED that the GREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;(i) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW; (j) The percentage of the monthly five-minute clock intervals during which the ESR was released to SCED that the ESREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the ESR was released to SCED that the ESREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;(k) The percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR Group, or the DSR Portfolio was released to SCED that the GREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR Group or the DSR Portfolio was released to SCED that the GREDP was greater than 5.0 MW;(l) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was greater than 5.0 MW; (m) The percentage of the monthly five-minute clock intervals during which the ESR was released to SCED that the ESREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the ESR was released to SCED that the ESREDP was greater than 5.0 MW;(n) The percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR, or the DSR Portfolio was providing Regulation Service that the GREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR, or the DSR Portfolio was providing Regulation Service that the GREDP was less than 2.5 MW;(o) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was less than 2.5 MW; (p) The percentage of the monthly five-minute clock intervals during which the ESR was awarded Regulation Service that the ESREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the ESR was awarded Regulation Service that the ESREDP was less than 2.5 MW;(q) The percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR, or the DSR Portfolio was awarded Regulation Service that the GREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR, or the DSR Portfolio was awarded Regulation Service that the GREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;(r) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW; (s) The percentage of the monthly five-minute clock intervals during which the ESR was awarded Regulation Service that the ESREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the ESR was awarded Regulation Service that the ESREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;(t) The percent of the monthly five-minute clock intervals during which the Generation Resource, the IRR, or the DSR Portfolio was awarded Regulation Service that the GREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR, or the DSR Portfolio was awarded Regulation Service that the GREDP was greater than 5.0 MW;(u) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was greater than 5.0 MW; and(v) The percent of the monthly five-minute clock intervals during which the ESR was awarded Regulation Service that the ESREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the ESR was awarded Regulation Service that the ESREDP was greater than 5.0 MW. |

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| ***[NPRR1000: Replace paragraph (4) above with the following upon system implementation:]***(4) ERCOT shall post to the MIS Certified Area for each QSE and for all Generation Resources or Wind-powered Generation Resource (WGR) Groups, and for all Controllable Load Resources:(a) The percentage of the monthly five-minute clock intervals during which the Generation Resource or IRR Group was On-Line and released to SCED Base Point Dispatch Instructions;(b) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL; (c) The percentage of the monthly five-minute clock intervals during which the Generation Resource, IRR or Controllable Load Resource was awarded Regulation Service;(d) The percentage of the monthly five-minute clock intervals during which the Generation Resource, the IRR Group, or the DSR Portfolio was released to SCED that the GREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR Group was released to SCED that the GREDP was less than 2.5 MW;(e) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was less than 2.5 MW; (f) The percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR Group was released to SCED that the GREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR Group was released to SCED that the GREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;(g) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW; (h) The percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR Group was released to SCED that the GREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR Group was released to SCED that the GREDP was greater than 5.0 MW;(i) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was greater than 5.0 MW; (j) The percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR was awarded Regulation Service that the GREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR was awarded Regulation Service that the GREDP was less than 2.5 MW;(k) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was less than 2.5 MW; (l) The percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR was awarded Regulation Service that the GREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR was awarded Regulation Service that the GREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;(m) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW; (n) The percent of the monthly five-minute clock intervals during which the Generation Resource or the IRR was awarded Regulation Service that the GREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR was awarded Regulation Service that the GREDP was greater than 5.0 MW; and(o) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was greater than 5.0 MW. |

(5) ERCOT shall calculate the GREDP/CLREDP under normal operating conditions. ERCOT shall not consider five-minute clock intervals during which any of the following events has occurred:

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| ***[NPRR963: Replace paragraph (5) above with the following upon system implementation:]***(5) ERCOT shall calculate the GREDP/CLREDP/ESREDP under normal operating conditions. ERCOT shall not consider five-minute clock intervals during which any of the following events has occurred: |

(a) The five-minute intervals within the 20-minute period following an event in which ERCOT has experienced a Forced Outage causing an ERCOT frequency deviation of greater than 0.05 Hz;

(b) Five-minute clock intervals in which ERCOT has issued Emergency Base Points to the QSE;

(c) The five-minute clock interval following the Forced Outage of any Resource within the QSE’s DSR Portfolio that has a Resource Status of ONDSR;

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

(d) The five-minute clock intervals following a documented Forced Derate or Startup Loading Failure of a Generation Resource or any member IRR of an IRR Group. Upon request of the reliability monitor, the QSE shall provide the following documentation regarding each Forced Derate or Startup Loading Failure:

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| ***[NPRR963: Replace paragraph (d) above with the following upon system implementation:]***(d) The five-minute clock intervals following a documented Forced Derate or Startup Loading Failure of a Generation Resource, ESR, or any member IRR of an IRR Group. Upon request of the reliability monitor, the QSE shall provide the following documentation regarding each Forced Derate or Startup Loading Failure: |

(i) Its generation log documenting the Forced Outage, Forced Derate or Startup Loading Failure;

(ii) QSE (COP) for the intervals prior to, and after the event; and

(iii) Equipment failure documentation which may include, but not be limited to, Generation Availability Data System (GADS) reports, plant operator logs, work orders, or other applicable information;

(e) The five-minute clock intervals where the telemetered Resource Status is set to ONTEST such as intervals during Ancillary Service Qualification and Testing as outlined in Section 8.1.1.1, Ancillary Service Qualification and Testing, or the five-minute clock intervals during general capacity testing requirements as outlined in Section 8.1.1.2, General Capacity Testing Requirements;

(f) The five-minute clock intervals where the telemetered Resource Status is set to STARTUP;

(g) The five-minute clock intervals where a Generation Resource’s ASP is below the average telemetered LSL;

(h) Certain other periods of abnormal operations as determined by ERCOT in its sole discretion; and

(i) For a Controllable Load Resource, the five-minute clock intervals in which the computed Base Points are equal to the snapshot of its telemetered power consumption.

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| ***[NPRR965: Insert paragraph (j) below upon system implementation:]***(j) For QSGRs, the five-minute clock intervals in which the QSGR has a telemetered status of SHUTDOWN or telemeters an LSL of zero pursuant to Section 3.8.3.1, Quick Start Generation Resource Decommitment Decision Process. |

(6) All Generation Resources that are not part of a DSR Portfolio, excluding IRRs, and all DSR Portfolios shall meet the following GREDP criteria for each month. ERCOT will report non-compliance of the following performance criteria to the reliability monitor:

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| ***[NPRR963: Replace paragraph (6) above with the following upon system implementation:]***(6) All Generation Resources that are not part of an ESR or DSR Portfolio, excluding IRRs, and all DSR Portfolios shall meet the following GREDP criteria for each month. ERCOT will report non-compliance of the following performance criteria to the reliability monitor: |

(a) A Generation Resource or DSR Portfolio, excluding an IRR, must have a GREDP less than the greater of X% or Y MW for 85% of the five-minute clock intervals in the month during which GREDP was calculated.

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| ***[NPRR1000: Replace paragraph (a) above with the following upon system implementation:]***(a) A Generation Resource, excluding an IRR, must have a GREDP less than the greater of X% or Y MW for 85% of the five-minute clock intervals in the month during which GREDP was calculated. |

(b) If at the end of the month during which GREDP was calculated a DSR Portfolio has a GREDP less than X% or Y MW for 85% of the five-minute clock intervals, the reliability monitor shall, at the request of the QSE with the DSR Portfolio, recalculate GREDP excluding the five-minute clock intervals following the Forced Outage of any Resource within the QSE’s DSR Portfolio that has a Resource Status of ONDSR continuing until the start of the next Operating Hour for which the QSE is able to adjust. If the Forced Outage of the Resource occurs within ten minutes of the start of the next Operating Hour, then the reliability monitor shall not consider any of the five-minute intervals between the time of the Forced Outage and continuing until the start of the second Operating Hour for which the QSE is able to adjust. The requesting QSE shall provide to the reliability monitor information validating the Forced Outage including the time of the occurrence of the Forced Outage and documentation of the last submitted COP status prior to the Forced Outage of the Resource for the intervals in dispute.

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

(c) Additionally, all Generation Resources that are not part of a DSR Portfolio, excluding IRRs, and all DSR Portfolios will also be measured for performance specifically during intervals in which ERCOT has declared EEA Level 1 or greater. These Resources must meet the following GREDP criteria for the time window that includes all five-minute clock intervals during which EEA was declared. ERCOT will report non-compliance of the following performance criteria to the reliability monitor:

(i) A Generation Resource or DSR Portfolio, excluding an IRR, must have a GREDP less than the greater of X% or Y MW. A Generation Resource or DSR Portfolio cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and GREDP was calculated. The performance will be measured separately for each instance in which ERCOT has declared EEA.

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| ***[NPRR963: Replace paragraph (c) above with the following upon system implementation:]***(c) Additionally, all Generation Resources that are not part of an ESR or DSR Portfolio, excluding IRRs, and all DSR Portfolios will also be measured for performance specifically during intervals in which ERCOT has declared EEA Level 1 or greater. These Resources must meet the following GREDP criteria for the time window that includes all five-minute clock intervals during which EEA was declared. ERCOT will report non-compliance of the following performance criteria to the reliability monitor:(i) A Generation Resource or DSR Portfolio, excluding an IRR or Generation Resource part of an ESR, must have a GREDP less than the greater of X% or Y MW. A Generation Resource or DSR Portfolio cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and GREDP was calculated. The performance will be measured separately for each instance in which ERCOT has declared EEA. |

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| ***[NPRR1000: Replace paragraph (c) above with the following upon system implementation:]***(c) Additionally, all Generation Resources, excluding IRRs, will also be measured for performance specifically during intervals in which ERCOT has declared EEA Level 1 or greater. These Resources must meet the following GREDP criteria for the time window that includes all five-minute clock intervals during which EEA was declared. ERCOT will report non-compliance of the following performance criteria to the reliability monitor:(i) A Generation Resource, excluding an IRR, must have a GREDP less than the greater of X% or Y MW. A Generation Resource cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and GREDP was calculated. The performance will be measured separately for each instance in which ERCOT has declared EEA. |

(7) All IRRs and IRR Groups shall meet the following GREDP criteria for each month. ERCOT will report non-compliance of the following performance criteria to the reliability monitor:

(a) An IRR or IRR Group must have a GREDP less than Z% or the ATG must be less than the expected MW output for 95% of the five-minute clock intervals in the month when the Resource or a member IRR of an IRR Group received a Base Point Dispatch Instruction in which the Base Point was two MW or more below the IRR’s HSL used by SCED. The expected MW output includes the Resource’s Base Point, Regulation Service instructions, and any expected Primary Frequency Response.

(b) Additionally, all IRRs and IRR Groups will also be measured for performance specifically during intervals in which ERCOT has declared EEA Level 1 or greater. These Resources and IRR Groups must meet the following GREDP criteria for the time window that includes all five-minute clock intervals during which EEA was declared. ERCOT will report non-compliance of the following performance criteria to the reliability monitor:

(i) An IRR or IRR Group must have a GREDP less than Z% or the ATG must be less than the expected MW output. An IRR or IRR Group cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and the Resource or a member of an IRR Group received a Base Point Dispatch Instruction in which the Base Point was two MW or more below the IRR’s HSL used by SCED. The performance will be measured separately for each instance in which ERCOT has declared EEA.

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| ***[NPRR879: Replace paragraph (7) above with the following upon system implementation:]***(7) All IRRs and IRR Groups shall meet the following GREDP criteria for each month. ERCOT will report non-compliance of the following performance criteria to the reliability monitor:(a) An IRR or IRR Group must have a GREDP less than Z% or the ATG must be less than the expected MW output for 95% of the five-minute clock intervals in the month when the Resource or a member IRR of an IRR Group was not awarded Ancillary Service and received a Base Point Dispatch Instruction in which the Base Point was two MW or more below the IRR’s HSL used by SCED. The expected MW output includes the Resource’s Base Point, Regulation Service instructions, and any expected Primary Frequency Response.(b) An IRR or IRR Group must have a GREDP less than the greater of X% or Y MW for 85% of the five-minute clock intervals in the month during which the Resource or a member IRR of an IRR Group was awarded Ancillary Service.(c) Additionally, all IRRs and IRR Groups will also be measured for performance specifically during intervals in which ERCOT has declared EEA Level 1 or greater. These Resources and IRR Groups must meet the following GREDP criteria for the time window that includes all five-minute clock intervals during which EEA was declared. ERCOT will report non-compliance of the following performance criteria to the reliability monitor:(i) An IRR or IRR Group must have a GREDP less than Z% or the ATG must be less than the expected MW output. An IRR or IRR Group cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and the Resource or a member of an IRR Group was not awarded Ancillary Service and received a Base Point Dispatch Instruction in which the Base Point was two MW or more below the IRR’s HSL used by SCED. The performance will be measured separately for each instance in which ERCOT has declared EEA.(ii) An IRR or IRR Group must have a GREDP less than the greater of X% or Y MW when the Resource or a member IRR of an IRR Group was awarded Ancillary Service. An IRR or IRR Group cannot fail this criteria more than three five-minute clock intervals during which EEA was declared. The performance will be measured separately for each instance in which ERCOT has declared EEA. |

(8) All Controllable Load Resources shall meet the following CLREDP criteria each month. ERCOT will report non-compliance of the following performance criteria to the reliability monitor:

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| ***[NPRR963: Replace paragraph (8) above with the following upon system implementation:]***(8) All Controllable Load Resources that are not part of an ESR shall meet the following CLREDP criteria each month. ERCOT will report non-compliance of the following performance criteria to the reliability monitor: |

(a) A Controllable Load Resource must have a CLREDP less than the greater of X% or Y MW for 85% of the five-minute clock intervals in the month during which CLREDP was calculated.

(b) Additionally, all Controllable Load Resources will also be measured for performance specifically during intervals in which ERCOT has declared EEA Level 1 or greater. These Resources must meet the following CLREDP criteria for the time window that includes all five-minute clock intervals during which EEA was declared. ERCOT will report non-compliance of the following Performance criteria to the reliability monitor:

(i) A Controllable Load Resource must have a CLREDP less than the greater of X% or Y MW. A Controllable Load Resource cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and CLREDP was calculated. The performance will be measured separately for each instance in which ERCOT has declared EEA.

(c) For Controllable Load Resources which are providing RRS or Non-Spin, the following intervals will be excluded from these calculations:

(i) Five-minute clock intervals which begin ten minutes or less after a deployment of RRS was deployed to the Resource;

(ii) Five-minute clock intervals which begin ten minutes or less after a recall of RRS when the Resource was deployed for RRS;

(iii) Five-minute clock intervals which begin 30 minutes or less after a deployment of Non-Spin was deployed to the Resource; and

(iv) Five-minute clock intervals which begin 30 minutes or less after a recall of Non-Spin when the Resource was deployed for Non-Spin.

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| ***[NPRR863: Replace paragraph (c) above with the following upon system implementation:]***(c) For Controllable Load Resources which are providing RRS, ECRS, or Non-Spin, the following intervals will be excluded from these calculations:(i) Five-minute clock intervals which begin ten minutes or less after a deployment of RRS or ECRS was deployed to the Resource; (ii) Five-minute clock intervals which begin ten minutes or less after a recall of RRS or ECRS when the Resource was deployed for RRS or ECRS;(iii) Five-minute clock intervals which begin 30 minutes or less after a deployment of Non-Spin was deployed to the Resource; and(iv) Five-minute clock intervals which begin 30 minutes or less after a recall of Non-Spin when the Resource was deployed for Non-Spin. |

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| ***[NPRR963: Insert paragraph (9) below upon system implementation and renumber accordingly:]***(9) All ESRs shall meet the following ESREDP criteria each month. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:(a) An ESR must have an ESREDP less than the greater of V% or W MW for 85% of the five-minute clock intervals in the month during which ESREDP was calculated.(b) Additionally, all ESRs will also be measured for performance specifically during intervals in which ERCOT has declared EEA Level 1 or greater. These Resources must meet the following ESREDP criteria for the time window that includes all five-minute clock intervals during which EEA was declared. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:(i) An ESR must have an ESREDP less than the greater of V% or W MW. An ESR cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and ESREDP was calculated. The performance will be measured separately for each instance in which ERCOT has declared EEA. |

(10) DC-Coupled Resources shall meet the following ESREDP criteria each month. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:

(a) For each five-minute clock interval in which a DC-Coupled Resource meets the conditions in paragraph (1) of Section 3.8.7, DC-Coupled Resources, the DC-Coupled Resource must have an ESREDP less than the greater of V% or W MW for 85% of the five-minute clock intervals in the month during which ESREDP for the DC-Coupled Resource was calculated.

(b) For each five-minute clock interval in which a DC-Coupled Resource meets the conditions in paragraph (2) of Section 3.8.7, the DC-Coupled Resource must have an ESREDP less than Z% or the ATG must be less than the expected MW output for 95% of the five-minute clock intervals in the month when the DC-Coupled Resource received a Base Point Dispatch Instruction in which the Base Point was two MW or more below the DC-Coupled Resource’s HSL used by SCED. The expected MW output includes the Resource’s Base Point and any expected Primary Frequency Response.

(c) Additionally, all DC-Coupled Resources will be measured for performance during intervals in which ERCOT has declared an EEA. These Resources must meet the following ESREDP criteria for the time window that includes all five-minute clock intervals during which the EEA was declared. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:

(i) For each five-minute clock interval in which a DC-Coupled Resource meets the conditions in paragraph (1) of Section 3.8.7, the DC-Coupled Resource must have an ESREDP less than the greater of V% or W MW. A DC-Coupled Resource cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and ESREDP was calculated. The performance will be measured separately for each instance in which ERCOT has declared EEA.(ii) For each five-minute clock interval in which a DC-Coupled Resource meets the conditions in paragraph (2) of Section 3.8.7, the DC-Coupled Resource must have a ESREDP less than Z% or the ATG must be less than the expected MW output. A DC-Coupled Resource cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and the DC-Coupled Resource received a Base Point Dispatch Instruction in which the Base Point was two MW or more below the DC-Coupled Resource’s HSL used by SCED. The performance will be measured separately for each instance in which ERCOT has declared EEA.

(11) The GREDP/CLREDP performance criteria in paragraphs (6) through (8) above shall be subject to review and approval by TAC. The GREDP/CLREDP performance criteria variables X, Y, and Z shall be posted to the MIS Public Area no later than three Business Days after TAC approval.

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| ***[NPRR963: Replace paragraph (11) above with the following upon system implementation:]***(11) The GREDP/CLREDP/ESREDP performance criteria in paragraphs (8) through (11) above shall be subject to review and approval by TAC. The GREDP/CLREDP/ESREDP performance criteria variables V, W, X, Y, and Z shall be posted to the MIS Public Area no later than three Business Days after TAC approval. |

(12) If at the end of the month during which GREDP was calculated, a non-DSR Resource or a QSE with DSR Resources, has a GREDP less than X% or Y MW for 85% of the five-minute clock intervals, the reliability monitor shall, at the request of the QSE, recalculate GREDP excluding the five-minute clock intervals when a Resource is deployed above the unit’s ramp rate due to ramp rate sharing between energy and Regulation Service. The requesting QSE shall provide to the reliability monitor information validating the ramp rate violation for the intervals in dispute.

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| ***[NPRR1000: Replace paragraph (12) above with the following upon system implementation:]***(12) If at the end of the month during which GREDP was calculated, a Resource has a GREDP less than X% or Y MW for 85% of the five-minute clock intervals, the reliability monitor shall, at the request of the QSE, recalculate GREDP excluding the five-minute clock intervals when a Resource is deployed above the unit’s ramp rate due to ramp rate sharing between energy and Regulation Service. The requesting QSE shall provide to the reliability monitor information validating the ramp rate violation for the intervals in dispute. |

***25.5.2 Market Suspension Make-Whole Payment***

(1) To compensate QSEs representing Generation Resources or Energy Storage Resources (ESRs) for providing energy during a Market Suspension, ERCOT shall calculate a Market Suspension Make-Whole Payment for the Operating Day as follows:

MSMWAMT *q, r, d* = (-1) \* (MSSUC *q, r, d* + MSOC *q, r, d* + MSSUCADJ *q, r, d* + MSOCADJ *q, r, d*)

Where,

The startup cost (MSSUC) is calculated as follows:

For Black Start Resources:

MSSUC *q, r, d* = $0.00

For Combined Cycle Trains:

MSSUC *q, r, d* = MSSUPR *q, r,* s + (MAX (0, MSSUPR afterCCGR –

MSSUPR beforeCCGR))

For all other Resources:

MSSUC *q, r, d* =  MSSUPR *q, r, s*

The startup price (MSSUPR) and operating cost (MSOC) are calculated as follows:

If ERCOT has approved verifiable costs for the Generation Resource:

MSSUPR *q, r, s* = RABCFCRS *q, r, s* \* (MSAVGFP + FA *q, r*) + RVOMS *q, r, s*

MSOC *q, r, d* = (AHR *q, r, i* \* (MSAVGFP + FA *q, r*) + ROM *q, r*) \* MSGEN *q, r, i*

Otherwise,

MSSUPR *q, r, s* = RCGSC

MSOC *q, r, d* = (PAHR *r, i* \* (MSAVGFP + PFA *rc*) + STOM *rc*) \* MSGEN *q, r, i*

Where,

MSAVGFP = MSAVGFIP for Generation Resources that indicate in the Resource Registration process or the verifiable cost process to start on natural gas. For ESRs, the MSAVGFIP shall be set to zero.

Or,

MSAVGFP = MSAVGFOP for Generation Resources that indicate in the Resource Registration process or through the verifiable cost process to start on fuel oil

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MSMWAMT *q, r, d* | $ | *Market Suspension Make-Whole Payment –* The Market SuspensionMake-Whole Payment to the QSE *q,* for Resource *r*, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MSSUCADJ *q, r, d* | $ | *Market Suspension Startup Costs Adjustment –* Adjustment to the Market SuspensionMake-Whole Payment to pay or charge the QSE *q* for actual costs related to starting up Resource *r*, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MSOCADJ *q, r, d* | $ | *Market Suspension Operating Costs Adjustment –* Adjustment to the Market SuspensionMake-Whole Payment to pay or charge the QSE *q* for actual costs for operating Resource *r*, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MSSUC *q, r, d*  | $ | *Market Suspension Startup Cost –* The Startup Costs for Resource *r* represented by QSE *q* during restart hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MSSUPR *q, r, s* | $ | *Market Suspension Startup Price per Start –* The MarketSuspensionSettlement price for Resource *r* represented by QSE *q* for the start *s*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RABCFCRS *q, r, s* | MMBtu / start | *Raw Actual Breaker Close Fuel Consumption Rate per Start –* The raw actual verifiable fuel consumption rate, from first fire to breaker close, for the Resource *r* represented by QSE *q*, per start *s,* for the warmth state, as submitted through the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MSOC *q, r, d*  | $ | *Market Suspension Operating Cost* *–* The MarketSuspensionoperating cost for Resource *r* represented by QSE *q* for operations after breaker close for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RVOMS *q, r, s* | $/start | *Raw Verifiable Operations and Maintenance Cost per Start –* The raw verifiable Operations and Maintenance (O&M) cost for the Resource *r* represented by QSE *q*, per start *s,* for the warmth state, as submitted through the verifiable cost process*.*  Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.  |
| ROM *q, r* | $/MWh | *Raw Verifiable Operations and Maintenance Cost Above LSL –* The raw verifiable O&M cost for the Resource *r* represented by QSE *q* for operations above Low Sustained Limit (LSL). Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| STOM *rc* | $/MWh | *Standard Operations and Maintenance Cost –* The standard O&M cost for the Resource category *rc* for operations above LSL, shall be set to the minimum energy variable O&M costs, as described in paragraph (6)(c) of Section 5.6.1, Verifiable Costs. For an ESR, STOM shall be set at $0.3/MWh and for a DC-Coupled Resource, the value shall be set at $4.40/MWh. |
| MSAVGFP | $/MMBtu | *Market Suspension Average Fuel Price* *–* The Market Suspensionaverage fuel price calculated based on MSAVGFIP or MSAVGFOP. |
| MSAVGFIP | $/MMBtu | *Market Suspension Average Fuel Index Price* *–* The Market Suspensionaverage Fuel Index Price (FIP) calculated as the average price of FIP for the 15 days prior to the Market Suspensionevent, calculated on a daily rolling basis for Operating Days the index price is available to ERCOT.  |
| MSAVGFOP | $/MMBtu | *Market Suspension Average Fuel Oil Price* *–* The Market Suspension average Fuel Oil Price (FOP) calculated as the average price of FOP for the 15 days prior to the Market Suspensionevent, calculated on a daily rolling basis for Operating Days the index price is available to ERCOT.  |
| RCGSC | $/start | *Resource Category Generic Startup Cost –* The Resource Category Generic Startup Cost cap for the category of the Resource, according to Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, for the Operating Day. |
| FA *q, r* | $/MMBtu | *Verifiable Average Fuel Adder* *–* The verifiable average fuel price adder for the Resource *r* represented by QSE *q*. The fuel adder shall be set to the actual approved verifiable fuel adder or the standard value defined in the Verifiable Cost Manual. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| PFA *rc* | $/MMBtu | *Proxy Fuel Adder –* The proxy fuel price adder for the Resource category *rc*. For all thermal Generation Resources, the fuel adder shall be set to $0.50/MMBtu; otherwise, the fuel adder shall be set to $0.00/MMBtu.  |
| AHR *q, r, i* | MMBtu / MWh | *Average Heat Rate per Resource –* The verifiable average heat rate for the Resource *r* represented by QSE *q*, for operating levels between LSL and High Sustained Limit (HSL), for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| PAHR *r, i* | MMBtu / MWh | *Proxy Average Heat Rate –* The proxy average heat rate for the Resource *r* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MSGEN *q, r, i* | MWh | *Market Suspension Generation per Resource –* The generation for the Resource *r* represented by QSE *q* for the 15-minute Settlement Interval *i*.  |
| *q* | None | A QSE. |
| *r* | None | A Generation Resource or ESR. |
| *d* | None | An Operating Day during a Market Suspensionevent. |
| *i* | None | A 15-minute Settlement Interval within the hour of an Operating Day of a Market Suspensionevent. |
| *s* | None | A Generation Resource start during an Operating Day of a Market Suspension event. |
| *t* | None | A transition that is eligible to have its costs included in the Market Suspension Startup Cost. |
| *rc* | None | A Resource category. |
| *afterCCGR* | None | The Combined Cycle Generation Resource to which a Combined Cycle Train transitions. |
| *beforeCCGR* | None | The Combined Cycle Generation Resource from which a Combined Cycle Train transitions. |

(2) The total compensation to each QSE for the Market SuspensionMake-Whole Payment for an Operating Day is calculated as follows:

**MSMWAMTQSETOT *q, d* =** **MSMWAMT *q, r, d***

And,

MSMWAMTTOT *d* =  MSMWAMTQSETOT *q, d*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| MSMWAMTQSETOT*q, d*  | $ | *Market Suspension Make-Whole Payment per QSE –* The total payment to QSE *q* for MarketSuspensionMake-Whole Payment for the Operating Day *d*. |
| MSMWAMTTOT *d* | $ | *Market Suspension Make-Whole Payment Total –* The total payment to all QSEs for MarketSuspensionMake-Whole Payment for the Operating Day.  |
| MSMWAMT *q, r, d* | $ | *Market Suspension Make-Whole Payment –* The MarketSuspensionMake-Whole Payment to the QSE *q,* for Resource *r*, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource or ESR. |
| *d* | none | An Operating Day during a Market Suspensionevent. |

(3) During a Market Suspension, ERCOT may cease making payments in accordance with this Section in the event that funds are not available to make such payments.

***25.5.5 Market Suspension Charge Allocation***

(1) After resumption of the RTM, and in accordance with Section 25.5.1, Settlement Activity for a Market Suspension, ERCOT shall allocate the cost on a Load Ratio Share (LRS) basis for the cost to:

(a) Reimburse QSEs representing Resources for Market Suspension Make-Whole Payments in accordance with Section 25.5.2, Market Suspension Make-Whole Payment;

(b) Reimburse QSEs for Market Suspension DC Tie Import Payments in accordance with Section 25.5.3, Market Suspension DC Tie Import Payment;

(c) Reimburse QSEs for Market Suspension Block Load Transfer Payments in accordance with Section 25.5.4, Market Suspension Block Load Transfer Payment;

(d) Reimburse QSEs for Market Suspension RMR Standby Payments in accordance with Section 6.6.6.1, RMR Standby Payment;

(e) Reimburse QSEs for Market Suspension RMR Payment for Energy in accordance with Section 6.6.6.2, RMR Payment for Energy;

(f) Reimburse QSEs for Market Suspension Black Start Service in accordance with Section 6.6.8.1, Black Start Hourly Standby Fee Payment;

(g) Reimburse QSEs representing ESRs for approved charging costs incurred prior to the Market Suspension; and

(h) Pay any other unfunded non-recurring costs incurred in restarting ERCOT markets.

(2) ERCOT shall charge for the costs described above through the Market Suspension Charge Allocation.

(a) These charges shall be initially allocated on an LRS basis for the most recent 30 days prior to the Market Suspension event for which Initial Settlement has been completed. For purposes of this charge, a QSE’s basis shall be the QSE’s total Real-Time Adjusted Metered Load (AML) for the 30 days prior to the Market Suspension divided by the total ERCOT Real-Time AML for the same period. The initial Market Suspension Charge to each QSE for a given Operating Day is calculated as follows:

LARTMSAMT*q* = (-1) \* (MSMWAMTTOT *d* + MSEDCIMPAMTTOT *d* + MSBLTRAMTTOT *d* + RMRSBAMTTOT + RMREAMTTOT + BSSAMTTOT) \* RTMSLRS *q*

Where:

RTMSLRS *q*= Max(0,RTAML *q, p, i*) / (Max(0,RTAML *q, p, i*))

 The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| LARTMSAMT*q* | $ | *Load Allocated Real-Time Market Suspension Charge –* The allocated charge to QSE *q* for Market Suspension activities for the Operating Day. |
| MSEDCIMPAMTTOT *d*  | $ | *Market Suspension Emergency DC Import Amount Total –* The total Market Suspension Emergency DC Import Amount charges for all QSEs for the Operating Day *d*. |
| MSMWAMTTOT *d*  | $ | *Market Suspension Make-Whole Payment Total –* The total payment to all QSEs for Market SuspensionMake-Whole Payments for the Operating Day.  |
| MSBLTRAMTTOT *d* | $ | *Market Suspension Block Load Transfer Amount Total –* The total Market Suspension Block Load Transfer Amount for all QSEs for the Operating Day *d*. |
| BSSAMTTOT | $ | *Black Start Service Amount QSE Total ERCOT-Wide –* The total of the payments to QSE *q* for BSS provided by all the BSS Resource represented by this QSE for the hour *h*. |
| RMREAMTTOT | $ | *RMR Energy Amount Total –* The total of the energy cost payments to all QSEs for all RMR Units, for the hour. |
| RMRSBAMTTOT | $ | *RMR Standby Amount Total –* The total of the Standby Payments to all QSEs for all RMR Units, for the hour. |
| RTMSLRS *q* | none | *Real-Time Market Suspension Load Ratio Share –* The ratio of the QSE *q*’s Real-Time AML to the total ERCOT Real-Time AML for the 30 day period prior to the Market Suspension for which Initial Settlement has been completed. |
| RTAML *q, p, i* | MWh | *Real-Time Adjusted Metered Load –* The sum of the AML at the Electrical Buses that are included in Settlement Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval *i*. |
| *i* | none | A 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Load Zone Settlement Point. |
| *d* | none | An Operating Day. |
| *h* | none | An hour within a Market Suspension. |

(b) This Market Suspension Charge shall be resettled using TDSP-submitted actual and estimated Load data. ERCOT-estimated data will be excluded. The most recent 30 day LRS prior to the Market Suspension event, as described in paragraph (a) above, will continue to be used to allocate Startup Costs and standby payments for RMR Units and Black Start Resources. The resettled Market Suspension Charge to each QSE for a given Operating Day is calculated as follows:

LARTMSAMT*q*= (-1) \* {((MSSUC *q, r, d* + MSSUCADJ *q, r, d*) + RMRSBAMTTOT +BSSAMTTOT) \* RTMSLRS *q* + [MSMWAMTTOT *d* - (MSSUC *q, r, d* + MSSUCADJ *q, r, d*)+ MSEDCIMPAMTTOT *d* + MSBLTRAMTTOT *d* + RMREAMTTOT] \* AMRTSLRS *q, d*}

Where:

AMRTSLRS *q, d*= Max(0, AMRTAML *q, d* – AMRTAESRML *q, d*) / Max(0, AMRTAML *q, d* – AMRTAESRML *q, d*)

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| LARTMSAMT*q* | $ | *Load Allocated Real-Time Market Suspension Charge –* The allocated charge to QSE *q* for Market Suspension activities for the Operating Day. |
| MSSUC *q, r, d*  | $ | *Market Suspension Startup Cost –* The Startup Costs for Resource *r* represented by QSE *q* during restart hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| MSEDCIMPAMTTOT *d*  | $ | *Market Suspension Emergency DC Import Amount Total –* The total Market Suspension Emergency DC Import Amount charges for all QSEs for the Operating Day *d*. |
| MSMWAMTTOT *d*  | $ | *Market Suspension Make-Whole Payment Total –* The total payment to all QSEs for Market SuspensionMake-Whole Payments for the Operating Day.  |
| MSBLTRAMTTOT *d* | $ | *Market Suspension Block Load Transfer Amount Total –* The total Market Suspension Block Load Transfer Amount for all QSEs for the Operating Day *d*. |
| BSSAMTTOT | $ | *Black Start Service Amount QSE Total ERCOT-Wide –* The total of the payments to QSE *q* for BSS provided by all the BSS Resource represented by this QSE for the hour. |
| RMREAMTTOT | $ | *RMR Energy Amount Total –* The total of the energy cost payments to all QSEs for all RMR Units, for the hour. |
| RMRSBAMTTOT | $ | *RMR Standby Amount Total –* The total of the Standby Payments to all QSEs for all RMR Units, for the hour. |
| RTMSLRS *q, d* | none | *Real-Time Market Suspension Load Ratio Share –* The ratio of the QSE *q*’s Real-Time AML to the total ERCOT Real-Time AML for the 30 day period prior to the Market Suspension for which Initial Settlement has been completed. |
| AMRTSLRS *q, d* | none | *Actual Metered Real-Time Suspension Load Ratio Share –* The ratio of the QSE *q*’s actual metered Real-Time AML to the total ERCOT actual metered Real-Time AML. |
| AMRTAML  *q, d*  | MWh | *Actual Metered Real-Time Adjusted Metered Load –* The sum of the actual metered Load represented by QSE *q* for the day *d*. |
| AMRTAESRML *q, d*  | MWh | *Actual Metered Real-Time Adjusted ESR Metered Load –* The sum of the ESR actual metered Load represented by QSE *q* for the day *d*. Where the ESR actual metered Load represents the ESR Load as measured by Metered Energy for Energy Storage Resource Load at Bus (MEBR), as described in Section 6.6.3.1, Real-Time Energy Imbalance Payment or Charge at a Resource Node. |
| *q* | none | A QSE. |
| *d* | none | An Operating Day during a Market Suspensionevent. |
| *h* | none | An hour within a Market Suspension. |
| *r* | none | A Generation Resource or ESR. |

***25.5.6 Market Suspension Data Submissions***

(1) Any data submissions provided by the Transmission and/or Distribution Service Provider (TDSP), Meter Reading Entity (MRE), or a QSE representing a Generation Resource required or requested by ERCOT due to a Market Suspension shall be filed within five months of the Market Restart, including but not limited to:

(a) Generation data;

(b) Load data;

(c) Actual price paid for delivered natural gas, fuel oil, or another fuel; and

(d) Costs associated with the transport or delivery of fuel.

(2) Any QSE representing an Energy Storage Resource may submit the following information to ERCOT within five months of the Market Restart for ERCOT’s use in calculating the QSE’s payment pursuant to Section 25.5.2, Market Suspension Make-Whole Payment:

(a) Actual variable O&M rate incurred during the Market Suspension period in lieu of the Standard Operations and Maintenance Cost (STOM);

(b) The electricity cost incurred prior to a Market Suspension for any net amount of discharge of the battery during the Market Suspension period, if the ESR’s state of charge at the end of the Market Suspension is less than the state of charge at the beginning of the period. The electricity cost incurred to charge the battery prior to a Market Suspension may include the cost of serving any auxiliary Load not measured with the settlement meters. The following information must be provided to support recovery of these costs:

(i) Battery state of charge prior to Market Suspension;

(ii) Battery state of charge at the end of the Market Suspension;

(iii) Prices paid to charge the battery for the MWh difference between (i) and (ii) above.