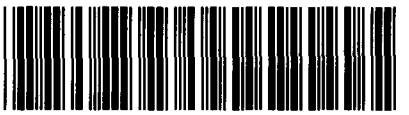

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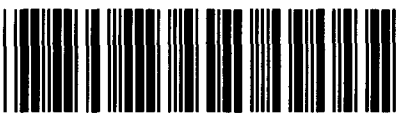

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PROJECT NO. 24055

PROTOCOL REVISION INFORMATIONAL FILINGS BY THE ELECTRIC RELIABILTY COUNCIL OF TEXAS	§ § § §	**PUBLIC UTILITY COMMISSION OF TEXAS**

ERCOT'S NOTICE OF NODAL PROTOCOL REVISIONS (OCTOBER 26, 2018)

COMES NOW, Electric Reliability Council of Texas, Inc. (ERCOT) and respectfully informs the Public Utility Commission of Texas (Commission) of revisions to the ERCOT Nodal Protocols.

Summary of Revisions

In accordance with the process set forth in Section 21 of the ERCOT Protocols, ERCOT adopted Nodal Protocol Revision Requests (NPRRs) 843 (partially unboxed language) and 864 (unboxed language). These NPRRs were developed in the ERCOT committee process, and approved by the ERCOT Board of Directors (ERCOT Board) on December 12, 2017 (NPRR843) and April 10, 2018 (NPRR864). These NPRRs are described below.

NPRR	Description	ERCOT Nodal Protocol Sections Modified
843 **(partially unboxed language)**	**Short-Term System Adequacy and AS Offer Disclosure Reports Additions.** This NPRR addresses four separate reporting items in Section 3, Management Activities for the ERCOT System: 1) Changes the logic for the Short-Term System Adequacy Reports for more consistent treatment of Resource Statuses in reporting available capacity. Also, more specific language is added to provide clarity to end users of the reports; 2) Creates a new report which will show the portion of Ancillary Service Offers at or above 50 times the Fuel Index Price (FIP) when the Market Clearing Price for	Section 3, Subsections 3.2.3 and 3.2.5 (Attachment A)

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	Capacity (MCPC) of that Ancillary Service exceeds 50 times FIP; 3) Includes additional elements to the "48-Hour Highest Price AS Offer Selected" report to also include the highest-priced Ancillary Service Offer selected in a Supplemental Ancillary Services Market (SASM); and 4) Creates a 60-day SASM disclosure report to provide transparency into Ancillary Service Offers and awards for any SASMs that may have been executed for a period within an Operating Day.	
864 **(unboxed language)**	**RUC Modifications to Consider Market-Based Solutions.** This NPRR modifies the Reliability Unit Commitment (RUC) engine to scale down commitment costs of fast-start Resources (<=1 hr starts) so that the RUC engine will recommend slow-start Resource commitments only if re-Dispatching of On-Line Resources and potential market-based self-commitments of fast-start Resources will not resolve the reliability issue.	Section 3, Subsection 3.2.3 (Attachment A) Section 5, Subsections 5.1 and 5.5.2 (Attachment B) Section 8, Subsection 8.1.2 (Attachment C)
	Administrative Changes. Non-substantive administrative changes were made such as spelling corrections, formatting, and correcting Section numbering and references.	Section 1, Subsection 1.3.1.1 (Attachment D) Section 3, Subsection 3.2.1 (Attachment A) Section 6, Subsections 6.7.5 and 6.5.7.3.1 (Attachment E)

The changes to the Nodal Protocol language as revised by the above NPRRs are shown in Attachments A through E in redline format.

The ERCOT Nodal Protocols, including these revisions, may be accessed on ERCOT's website at http://www.ercot.com/mktrules/nprotocols/index.html.

Respectfully submitted,

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LIST OF ATTACHMENTS

ATTACHMENT A – Section 03-102618 Redline

ATTACHMENT B – Section 05-102618 Redline

ATTACHMENT C – Section 08-102618 Redline

ATTACHMENT D – Section 01-102618 Redline

ATTACHMENT E – Section 06-102618 Redline

ERCOT Nodal Protocols

Section 3: Management Activities for the ERCOT System

~~September 1~~October 26, 2018

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3 MANAGEMENT ACTIVITIES FOR THE ERCOT SYSTEM

3.2 Analysis of Resource Adequacy

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 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 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 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 Resource capacity from Intermittent Renewable Resources (IRRs) 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 a "Medium-Term System Adequacy Report" on the MIS Secure Area. ERCOT shall update the report monthly using the latest aggregate Generation Resource capacity and Load Resource capacity. The data will be provided for

each week, starting with the second week, of a rolling 36-month period. The Medium-Term System Adequacy Report will provide:

(a) Generation Resource capacity at the time of forecasted weekly peak Demand;

(b) Load Resource capacity at the time of the forecasted weekly peak Demand;

(c) Weekly peak forecast Demand described in Section 3.2.2, Demand Forecasts;

(d) Calculated system reserve, highlighting any deficiency hours, that excludes Load Resource capacity;

(e) Calculated system reserve, highlighting any deficiency hours, that includes Load Resource capacity shown as a reduction in forecast Demand;

(f) Ancillary Service requirements; and

(g) Transmission constraints that have a high probability of being binding in the Security-Constrained Economic Dispatch (SCED) or Day-Ahead Market (DAM) given the forecasted system conditions for each week excluding the effects of any transmission or Resource Outages.

(3) 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;

~~*[NPRR843: Replace paragraph (a) above with the following upon system implementation:]*~~

~~(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:

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(i) IRRs 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 ONRGL, ONCLR, or ONRL;

~~*[NPRR843: Replace paragraph (c) above with the following upon system implementation:]*~~

~~(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 ONRGL, ONCLR, or ONRL;~~

(d) Forecast Demand for each hour described in Section 3.2.2;

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

(f) Transmission constraints that have a high probability of being binding in SCED or 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; and

(g) 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 or OFFNS and temporal constraints.

~~*[NPRR843: Replace paragraph (g) above with the following upon system implementation:]*~~

~~(g) 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 or OFFNS and temporal constraints.~~

(h) 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.

~~*[NPRR864: Insert paragraph (h) below upon system implementation:]*~~

~~(h) 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, Current Operating Plan (COP) Criteria, excluding SHUTDOWN.~~

3.2.5 Publication of Resource and Load Information

(1) Two days after the applicable Operating Day, ERCOT shall post on the MIS Public Area for the ERCOT System and, if applicable, for each Disclosure Area, the information derived from the first complete execution of SCED in each 15-minute Settlement Interval. The Disclosure Area is the 2003 ERCOT ~~Congestion Management Zone~~s. Posting requirements will be applicable to Generation Resources and Controllable Load Resources physically located in the defined Disclosure Area. This information shall not be posted if the posting of the information would reveal any individual Market Participant's Protected Information. The information posted by ERCOT shall include:

(a) An aggregate energy supply curve based on non-IRR Generation Resources with Energy Offer Curves that are available to SCED. The energy supply curves will be calculated beginning at the sum of the Low Sustained Limits (LSLs) and ending at the sum of the HSLs for non-IRR Generation Resources with Energy Offer Curves, with the dispatch for each Generation Resource constrained between the Generation Resource's LSL and HSL. The result will represent the ERCOT System energy supply curve economic dispatch of the non-IRR Generation Resources with Energy Offer Curves at various pricing points, not taking into consideration any physical limitations of the ERCOT System;

(b) An aggregate energy supply curve based on Wind-powered Generation Resources (WGRs) with Energy Offer Curves that are available to SCED. The energy supply curves will be calculated beginning at the sum of the LSLs and ending at the sum of the HSLs for WGRs with Energy Offer Curves, with the dispatch for each WGR constrained between the WGR's LSL and HSL. The result will represent the ERCOT System energy supply curve economic dispatch of the WGRs with Energy Offer Curves at various pricing points, not taking into consideration any physical limitations of the ERCOT System;

(c) An aggregate energy supply curve based on PhotoVoltaic Generation Resources (PVGRs) with Energy Offer Curves that are available to SCED. The energy supply curves will be calculated beginning at the sum of the LSLs and ending at

the sum of the HSLs for PVGRs with Energy Offer Curves, with the dispatch for each PVGR constrained between the PVGR's LSL and HSL. The result will represent the ERCOT System energy supply curve economic dispatch of the PVGRs with Energy Offer Curves at various pricing points, not taking into consideration any physical limitations of the ERCOT System;

(d) The sum of LSLs, sum of Output Schedules, and sum of HSLs for Generation Resources without Energy Offer Curves;

(e) The sum of the Base Points, High Ancillary Service Limit (HASL) and Low Ancillary Service Limit (LASL) of non-IRR Generation Resources with Energy Offer Curves, sum of the Base Points, HASL and LASL of WGRs with Energy Offer Curves, sum of the Base Points, HASL and LASL of PVGRs with Energy Offer Curves, and the sum of the Base Points, HASL and LASL of all remaining Generation Resources dispatched in SCED;

(f) The sum of the telemetered Generation Resource net output used in SCED; and

(g) An aggregate energy Demand curve based on the Real-Time Market (RTM) Energy Bid curves available to SCED. The energy Demand curve will be calculated beginning at the sum of the Low Power Consumptions (LPCs) and ending at the sum of the Maximum Power Consumptions (MPCs) for Controllable Load Resources with RTM Energy Bids, with the dispatch for each Controllable Load Resource constrained between the Controllable Load Resource's LPC and MPC. The result will represent the ERCOT System Demand response capability available to SCED of the Controllable Load Resources with RTM Energy Bids at various pricing points, not taking into consideration any physical limitations of the ERCOT System.

(2) Two days after the applicable Operating Day, ERCOT shall post on the MIS Public Area for the ERCOT System the following information derived from the first complete execution of SCED in each 15-minute Settlement Interval:

(a) Each telemetered Dynamically Scheduled Resource (DSR) Load, and the telemetered DSR net output(s) associated with each DSR Load; and

(b) The actual ERCOT Load as determined by subtracting the Direct Current Tie (DC Tie) Resource actual telemetry from the sum of the telemetered Generation Resource net output as used in SCED.

(3) Two days after the applicable Operating Day, ERCOT shall post on the MIS Public Area the following information for the ERCOT System and, if applicable, for each Disclosure Area from the DAM for each hourly Settlement Interval:

(a) An aggregate energy supply curve based on all energy offers that are available to the DAM, not taking into consideration Resource Startup Offer or Minimum-Energy Offer or any physical limitations of the ERCOT System. The result will

represent the energy supply curve at various pricing points for energy offers available in the DAM;

(b) Aggregate minimum energy supply curves based on all Minimum-Energy Offers that are available to the DAM;

(c) An aggregate energy Demand curve based on the DAM Energy Bid curves available to the DAM, not taking into consideration any physical limitations of the ERCOT System;

(d) The aggregate amount of cleared energy bids and offers including cleared Minimum-Energy Offer quantities;

(e) The aggregate Ancillary Service Offers (prices and quantities) in the DAM, for each type of Ancillary Service regardless of a Resource's On-Line or Off-Line status. For Responsive Reserve (RRS) Service, ERCOT shall separately post aggregated offers from Generation Resources, Controllable Load Resources, and non-Controllable Load Resources. Linked Ancillary Service Offers will be included as non-linked Ancillary Service Offers;

(f) The aggregate Self-Arranged Ancillary Service Quantity, for each type of service, by hour;

(g) The aggregate amount of cleared Ancillary Service Offers; and

(h) The aggregate Point-to-Point (PTP) Obligation bids (not-to-exceed price and quantities) for the ERCOT System and the aggregate PTP Obligation bids that sink in the Disclosure Area for each Disclosure Area.

(4) ERCOT shall post on the MIS Public Area the following information for each Resource for each 15-minute Settlement Interval 60 days prior to the current Operating Day:

(a) The Generation Resource name and the Generation Resource's Energy Offer Curve (prices and quantities):

(i) As submitted;

(ii) As submitted and extended (or truncated) with proxy Energy Offer Curve logic by ERCOT to fit to the operational HSL and LSL values that are available for dispatch by SCED; and

(iii) As mitigated and extended for use in SCED, including the Incremental and Decremental Energy Offer Curves for DSRs;

(b) The Generation Resource name and the Generation Resource's Output Schedule;

(c) For a DSR, the DSR Load and associated DSR name and DSR net output;

(d) The Generation Resource name and actual metered Generation Resource net output;

(e) The self-arranged Ancillary Service by service for each QSE;

(f) The following Generation Resource data using a single snapshot during the first SCED execution in each Settlement Interval:

(i) The Generation Resource name;

(ii) The Generation Resource status;

(iii) The Generation Resource HSL, LSL, HASL, LASL, High Dispatch Limit (HDL), and Low Dispatch Limit (LDL);

(iv) The Generation Resource Base Point from SCED;

(v) The telemetered Generation Resource net output used in SCED;

(vi) The Ancillary Service Resource Responsibility for each Ancillary Service; and

(vii) The Generation Resource Startup Cost and minimum energy cost used in the Reliability Unit Commitment (RUC); and

(g) The following Load Resource data using a single snapshot during the first SCED execution in each Settlement Interval:

(i) The Load Resource name;

(ii) The Load Resource status;

(iii) The Maximum Power Consumption (MPC for a Load Resource);

(iv) The Low Power Consumption (LPC for a Load Resource);

(v) The telemetered real power consumption; and

(vi) The Ancillary Service Resource Responsibility for each Ancillary Service.

(5) If any Real-Time Locational Marginal Price (LMP) exceeds 50 times the Fuel Index Price (FIP) during any 15-minute Settlement Interval for the applicable Operating Day, ERCOT shall post on the MIS Public Area the portion of any Generation Resource's as-submitted and as-mitigated and extended Energy Offer Curve that is at or above 50 times the FIP for each 15-minute Settlement Interval seven days after the applicable Operating Day.

(6) If any Market Clearing Price for Capacity (MCPC) for an Ancillary Service exceeds 50 times the FIP for any Operating Hour in a DAM or Supplemental Ancillary Services Market (SASM) for the applicable Operating Day, ERCOT shall post on the MIS Public Area the portion on any Resource's Ancillary Service Offer that is at or above 50 times the FIP for that Ancillary Service for each Operating Hour seven days after the applicable Operating Day.

~~*[NPRR843: Insert paragraph (6) below upon system implementation and renumber accordingly:]*~~

~~(6) If any Market Clearing Price for Capacity (MCPC) for an Ancillary Service exceeds 50 times the FIP for any Operating Hour in a DAM or Supplemental Ancillary Services Market (SASM) for the applicable Operating Day, ERCOT shall post on the MIS Public Area the portion on any Resource's Ancillary Service Offer that is at or above 50 times the FIP for that Ancillary Service for each Operating Hour seven days after the applicable Operating Day.~~

(~~7~~6) ERCOT shall post on the MIS Public Area the offer price and the name of the Entity submitting the offer for the highest-priced offer selected or Dispatched by SCED 48 hours after the end of the applicable Operating Day. If multiple Entities submitted the highest-priced offers selected, all Entities shall be identified on the MIS Public Area.

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(~~8~~7) ERCOT shall post on the MIS Public Area the bid price and the name of the Entity submitting the bid for the highest-priced bid selected or Dispatched by SCED 48 hours after the end of the applicable Operating Day. If multiple Entities submitted the highest-priced bids selected, all Entities shall be identified on the MIS Public Area.

(~~9~~8) ERCOT shall post on the MIS Public Area the offer price and the name of the Entity submitting the offer for the highest-priced Ancillary Service Offer selected in the DAM for each Ancillary Service 48 hours after the end of the applicable Operating Day. This same report shall also include the highest-priced Ancillary Service Offer selected for any SASMs cleared for that same Operating Day. If multiple Entities submitted the highest-priced offers selected, all Entities shall be identified on the MIS Public Area. The report shall specify whether the Ancillary Service Offer was selected in a DAM or a SASM.

~~*[NPRR843: Replace paragraph (8) above with the following upon system implementation:]*~~

~~(8) ERCOT shall post on the MIS Public Area the offer price and the name of the Entity submitting the offer for the highest-priced Ancillary Service Offer selected in the DAM for each Ancillary Service 48 hours after the end of the applicable Operating Day. This same report shall also include the highest-priced Ancillary Service Offer selected for any SASMs cleared for that same Operating Day. If multiple Entities submitted the highest-priced offers selected, all Entities shall be identified on the MIS Public Area. The report shall specify whether the Ancillary Service Offer was selected in a DAM or a SASM.~~

(~~9~~10) ERCOT shall post on the MIS Public Area for each Operating Day the following information for each Resource:

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(a) The Resource name;

(b) The names of the Entities providing information to ERCOT;

(c) The names of the Entities controlling each Resource. ERCOT shall determine whether the Entity is in control of each Resource in accordance with subsection (e) of P.U.C. SUBST. R. 25.502, Pricing Safeguards in Markets Operated by the Electric Reliability Council of Texas; and

(d) Flag for Reliability Must-Run (RMR) Resources.

(11~~0~~) ERCOT shall post on the MIS Public Area the following information from the DAM for each hourly Settlement Interval for the applicable Operating Day 60 days prior to the current Operating Day:

(a) The Generation Resource name and the Generation Resource's Three-Part Supply Offer (prices and quantities), including Startup Offer and Minimum-Energy Offer, available for the DAM;

(b) For each Settlement Point, individual DAM Energy-Only Offer Curves available for the DAM and the name of the QSE submitting the offer;

(c) The Resource name and the Resource's Ancillary Service Offers available for the DAM;

(d) For each Settlement Point, individual DAM Energy Bids available for the DAM and the name of the QSE submitting the bid;

(e) For each Settlement Point, individual PTP Obligation bids available to the DAM that sink at the Settlement Point and the QSE submitting the bid;

(f) The awards for each Ancillary Service from DAM for each Generation Resource;

(g) The awards for each Ancillary Service from DAM for each Load Resource;

(h) The award of each Three-Part Supply Offer from the DAM and the name of the QSE receiving the award;

(i) For each Settlement Point, the award of each DAM Energy-Only Offer from the DAM and the name of the QSE receiving the award;

(j) For each Settlement Point, the award of each DAM Energy Bid from the DAM and the name of the QSE receiving the award; and

(k) For each Settlement Point, the award of each PTP Obligation bid from the DAM that sinks at the Settlement Point, including whether or not the PTP Obligation bid was Linked to an Option, and the QSE submitting the bid.

[NPRR843: Insert paragraph (12~~1~~) below upon system implementation:]

(12~~1~~) ERCOT shall post on the MIS Public Area the following information from any applicable SASMs for each hourly Settlement Interval for the applicable Operating Day 60 days prior to the current Operating Day:

(a) The Resource name and the Resource's Ancillary Service Offers available for any applicable SASMs;

(b) The awards for each Ancillary Service from any applicable SASMs for each Generation Resource; and

(c) The awards for each Ancillary Service from any applicable SASMs for each Load Resource.

ATTACHMENT B

ERCOT Nodal Protocols

Section 5: Transmission Security Analysis and Reliability Unit Commitment

October 26~~September 1~~, 2018

5 TRANSMISSION SECURITY ANALYSIS AND RELIABILITY UNIT COMMITMENT

5.1 Introduction

(1) Transmission security analysis and Reliability Unit Commitment (RUC) are used to ensure ERCOT System reliability and to ensure that enough Resource capacity, in addition to Ancillary Service capacity, is committed in the right locations to reliably serve the forecasted Load on the ERCOT System including Direct Current Tie (DC Tie) Load that has not been curtailed.

(2) ERCOT shall conduct at least one Day-Ahead Reliability Unit Commitment (DRUC) and at least one Hourly Reliability Unit Commitment (HRUC) before each hour of the Operating Day. ERCOT, in its sole discretion, may conduct a RUC at any time to evaluate and resolve reliability issues.

(3) The DRUC must be run after the close of the Day-Ahead Market (DAM).

(4) The DRUC uses Three-Part Supply Offers, capped at the maximum of generic or verifiable minimum energy and Startup Costs, submitted before the DAM by Qualified Scheduling Entities (QSEs) that were considered in the DAM but not awarded in the DAM. A QSE may not submit a Three-Part Supply Offer to be considered in the DRUC unless the offer was also submitted for consideration in the DAM.

(5) ERCOT must initiate the HRUC process at least one hour before the Operating Hour to fine-tune the Resource commitments using updated Load forecasts and updated Outage information.

(6) The RUC Study Period for DRUC is the next Operating Day. The RUC Study Period for HRUC is the balance of the current Operating Day plus the next Operating Day if the DRUC for the Operating Day has been solved.

(7) HRUC may decommit Resources only to maintain the reliability of the ERCOT System.

(8) For each RUC Study Period, the RUC considers capacity requirements for each hour of the RUC Study Period with the objective of minimizing costs based on logic described in Section 5.5.2, Reliability Unit Commitment (RUC) Process. ~~For each RUC Study Period, the RUC considers capacity requirements for each hour of the RUC Study Period with the objective of minimizing costs based on Three-Part Supply Offers and while substituting a proxy Energy Offer Curve for the Energy Offer Curve. The proxy Energy Offer Curve is calculated in a way that minimizes the effect of the proxy Energy Offer Curves on optimization.~~

~~*[NPRR864: Replace paragraph (8) above with the following upon system implementation:]*~~

~~(8) For each RUC Study Period, the RUC considers capacity requirements for each hour of the RUC Study Period with the objective of minimizing costs based on logic described in~~

~~Section 5.5.2, Reliability Unit Commitment (RUC) Process.~~

(9) The calculated Resource commitments arising from each RUC process, and a list of Off-Line Available Resources having a start-up time of one hour or less, must be reviewed by ERCOT before issuing Dispatch Instructions to QSEs to commit, extend, or decommit Resources.

(10) The Security Sequence is a set of prerequisite processes for RUC that describes the key system components and inputs that are required to support the RUC process, the RUC process itself, and the ERCOT review of the Resource commitment recommendations made by the RUC process.

(11) The RUC process may not be used to buy Ancillary Service unless the Ancillary Service Offers submitted in the DAM are insufficient to meet the requirements of the Ancillary Service Plan.

(12) After the use of market processes to the fullest extent practicable without jeopardizing the reliability of the ERCOT System, any ERCOT Dispatch Instructions for additional capacity that order a QSE to commit a specific Generation Resource to be On-Line shall be considered a RUC Dispatch for the purpose of the Settlement of payments and charges related to the committed Generation Resource. An Operating Condition Notice (OCN), Advisory, Watch, or Emergency Notice requesting the available capacity of any currently available Generation Resources but not naming specific Generation Resources is not considered a RUC Dispatch for purposes of Settlement.

(13) ERCOT shall post on the Market Information System (MIS) Certified Area, for each Off-Line Generation Resource that may be selected by an HRUC process, the current time since the Generation Resource last went Off-Line (in hours) and the corresponding start-up times ERCOT is using for each such Off-Line Generation Resource. The time since the Generation Resource last went Off-Line and start-up times shall be updated at least hourly.

(14) Prior to 1330 in the Day-Ahead, ERCOT may issue a Weekly Reliability Unit Commitment (WRUC) Verbal Dispatch Instruction (VDI) to inform a QSE that a Resource is required to be On-Line for all or part of a future Operating Day. Following the receipt of a WRUC:

(a) The QSE may self-commit the Resource for the WRUC-instructed hours by updating the Resource's Current Operating Plan (COP) to reflect the appropriate On-Line Resource Status for the WRUC-instructed hours prior to the DRUC process execution for the associated Operating Day. Resources that have been self-committed by a QSE in accordance with a WRUC:

(i) May have a Three-Part Supply Offer submitted into the DAM, and any of the WRUC-instructed hours in which the Three-Part Supply Offer is awarded in the DAM become DAM-Committed Intervals for the Resource and are settled accordingly; and

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(ii) Will not be issued a RUC commitment for the WRUC-instructed hours that were self-committed or DAM-committed.

(b) ERCOT will commit the Resource as part of the DRUC process for the relevant Operating Day for all WRUC-instructed hours not DAM-committed or QSE self-committed. For all purposes, including RUC Settlement, the Resource will be considered as committed by the DRUC for these hours.

5.5 Security Sequence, Including RUC

5.5.2 Reliability Unit Commitment (RUC) Process

(1) The RUC process recommends commitment of Generation Resources, to match ERCOT's forecasted Load including Direct Current Tie (DC Tie) Schedules, subject to all transmission constraints and Resource performance characteristics. The RUC process takes into account Resources already committed in the Current Operating Plans (COPs), Resources already committed in previous RUCs, Off-Line Available Resources having a start-up time of one hour or less, and Resource capacity already committed to provide Ancillary Service. The formulation of the RUC objective function must employ penalty factors on violations of security constraints. The objective of the RUC process is to minimize costs based on the Resource costs described in paragraphs (4) through (7) below. For all hours of the RUC Study Period within the RUC process, Quick Start Generation Resources (QSGRs) with a COP Resource Status of OFFQS shall be considered as On-Line with Low Sustained Limit (LSL) at zero MW. QSGRs with a Resource Status of OFFQS shall only be committed by ERCOT through a RUC instruction in instances when a reliability issue would not otherwise be managed through Dispatch Instructions from Security-Constrained Economic Dispatch (SCED). ~~The RUC process recommends commitment of Generation Resources, to match ERCOT's forecasted Load including Direct Current Tie (DC Tie) Schedules, subject to all transmission constraints and Resource performance characteristics. The RUC process takes into account Resources already committed in the Current Operating Plans (COPs), Resources already committed in previous RUCs, Off-Line Available Resources having a start-up time of one hour or less, and Resource capacity already committed to provide Ancillary Service. The formulation of the RUC objective function must employ penalty factors on violations of security constraints. The objective of the RUC process is to minimize costs based on Three-Part Supply Offers, substituting a proxy Energy Offer Curve for the Energy Offer Curve, over the RUC Study Period.~~

~~*[NPRR864: Replace paragraph (1) above with the following upon system implementation:]*~~

~~(1) The RUC process recommends commitment of Generation Resources, to match ERCOT's forecasted Load including Direct Current Tie (DC Tie) Schedules, subject to all transmission constraints and Resource performance characteristics. The RUC process takes into account Resources already committed in the Current Operating Plans (COPs), Resources already committed in previous RUCs, Off-Line Available Resources having a~~

~~start-up time of one hour or less, and Resource capacity already committed to provide Ancillary Service. The formulation of the RUC objective function must employ penalty factors on violations of security constraints. The objective of the RUC process is to minimize costs based on the Resource costs described in paragraphs (4) through (7) below. For all hours of the RUC Study Period within the RUC process, Quick Start Generation Resources (QSGRs) with a COP Resource Status of OFFQS shall be considered as On-Line with Low Sustained Limit (LSL) at zero MW. QSGRs with a Resource Status of OFFQS shall only be committed by ERCOT through a RUC instruction in instances when a reliability issue would not otherwise be managed through Dispatch Instructions from Security Constrained Economic Dispatch (SCED).~~

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

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

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

~~Resource as specified in Section 4.4.9.4, Mitigated Offer Cap and Mitigated Offer Floor, for use in the RUC. Proxy Energy Offer Curves are calculated by multiplying the MOC by a constant selected by ERCOT from time to time that is no more than 0.10% and applying the cost for all Generation Resource output between High Sustained Limit (HSL) and Low Sustained Limit (LSL).~~

~~*[NPRR864: Replace paragraph (4) above with the following upon system implementation:]*~~

~~(4) To determine the projected energy output level of each Resource and to project potential congestion patterns for each hour of the RUC, ERCOT shall calculate proxy Energy Offer Curves based on the Mitigated Offer Caps (MOCs) for the type of Resource as specified in Section 4.4.9.4, Mitigated Offer Cap and Mitigated Offer Floor, for use in the RUC. Proxy Energy Offer Curves are calculated by multiplying the MOC by a constant selected by ERCOT from time to time that is no more than 0.10% and applying the cost for all Generation Resource output between High Sustained Limit (HSL) and LSL. The intent of this process is to minimize the effect of the proxy Energy Offer Curves on optimization.~~

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

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~~*[NPRR864: Replace paragraph (5) above with the following upon system implementation:]*~~

~~(5) ERCOT shall use the RUC process to evaluate the need to commit Resources for which a QSE has submitted Three-Part Supply Offers and other available Off-Line Resources in addition to Resources that are planned to be On-Line during the RUC Study Period. All of the above commitment information must be as specified in the QSE's COP. For available Off-Line Resources with a cold start time of one hour or less that have not been removed from special consideration under paragraph (7) below pursuant to paragraph (4) of Section 8.1.2, Current Operating Plan (COP) Performance Requirements, the Startup Offers and Minimum-Energy Offer from a Resource's Three-Part Supply Offer shall not be used in the RUC process.~~

(6) ERCOT shall create Three-Part Supply Offers for all Resources that did not submit a Three-Part Supply Offer, but are specified as available but Off-Line, excluding Resources

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with a Resource Status of EMR, in a QSE's COP. For such Resources, excluding available Off-Line Resources with a cold start time of one hour or less that have not been removed from special consideration under paragraph (7) below pursuant to paragraph (4) of Section 8.1.2, ERCOT shall use in the RUC process 150% of any approved verifiable Startup Cost and verifiable minimum-energy cost or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as described specified in Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, registered with ERCOT. However for Settlement purposes, ERCOT shall use any approved verifiable Startup Costs and verifiable minimum-energy cost for such Resources, or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and Generic Minimum-Energy Offer Cost.~~ERCOT shall create Three-Part Supply Offers for all Resources that did not submit a Three-Part Supply Offer, but are specified as available but Off-Line, excluding Resources with a Resource Status of EMR, in a QSE's COP. For such Resources, ERCOT shall use in the RUC process 150% of any approved verifiable Startup Cost and verifiable minimum-energy cost or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as described specified in Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, registered with ERCOT. However for Settlement purposes, ERCOT shall use any approved verifiable Startup Costs and verifiable minimum-energy cost for such Resources, or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and Generic Minimum-Energy Offer Cost.~~

~~*[NPRR864: Replace paragraph (6) above with the following upon system implementation:]*~~

~~(6) ERCOT shall create Three-Part Supply Offers for all Resources that did not submit a Three-Part Supply Offer, but are specified as available but Off-Line, excluding Resources with a Resource Status of EMR, in a QSE's COP. For such Resources, excluding available Off-Line Resources with a cold start time of one hour or less that have not been removed from special consideration under paragraph (7) below pursuant to paragraph (4) of Section 8.1.2, ERCOT shall use in the RUC process 150% of any approved verifiable Startup Cost and verifiable minimum-energy cost or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as described specified in Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, registered with ERCOT. However for Settlement purposes, ERCOT shall use any approved verifiable Startup Costs and verifiable minimum-energy cost for such Resources, or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and Generic Minimum-Energy Offer Cost.~~

(7) For all available Off-Line Resources having a cold start time of one hour or less and not removed from special consideration pursuant to paragraph (4) of Section 8.1.2, ERCOT shall scale any approved verifiable Startup Cost and verifiable minimum-energy cost or if verifiable costs have not been approved, the applicable Resource Category Generic

Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as specified in Section 4.4.9.2.3 for use in the RUC process.

The above parameter is defined as follows:

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

~~*[NPRR864: Insert paragraph (7) below upon system implementation and renumber accordingly:]*~~

~~(7) For all available Off-Line Resources having a cold start time of one hour or less and not removed from special consideration pursuant to paragraph (4) of Section 8.1.2, ERCOT shall scale any approved verifiable Startup Cost and verifiable minimum-energy cost or if verifiable costs have not been approved, the applicable Resource Category Generic Startup Offer Cost and the applicable Resource Category Generic Minimum-Energy Offer Cost as specified in Section 4.4.9.2.3 for use in the RUC process.~~

~~The above parameter is defined as follows:~~

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

(8~~7~~) The RUC process must treat all Resource capacity providing Ancillary Service as unavailable for the RUC Study Period, unless that treatment leads to infeasibility (i.e., that capacity is needed to resolve some local transmission problem that cannot be resolved by any other means). If an ERCOT Operator decides that the Ancillary Service capacity allocated to that Resource is infeasible based on ERCOT System conditions, then, ERCOT shall inform each affected QSE of the amount of its Resource capacity that does not qualify to provide Ancillary Service, and the projected hours for which this is the case. In that event, the affected QSE may, under Section 6.4.9.1.2, Replacement of Infeasible Ancillary Service Due to Transmission Constraints, either:

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

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

(c) Ask ERCOT to replace the capacity.

(98) Factors included in the RUC process are:

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

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

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

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

(c) Planned transmission topology;

(d) Energy sufficiency constraints;

(e) Inputs from the COP, as appropriate;

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

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

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

(i) Forced Outage information; and

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

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

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

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

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

(11~~0~~) A QSE that has one or more of its Resources RUC-committed to provide Ancillary Services must increase its Ancillary Service Supply Responsibility by the total amount of RUC-committed Ancillary Service quantities. The QSE may only use a RUC-committed Resource to meet its Ancillary Service Supply Responsibility during that Resource's RUC-Committed Interval if the Resource has been committed by the RUC process to provide Ancillary Service. The QSE shall indicate the exact amount and type of Ancillary Service for which it was committed as the Resource's Ancillary Service Resource Responsibility and Ancillary Services Schedule for the RUC-Committed Intervals for both telemetry and COP information provided to ERCOT. Upon deployment of the Ancillary Services, the QSE shall adjust its Ancillary Services Schedule to reflect the amounts requested in the deployment.

(12~~1~~) A QSE with a Resource that is not a Reliability Must-Run (RMR) Unit that has been committed in a RUC process or by a RUC Verbal Dispatch Instruction (VDI) may opt out of the RUC Settlement (or "buy back" the commitment) by setting the telemetered Resource Status of the RUC-committed Resource to ONOPTOUT for the first SCED run that the Resource is On-Line and available for SCED dispatch during the first hour of a contiguous block of RUC-Committed Hours. A QSE that opts out of RUC Settlement forfeits RUC Settlement for the affected Resource for a given block of RUC Buy-Back Hours. A QSE that opts out of RUC Settlement treatment must make the Resource available to SCED for all RUC Buy-Back Hours. All hours in a contiguous block of RUC-Committed Hours that includes the RUC Buy-Back Hour shall be considered RUC Buy-Back Hours. However, if a contiguous block of RUC-Committed Hours spans more than one Operating Day, each contiguous block of RUC-Committed Hours within each Operating Day shall be treated as an independent block for purposes of opting out, and a QSE that wishes to opt out of RUC Settlement for the RUC-Committed Hours in the next Operating Day must set its telemetered Resource Status to ONOPTOUT for the first SCED run the next Operating Day.

(13~~2~~) If a QSE-committed Resource experiences a Forced Outage or Startup Loading Failure in an hour for which another Resource under the control of the same QSE is committed by a RUC instruction, the QSE may opt out of RUC Settlement for the RUC-committed Resource in accordance with paragraph (12~~1~~) above, or if the Forced Outage or Startup Loading Failure occurs after the beginning of the first RUC-Committed Interval, the QSE may opt out of RUC Settlement by submitting a dispute pursuant to Section 9.14, Settlement and Billing Dispute Process, requesting a correction of the RUC Settlement treatment for the RUC-committed Resource.

(14~~3~~) ERCOT shall, as soon as practicable, post to the MIS Secure Area a report identifying those hours that were considered RUC Buy-Back Hours, along with the name of each RUC-committed Resource whose QSE opted out of RUC Settlement.

ERCOT Nodal Protocols

Section 8: Performance Monitoring

October 26~~September 1~~, 2018

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8 PERFORMANCE MONITORING

8.1 QSE and Resource Performance Monitoring

8.1.2 Current Operating Plan (COP) Performance Requirements

(1) Each QSE representing a Resource must submit a COP in accordance with Section 3.9, Current Operating Plan (COP).

(2) For each QSE, ERCOT shall post for each month the number, by Operating Hour, of valid COP failures to meet the provisions of paragraphs (3) and (4) of Section 3.9.2, Current Operating Plan Validation, for Ancillary Service Resource Responsibilities contained in the QSE's COP used for the DRUC and each HRUC during the Operating Day. QSEs shall have no more than three hours during an Operating Day or 74 hours during a month that contains COP Ancillary Service Resource Responsibility validation failures.

(3) For each QSE, ERCOT shall post for each month the number of Operating Hours during which a Reliability Unit Commitment (RUC)-committed QSE Resource, not Off-Line as the result of a Forced Outage, failed to be On-Line and released to SCED for deployment within the first 15 minutes of the RUC-Commitment Hour. QSEs shall have no more than three hours during an Operating Day and no more than 74 hours during a month that contains one or more of these events.

(4) ERCOT shall post for each QSE for each month the number of Operating Hours during which a RUC-committed Resource with a cold start time of one hour or less, not Off-Line as the result of a Forced Outage, failed to be On-Line and released to SCED (has reached its physical LSL) within its cold start time by the start of the Operating Hour for which it was RUC-committed. Any Resource with more than one occurrence during a month whereby the cold start time is not met shall be removed from special consideration pursuant to paragraph (7) of Section 5.5.2, Reliability Unit Commitment (RUC) Process, for a period of 90 days, beginning with the next Operating Day following the second occurrence within a month.

~~*[NPRR864: Insert paragraph (4) below upon system implementation:]*~~

~~(4) ERCOT shall post for each QSE for each month the number of Operating Hours during which a RUC-committed Resource with a cold start time of one hour or less, not Off-Line as the result of a Forced Outage, failed to be On-Line and released to SCED (has reached its physical LSL) within its cold start time by the start of the Operating Hour for which it was RUC-committed. Any Resource with more than one occurrence during a month whereby the cold start time is not met shall be removed from special consideration pursuant to paragraph (7) of Section 5.5.2, Reliability Unit Commitment (RUC) Process for a period of 90 days, beginning with the next Operating Day following the second~~

~~occurrence within a month.~~

ERCOT Nodal Protocols

Section 1: Overview

~~May 1, 2018~~October 26, 2018

1 OVERVIEW

1.3 Confidentiality

1.3.1 Restrictions on Protected Information

1.3.1.1 Items Considered Protected Information

(1) Subject to the exclusions set out in Section 1.3.1.2, Items Not Considered Protected Information, and in Section 3.2.5, Publication of Resource and Load Information, "Protected Information" is information containing or revealing any of the following:

(a) Base Points, as calculated by ERCOT. The Protected Information status of this information shall expire 60 days after the applicable Operating Day;

(b) Bids, offers, or pricing information identifiable to a specific Qualified Scheduling Entity (QSE) or Resource. The Protected Information status of part of this information shall expire 60 days after the applicable Operating Day, as follows:

(i) Ancillary Service Offers by Operating Hour for each Resource for all Ancillary Services submitted for the Day-Ahead Market (DAM) or any Supplemental Ancillary Services Market (SASM);

(ii) The quantity of Ancillary Service offered by Operating Hour for each Resource for all Ancillary Service submitted for the DAM or any SASM; and

(iii) Energy Offer Curve prices and quantities for each Settlement Interval by Resource. The Protected Information status of this information shall expire within seven days after the applicable Operating Day if required to be posted as part of paragraph (5) of Section 3.2.5 and within two days after the applicable Operating Day if required to be posted as part of paragraph (7~~6~~) of Section 3.2.5;

(c) Status of Resources, including Outages, limitations, or scheduled or metered Resource data. The Protected Information status of this information shall expire 60 days after the applicable Operating Day;

(d) Current Operating Plans (COPs). The Protected Information status of this information shall expire 60 days after the applicable Operating Day;

(e) Ancillary Service Trades, Energy Trades, and Capacity Trades identifiable to a specific QSE or Resource. The Protected Information status of this information shall expire 180 days after the applicable Operating Day;

(f) Ancillary Service Schedules identifiable to a specific QSE or Resource. The Protected Information status of this information shall expire 60 days after the applicable Operating Day;

(g) Dispatch Instructions identifiable to a specific QSE or Resource, except for Reliability Unit Commitment (RUC) commitments and decommitments as provided in Section 5.5.3, Communication of RUC Commitments and Decommitments. The Protected Information status of this information shall expire 180 days after the applicable Operating Day;

(h) Raw and Adjusted Metered Load (AML) data (demand and energy) identifiable to:

(i) A specific QSE or Load Serving Entity (LSE). The Protected Information status of this information shall expire 180 days after the applicable Operating Day; or

(ii) A specific Customer or Electric Service Identifier (ESI ID);

(i) Wholesale Storage Load (WSL) data identifiable to a specific QSE. The Protected Information status of this information shall expire 180 days after the applicable Operating Day;

(j) Settlement Statements and Invoices identifiable to a specific QSE. The Protected Information status of this information shall expire 180 days after the applicable Operating Day;

(k) Number of ESI IDs identifiable to a specific LSE. The Protected Information status of this information shall expire 365 days after the applicable Operating Day;

(l) Information related to generation interconnection requests, to the extent such information is not otherwise publicly available. The Protected Information status of certain generation interconnection request information expires as provided in Section 1.3.3, Expiration of Confidentiality;

(m) Resource-specific costs, design and engineering data, including such data submitted in connection with a verifiable cost appeal;

(n) Congestion Revenue Right (CRR) credit limits, the identity of bidders in a CRR Auction, or other bidding information identifiable to a specific CRR Account Holder. The Protected Information status of this information shall expire as follows:

(i) The Protected Information status of the identities of CRR bidders that become CRR Owners and the number and type of CRRs that they each

own shall expire at the end of the CRR Auction in which the CRRs were first sold; and

(ii) The Protected Information status of all other CRR information identified above in item (n) shall expire six months after the end of the year in which the CRR was effective.

(o) Renewable Energy Credit (REC) account balances. The Protected Information status of this information shall expire three years after the REC Settlement period ends;

(p) Credit limits identifiable to a specific QSE;

(q) Any information that is designated as Protected Information in writing by Disclosing Party at the time the information is provided to Receiving Party except for information that is expressly designated not to be Protected Information by Section 1.3.1.2 or that, pursuant to Section 1.3.3, Expiration of Confidentiality, is no longer confidential;

(r) Any information compiled by a Market Participant on a Customer that in the normal course of a Market Participant's business that makes possible the identification of any individual Customer by matching such information with the Customer's name, address, account number, type of classification service, historical electricity usage, expected patterns of use, types of facilities used in providing service, individual contract terms and conditions, price, current charges, billing record, or any other information that a Customer has expressly requested not be disclosed ("Proprietary Customer Information") unless the Customer has authorized the release for public disclosure of that information in a manner approved by the Public Utility Commission of Texas (PUCT). Information that is redacted or organized in such a way as to make it impossible to identify the Customer to whom the information relates does not constitute Proprietary Customer Information;

(s) Any software, products of software, or other vendor information that ERCOT is required to keep confidential under its agreements;

(t) QSE, Transmission Service Provider (TSP), and Distribution Service Provider (DSP) backup plans collected by ERCOT under the Protocols or Other Binding Documents;

(u) Direct Current Tie (DC Tie) information provided to a TSP or DSP under Section 9.17.2, Direct Current Tie Schedule Information;

(v) Any Texas Standard Electronic Transaction (TX SET) transaction submitted by an LSE to ERCOT or received by an LSE from ERCOT. This paragraph does not apply to ERCOT's compliance with:

(i) PUCT Substantive Rules on performance measure reporting;

(ii) These Protocols or Other Binding Documents; or

(iii) Any Technical Advisory Committee (TAC)-approved reporting requirements;

(w) Information concerning a Mothballed Generation Resource's probability of return to service and expected lead time for returning to service submitted pursuant to Section 3.14.1.9, Generation Resource Status Updates;

(x) Information provided by Entities under Section 10.3.2.4, Reporting of Net Generation Capacity;

(y) Alternative fuel reserve capability and firm gas availability information submitted pursuant to Section 6.5.9.3.1, Operating Condition Notice, Section 6.5.9.3.2, Advisory, and Section 6.5.9.3.3, Watch, and as defined by the Operating Guides;

(z) Non-public financial information provided by a Counter-Party to ERCOT pursuant to meeting its credit qualification requirements as well as the QSE's form of credit support;

(aa) ESI ID, identity of Retail Electric Provider (REP), and MWh consumption associated with transmission-level Customers that wish to have their Load excluded from the Renewable Portfolio Standard (RPS) calculation consistent with Section 14.5.3, End-Use Customers, and subsection (j) of P.U.C. SUBST. R. 25.173, Goal for Renewable Energy;

(bb) Generation Resource emergency operations plans and weatherization plans;

(cc) Information provided by a Counter-Party under Section 16.16.3, Verification of Risk Management Framework;

(dd) Any data related to Load response capabilities that are self-arranged by the LSE or pursuant to a bilateral agreement between a specific LSE and its Customers, other than data either related to any service procured by ERCOT or non-LSE-specific aggregated data. Such data includes pricing, dispatch instructions, and other proprietary information of the Load response product;

(ee) Status of Non-Modeled Generators, including Outages, limitations, or scheduled or metered output data, except that ERCOT may disclose output data from a Non-Modeled Generator as part of an extract or forwarded TX SET transaction provided to the LSE associated with the ESI ID of the Premise where the Non-Modeled Generator is located. The Protected Information status of this information shall expire 60 days after the applicable Operating Day;

[NPRR829: Replace paragraph (ee) above with the following upon system implementation:]

(ee) Status of Non-Modeled Generators, including Outages, limitations, schedules, metered output data, or data telemetered for use in the calculation of Real-Time

Liability (RTL) as described in Section 16.11.4.3.2, Real-Time Liability Estimate, except that ERCOT may disclose metered output data from a Non-Modeled Generator as part of an extract or forwarded TX SET transaction provided to the LSE associated with the ESI ID of the Premise where the Non-Modeled Generator is located. The Protected Information status of this information shall expire 60 days after the applicable Operating Day;

(ff) Any documents or data submitted to ERCOT in connection with an Alternative Dispute Resolution (ADR) proceeding. The Protected Information status of this information shall expire upon ERCOT's issuance of a Market Notice indicating the disposition of the ADR proceeding pursuant to paragraph (1) of Section 20.9, Resolution of Alternative Dispute Resolution Proceedings and Notification to Market Participants, except to the extent the information continues to qualify as Protected Information pursuant to another paragraph of this Section 1.3.1.1; and

(gg) Reasons for and future expectations of overrides to a specific Resource's High Dispatch Limit (HDL) or Low Dispatch Limit (LDL). The Protected Information status of this information shall expire 60 days after the applicable Operating Day.

ERCOT Nodal Protocols

Section 6: Adjustment Period and Real-Time Operations

October 26~~10~~, 2018

6 ADJUSTMENT PERIOD AND REAL-TIME OPERATIONS

6.5 Real-Time Energy Operations

6.5.7 Energy Dispatch Methodology

6.5.7.3 Security Constrained Economic Dispatch

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

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

(a) RUC-committed Resources, except for those whose QSEs have opted out of RUC Settlement in accordance with paragraph (12~~+~~) of Section 5.5.2, Reliability Unit Commitment (RUC) Process;

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

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

(d) Deployed Emergency Response Service (ERS);

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(o) The Real-Time On-Line Reliability Deployment Price Adder is the minimum of items (m) and (n) above.

6.7 Real-Time Settlement Calculations for the Ancillary Services

6.7.5 Real-Time Ancillary Service Imbalance Payment or Charge

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

(2) The payment or charge to each QSE for Ancillary Service imbalance is calculated based on the price calculation set forth in paragraph (11) of Section 6.5.7.3, Security Constrained Economic Dispatch, and applied to the following amounts for each QSE:

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

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

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

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

(a) Intermittent Renewable Resources (IRRs) excluding Wind-powered Generation Resources (WGRs);

(b) Nuclear Resources;

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

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

(4) Reliability Must-Run (RMR) Units and Reliability Unit Commitment (RUC) Resources On-Line during the hour due to an ERCOT instruction, except for any RUC Resource committed by a RUC Dispatch Instruction where that Resource's QSE subsequently opted out of RUC Settlement pursuant to paragraph (12~~1~~) of Section 5.5.2, Reliability Unit Commitment (RUC) Process, will be excluded from the amounts calculated for the 15-minute Settlement Interval pursuant to paragraphs (2)(a), (b), and (c) above.

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

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

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

$$\mathbf{RTASIAMT}_q = \mathbf{(-1) * [(RTASOLIMB}_q \mathbf{* RTRSVPOR) + (RTASOFFIMB}_q \mathbf{* RTRSVPOFF)]}$$

$$\mathbf{RTRDASIAMT}_q = \mathbf{(-1) * (RTASOLIMB}_q \mathbf{* RTRDP)}$$

Where:

$$RTASOLIMB_q = RTOLCAP_q - [((SYS\_GEN\_DISCFACTOR * RTASRESP_q) * ¼) - RTASOFF_q - RTRUCNBBRESP_q - RTCLRNSRESP_q - RTRMRRESP_q]$$

Where:

$$RTASOFF_q = SYS\_GEN\_DISCFACTOR * \sum_r \sum_p RTASOFFR_{q,r,p}$$

$$RTRUCNBBRESP_q = SYS\_GEN\_DISCFACTOR * \sum_r RTRUCASA_{q,r} * ¼$$

$$RTCLRNSRESP_q = SYS\_GEN\_DISCFACTOR * \sum_r \sum_p RTCLRNSRESPR_{q,r,p}$$

$$RTRMRRESP_q = SYS\_GEN\_DISCFACTOR * \sum_q \sum_r \sum_p (HRRADJ_{q,r,p} + HRUADJ_{q,r,p} + HNSADJ_{q,r,p}) * ¼$$

$$RTOLCAP_q = (RTOLHSL_q - RTMGQ_q - SYS\_GEN\_DISCFACTOR * (\sum_r \sum_p UGENA_{q,r,p})) + RTCLRCAP_q + RTNCLRCAP_q$$

Where:

$$RTNCLRCAP_q = Min(Max(RTNCLRNPC_q - RTNCLRLPC_q, 0.0), RTNCLRRRS_q * 1.5)$$

$$RTNCLRRRS_q = SYS\_GEN\_DISCFACTOR * \sum_r \sum_p RTNCLRRRSR_{q,r,p}$$

$$RTNCLRNPC_q = SYS\_GEN\_DISCFACTOR * \sum_r \sum_p RTNCLRNPCR_{q,r,p}$$

$$RTNCLRLPC_q = SYS\_GEN\_DISCFACTOR * \sum_r \sum_p RTNCLRLPCR_{q,r,p}$$

$$RTOLHSL_q = SYS\_GEN\_DISCFACTOR * \sum_r \sum_p RTOLHSLRA_{q,r,p}$$

$$RTMGQ_q = SYS\_GEN\_DISCFACTOR * \sum_r \sum_p RTMGA_{q,r,p}$$

If $RTMGA_{q,r,p} > RTOLHSLRA_{q,r,p}$

Then $RTMGA_{q,r,p} = RTOLHSLRA_{q,r,p}$

$$RTCLRCAP_q = RTCLRNPC_q - RTCLRLPC_q - RTCLRNS_q + RTCLRREG_q$$

Where:

$$RTCLRNPC_q = SYS\_GEN\_DISCFACTOR * \sum_r \sum_p RTCLRNPCR_{q,r,p}$$

$$RTCLRLPC_q = SYS\_GEN\_DISCFACTOR * \sum_r \sum_p RTCLRLPCR_{q,r,p}$$

$$RTCLRNS_q = SYS\_GEN\_DISCFACTOR * \sum_r \sum_p RTCLRNSR_{q,r,p}$$

$$RTCLRREG_q = SYS\_GEN\_DISCFACTOR * \sum_r \sum_p RTCLRREGR_{q,r,p}$$

$$RTRSVPOR = \sum_y (RNWF_y * RTORPA_y)$$

$$RTASOFFIMB_q = RTOFFCAP_q - (RTASOFF_q + RTCLRNSRESP_q)$$

$$RTOFFCAP_q = (SYS\_GEN\_DISCFACTOR * RTCST30HSL_q) + (SYS\_GEN\_DISCFACTOR * RTOFFNSHSL_q) + RTCLRNS_q$$

$$RTRSVPOFF = \sum_y (RNWF_y * RTOFFPA_y)$$

$$RTRDP = \sum_y (RNWF_y * RTORDPA_y)$$

$$RNWF_y = TLMP_y / \sum_y TLMP_y$$

The above variables are defined as follows:

Variable	Unit	Description
$RTASIAMT_q$	$	*Real-Time Ancillary Service Imbalance Amount*—The total payment or charge to QSE *q* for the Real-Time Ancillary Service imbalance associated with Operating Reserve Demand Curve (ORDC) for each 15-minute Settlement Interval.

Variable	Unit	Description
$RTRDASIAMT_q$	$	*Real-Time Reliability Deployment Ancillary Service Imbalance Amount*—The total payment or charge to QSE *q* for the Real-Time Ancillary Service imbalance associated with Reliability Deployments for each 15-minute Settlement Interval.
$RTASOLIMB_q$	MWh	*Real Time Ancillary Service On-Line Reserve Imbalance for the QSE*—The Real-Time Ancillary Service On-Line reserve imbalance for the QSE *q*, for each 15-minute Settlement Interval.
$RTORPA_y$	$/MWh	*Real-Time On-Line Reserve Price Adder per interval*—The Real-Time Price Adder for On-Line Reserves for the SCED interval *y*.
$RTOFFPA_y$	$/MWh	*Real-Time Off-Line Reserve Price Adder per interval*—The Real-Time Price Adder for Off-Line Reserves for the SCED interval *y*.
$TLMP_y$	second	*Duration of SCED interval per interval*—The duration of the SCED interval *y*.
RTRDP	$/MWh	*Real-Time On-Line Reliability Deployment Price*—The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-time On-Line Reliability Deployment Price Adder.
$RTORDPA_y$	$/MWh	*Real-Time On-Line Reliability Deployment Price Adder*—The Real-Time Price Adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*.
$RNWF_y$	none	*Resource Node Weighting Factor per interval*—The weight used in the Resource Node Settlement Point Price calculation for the portion of the SCED interval *y* within the 15-minute Settlement Interval.
RTRSVPOR	$/MWh	*Real-Time Reserve Price for On-Line Reserves*—The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval.
RTRSVPOFF	$/MWh	*Real-Time Reserve Price for Off-Line Reserves*—The Real-Time Reserve Price for Off-Line Reserves for the 15-minute Settlement Interval.
$RTOLCAP_q$	MWh	*Real-Time On-Line Reserve Capacity for the QSE*—The Real-Time reserve capacity of On-Line Resources available for the QSE *q*, for the 15-minute Settlement Interval.
$RTOLHSLRA_{q,r,p}$	MWh	*Real-Time Adjusted On-Line High Sustained Limit for the Resource*—The Real-Time telemetered HSL for the Resource *r* represented by QSE *q* at Resource Node *p* that is available to SCED, integrated over the 15-minute Settlement Interval, and adjusted pursuant to paragraphs (3) and (4) above.
$RTOLHSL_q$	MWh	*Real-Time On-Line High Sustained Limit for the QSE*—The Real-Time telemetered HSL for all Generation Resources available to SCED, pursuant to paragraphs (3) and (4) above, integrated over the 15-minute Settlement Interval for the QSE *q*, discounted by the system-wide discount factor.
$RTASRESP_q$	MW	*Real-Time Ancillary Service Supply Responsibility for the QSE*—The Real-Time Ancillary Service Supply Responsibility for Reg-Up, RRS and Non-Spin pursuant to Section 4.4.7.4, Ancillary Service Supply Responsibility, for all Generation and Load Resources for the QSE *q*, for the 15-minute Settlement Interval.

Variable	Unit	Description
$RTCLRCAP_q$	MWh	*Real-Time Capacity from Controllable Load Resources for the QSE*—The Real-Time capacity and Reg-Up minus Non-Spin available from all Controllable Load Resources available to SCED for the QSE *q*, integrated over the 15-minute Settlement Interval.
$RTNCLRCAP_q$	MWh	*Real-Time Capacity from Non-Controllable Load Resources carrying Responsive Reserve for the QSE*—The Real-Time capacity for all Load Resources other than Controllable Load Resources that have a validated Real-Time RRS Ancillary Service Schedule for the QSE *q*, integrated over the 15-minute Settlement Interval.
$RTNCLRRRS_q$	MWh	*Real-Time Non-Controllable Load Resources Responsive Reserve for the QSE*—The validated Real-Time telemetered RRS Ancillary Service Supply Responsibility for all Load Resources other than Controllable Load Resources for QSE *q* discounted by the system-wide discount factor, integrated over the 15-minute Settlement Interval.
$RTNCLRRRSR_{q, r, p}$	MWh	*Real-Time Non-Controllable Load Resource Responsive Reserve*—The validated Real-Time telemetered RRS Ancillary Service Resource Responsibility for the Load Resource *r* (which is not a Controllable Load Resource) represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval.
$RTNCLRNPCR_{q, r, p}$	MWh	*Real-Time Non-Controllable Load Resource Net Power Consumption*—The Real-Time net real power consumption from the Load Resource *r* (which is not a Controllable Load Resource) represented by QSE *q* at Resource Node *p* that has a validated Real-Time RRS Ancillary Service Schedule integrated over the 15-minute Settlement Interval.
$RTNCLRLPCR_{q, r, p}$	MWh	*Real-Time Non-Controllable Load Resource Low Power Consumption*—The Real-Time Low Power Consumption (LPC) from the Load Resource *r* (which is not a Controllable Load Resource) represented by QSE *q* at Resource Node *p* that has a validated Real-Time RRS Ancillary Service Schedule integrated over the 15-minute Settlement Interval
$RTNCLRNPC_q$	MWh	*Real-Time Non-Controllable Load Resource Net Power Consumption for the QSE*—The Real-Time net real power consumption from all Load Resources other than Controllable Load Resources for QSE *q* that have a validated Real-Time RRS Ancillary Service Schedule integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor.
$RTNCLRLPC_q$	MWh	*Real-Time Non-Controllable Load Resource Low Power Consumption for the QSE*—The Real-Time LPC from all Load Resources other than Controllable Load Resources for QSE *q* that have a validated Real-Time RRS Ancillary Service Schedule integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor.
$RTCLRNPCR_{q, r, p}$	MWh	*Real-Time Net Power Consumption from the Controllable Load Resource*—The Real-Time net real power consumption from the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p* available to SCED integrated over the 15-minute Settlement Interval.
$RTCLRNPC_q$	MWh	*Real-Time Net Power Consumption from Controllable Load Resources for the QSE*—The Real-Time net real power consumption from all Controllable Load Resources available to SCED integrated over the 15-minute Settlement Interval for the QSE *q* discounted by the system-wide discount factor.

Variable	Unit	Description
$RTCLRLPCR_{q, r, p}$	MWh	*Real-Time Low Power Consumption for the Controllable Load Resource*—The Real-Time LPC from the Controllable Load Resource r represented by QSE q at Resource Node p available to SCED integrated over the 15-minute Settlement Interval.
$RTCLRLPC_{q}$	MWh	*Real-Time Low Power Consumption from Controllable Load Resources for the QSE*—The Real-Time LPC from Controllable Load Resources available to SCED integrated over the 15-minute Settlement Interval for the QSE q discounted by the system-wide discount factor.
$RTCLRREG_{q}$	MWh	*Real-Time Controllable Load Resources Regulation-Up Schedule for the QSE*—The Real-Time Reg-Up Ancillary Service Schedule from all Controllable Load Resources with Primary Frequency Response for the QSE q, integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor.
$RTCLRREGR_{q, r, p}$	MWh	*Real-Time Controllable Load Resource Regulation-Up Schedule for the Resource*—The validated Real-Time Reg-Up Ancillary Service Schedule for the Controllable Load Resource r represented by QSE q at Resource Node p with Primary Frequency Response, integrated over the 15-minute Settlement Interval.
$RTMGA_{q, r, p}$	MWh	*Real-Time Adjusted Metered Generation per QSE per Settlement Point per Resource*—The adjusted metered generation, pursuant to paragraphs (3) and (4) above, of Generation Resource r represented by QSE q at Resource Node p in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource r is the Combined Cycle Train.
$RTMGQ_{q}$	MWh	*Real-Time Metered Generation per QSE*—The metered generation, discounted by the system-wide discount factor, of all generation Resources represented by QSE q in Real-Time for the 15-minute Settlement Interval, pursuant to paragraphs (3) and (4) above.
$RTASOFFIMB_{q}$	MWh	*Real-Time Ancillary Service Off-Line Reserve Imbalance for the QSE*—The Real-Time Ancillary Service Off-Line reserve imbalance for the QSE q, for each 15-minute Settlement Interval.
$RTOFFCAP_{q}$	MWh	*Real-Time Off-Line Reserve Capacity for the QSE*—The Real-Time reserve capacity of Off-Line Resources available for the QSE q, for the 15-minute Settlement Interval.
$RTCST30HSL_{q}$	MWh	*Real-Time Generation Resources with Cold Start Available in 30 Minutes*—The Real-Time telemetered HSLs of Generation Resources, excluding IRRs, that have telemetered an OFF Resource Status and can be started from a cold temperature state in 30 minutes for the QSE q, time-weighted over the 15-minute Settlement Interval.
$RTOFFNSHSL_{q}$	MWh	*Real-Time Generation Resources with Off-Line Non-Spin Schedule*—The Real-Time telemetered HSLs of Generation Resources that have telemetered an OFFNS Resource Status for the QSE q, time-weighted over the 15-minute Settlement Interval.
$RTASOFFR_{q, r, p}$	MWh	*Real-Time Ancillary Service Schedule for the Off-Line Generation Resource*—The validated Real-Time telemetered Ancillary Service Schedule for the Off-Line Generation Resource r represented by QSE q at Resource Node p, integrated over the 15-minute Settlement Interval.

Variable	Unit	Description
$RTASOFF_{q}$	MWh	*Real-Time Ancillary Service Schedule for Off-Line Generation Resources for the QSE*—The Real-Time telemetered Ancillary Service Schedule for all Off-Line Generation Resources discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval.
$HRRADJ_{q, r, p}$	MW	*Ancillary Service Resource Responsibility Capacity for Responsive Reserve at Adjustment Period*—The Responsive Reserve Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last Current Operating Plan (COP) and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval.
$HRUADJ_{q, r, p}$	MW	*Ancillary Service Resource Responsibility Capacity for Reg-Up at Adjustment Period*—The Regulation Up Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last COP and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval.
$HNSADJ_{q, r, p}$	MW	*Ancillary Service Resource Responsibility Capacity for Non-Spin at Adjustment Period*—The Non-Spin Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last COP and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval.
$RTRUCNBBRESP_{q}$	MWh	*Real-Time RUC Ancillary Service Supply Responsibility for the QSE in Non-Buy-Back hours*—The Real-Time Ancillary Service Supply Responsibility for Reg-Up, RRS and Non-Spin pursuant to the Ancillary Service awards, for the 15-minute Settlement Interval that falls within a RUC-Committed Hour, discounted by the system-wide discount factor for the QSE *q*.
$RTRUCASA_{q, r}$	MW	*Real-Time RUC Ancillary Service Awards*—The Real-Time Ancillary Service award to the RUC Resource *r* for Reg-Up, RRS and Non-Spin for the hour that includes the 15-minute Settlement Interval that falls within a RUC-Committed Hour for the QSE *q*.
$RTCLRNSRESP_{q}$	MWh	*Real-Time Controllable Load Resource Non-Spin Responsibility for the QSE*—The Real Time telemetered Non-Spin Ancillary Service Supply Responsibility for all Controllable Load Resources available to SCED discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval.
$RTCLRNSRESPR_{q, r, p}$	MWh	*Real-Time Controllable Load Resource Non-Spin Responsibility for the Resource*—The Real-Time telemetered Non-Spin Ancillary Service Resource Responsibility for the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p* available to SCED, integrated over the 15-minute Settlement Interval.
$RTRMRRESP_{q}$	MWh	*Real-Time Ancillary Service Supply Responsibility for RMR Units represented by the QSE*—The Real-Time Ancillary Service Supply Responsibility as set forth in the end of the Adjustment Period COP for Reg-Up, RRS and Non-Spin for all RMR Units discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval.

Variable	Unit	Description
$RTCLRNSR_{q, r, p}$	MWh	*Real-Time Non-Spin Schedule for the Controllable Load Resource*—The validated Real Time telemetered Non-Spin Ancillary Service Schedule for the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval.
$RTCLRNS_q$	MWh	*Real-Time Non-Spin Schedule for Controllable Load Resources for the QSE*—The Real-Time telemetered Non-Spin Ancillary Service Schedule for all Controllable Load Resources for the QSE *q*, integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor.
SYS_GEN_DISCFACTOR	none	*System-Wide Discount Factor* – The system-wide discount factor used to discount inputs used in the calculation of Real-Time Ancillary Services Imbalance payment or charge is calculated as the average of the currently approved Reserve Discount Factors (RDFs) applied to the temperatures from the current Season from the year prior.
$UGEN_{q, r, p}$	MWh	*Under Generation Volumes per QSE per Settlement Point per Resource*—The amount under-generated by the Generation Resource *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval.
$UGENA_{q, r, p}$	MWh	*Adjusted Under Generation Volumes per QSE per Settlement Point per Resource*—The amount under-generated by the Generation Resource *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval adjusted pursuant to paragraph (6) above.
r	none	A Generation or Load Resource.
y	none	A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval.
q	none	A QSE.
p	none	A Resource Node Settlement Point.

(8) The payment to each QSE for the Ancillary Service reserves associated with RUC Resources that have received a RUC Dispatch to provide Ancillary Services in which the 15-minute Settlement Interval is part of a RUC Buy-Back Hour based on the RUC opt out provision set forth in paragraph (12~~4~~) of Section 5.5.2 for a given 15-minute Settlement Interval is calculated as follows:

$$\mathbf{RTRUCRSVAMT}_q = \mathbf{(-1) * (RTRUCRESP}_q \mathbf{* RTRSVPOR)}$$

$$\mathbf{RTRDRUCRSVAMT}_q = \mathbf{(-1) * (RTRUCRESP}_q \mathbf{* RTRDP)}$$

Where:

$$RTRUCRESP_q = \sum_r RTRUCASA_{q, r} * ¼$$

The above variables are defined as follows:

Variable	Unit	Description
$RTRUCRSVAMT_q$	$	*Real-Time RUC Ancillary Service Reserve Amount*—The total payment to QSE *q* for the Real-Time RUC Ancillary Service Reserve payment associated with ORDC for each 15-minute Settlement Interval.

Variable	Unit	Description
$RTRDRUCRSVAMT_q$	$	*Real-Time Reliability Deployment RUC Ancillary Service Reserve Amount*—The total payment to QSE *q* for the Real-Time RUC Ancillary Service Reserve payment associated with reliability deployments for each 15-minute Settlement Interval.
$RTRUCRESP_q$	MWh	*Real-Time RUC Ancillary Service Supply Responsibility for the QSE*—The Real-Time Ancillary Service Supply Responsibility pursuant to the Ancillary Service awards for Reg-Up, RRS and Non-Spin for all RUC Resources that have opted out per paragraph (12~~1~~) of Section 5.5.2 for the QSE *q*, for the 15-minute Settlement Interval.
$RTRUCASA_{q,r}$	MW	*Real-Time RUC Ancillary Service Awards*—The Real-Time Ancillary Service award to the RUC Resource *r* for Reg-Up, RRS and Non-Spin for the 15-minute Settlement Interval that falls within a RUC-Committed Hour for the QSE *q*.
RTRSVPOR	$/MWh	*Real-Time Reserve Price for On-Line Reserves*—The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval.
RTRDP	$/MWh	*Real-Time On-Line Reliability Deployment Price*—The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-time On-Line Reliability Deployment Price Adder.
q	none	A QSE.
r	none	A Generation Resource.