



Control Number: 24055



Item Number: 196

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PROJECT NO. 24055

PROTOCOL REVISION
INFORMATIONAL FILINGS BY THE
ELECTRIC RELIABILITY
COUNCIL OF TEXAS

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PUBLIC UTILITY COMMISSION
OF TEXAS

NOTICE OF ERCOT PROTOCOL REVISIONS
(OCTOBER 29, 2009)

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

Summary of Revisions

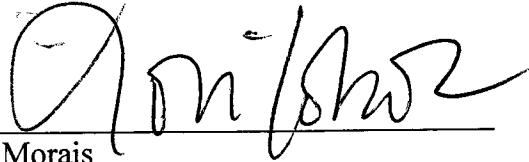
In accordance with the process set forth in Section 21 of the ERCOT Protocols, ERCOT adopted Protocol Revision Requests (PRRs) 601 and 803 (effective October 29, 2009). These Protocol revisions, described below, were developed in the ERCOT committee process and approved by the ERCOT Board of Directors on November 15, 2005 (PRR601), and April 22, 2009 (PRR803).

PRR	Description	ERCOT Protocol Sections Modified
601 (Unboxed language)	<u>15 Minute Ramping for BES and Base Power Schedule.</u> This PRR increases the ramping period for Balancing Energy Service (BES) deployment and for Base Power Schedule changes from ten (10) minutes to fifteen (15) minutes. PRR803 modifies the Protocol revisions made by this PRR.	Section 6, Subsections 6.5.2, 6.8.1.15.3, and 6.10.4.2 (Attachment A) (Effective October 29, 2009)
803 (Unboxed language)	<u>Revised Implementation Approach for PRR 601.</u> This PRR changes the ramping period for BES deployment for Base Power Schedule Calculation and Balancing Energy Power Schedule from ten (10) minutes to fourteen (14) minutes. PRR803 modifies the Protocol revisions made pursuant to PRR601.	Section 6, Subsections 6.5.2, 6.8.1.15.3, 6.10.4.2, and 6.10.4.3 (Attachment A) (Effective October 29, 2009)

The changes to the Protocol language as revised by the above PRRs are shown in Attachment A in redline format.

The Protocols, all revisions thereto, and the details of the revision process are available on the Internet at the link identified as "Protocols" on the ERCOT website, <http://www.ercot.com/mktrules/protocols/index.html>.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Matt Morais", written over a horizontal line.

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LIST OF ATTACHMENTS

ATTACHMENT A – Section 06-102909 Redline

ERCOT Protocols
Section 6: Ancillary Services

October ~~12~~29, 2009

6 ANCILLARY SERVICES

6.5 Ancillary Services Selection and Requirements

6.5.2 Balancing Energy Service

The Balancing Energy Service bids shall consist of Balancing Energy Service Up, Balancing Energy Service Down, BES-Capable Non-Spinning Reserve Service (BESCNSRS), and BUL bids. All Balancing Energy Service provider bids must be entered by the close of the Adjustment Period for the effective Operating Hour and shall become an Obligation at the close of the Adjustment Period. However, Balancing Energy Service provider bids may be withdrawn at any time prior to the close of the Adjustment Period. The portion of a QSE's Balancing Energy Service Up bid deployable in one (1) interval that may be provided by Off-line Generation Resources shall be limited to no more than the aggregate of qualified output amounts from Quick Start Units which have been demonstrated via the qualification testing process described in the Operating Guides. The QSE may utilize any remaining capacity from Quick Start Units in subsequent intervals once the Quick Start Units are On-line.

- (1) Balancing Energy Service bids must specify Congestion Zone, the type of bid, either a Resource or a BUL used to deploy the service, a ramp rate and service time period.

[PRR675: Replace paragraph (1) above with the following upon system implementation:]

- (1) Balancing Energy Service bids must specify Congestion Zone, the type of bid, either a Resource or a BUL used to deploy the service, a ramp rate or ramp rate curve, and service time period.
 - (a) For Balancing Energy Service Up and Balancing Energy Service Down, the bid curve consists of monotonically increasing ordered pairs of dollars per megawatt hour and cumulative megawatts (\$/MWh, MW).
 - (b) For BUL, the bids consist of blocks in dollars per megawatt hour and megawatts (\$/MWh, MW). If the full block cannot be deployed the bid will be bypassed.
- (2) QSEs shall provide Balancing Energy Service Down bids prior to the close of the Adjustment Period equal to or greater than the requirement according to the amounts set forth for the QSE in Section 4.5.2, Receipt of QSE's Balancing Energy Bid Curves.
- (3) ERCOT shall place all bids received for Balancing Energy Service Up and BUL in order from lowest bid price to highest bid price. This combination shall be the Balancing Energy Service Up Bid Stack. ERCOT will determine the total amount of energy bid in the stack available in sixty (60) minutes.

- (4) ERCOT will determine the required amount of Balancing Energy Service such that Regulation Service Up (RGSU) energy and Regulation Service Down (RGSD) energy is provided in each Settlement Interval.
- (5) ERCOT will plan to deploy Balancing Energy Service in each Settlement Interval in a manner that will minimize total net energy from Regulation Service (RGS).
- (6) The Balancing Energy Service deployment will be in megawatts. The Balancing Energy Obligation shall be the power requested integrated over the interval.
- (7) ERCOT may deploy Balancing Energy Service only in the Operating Period. ERCOT's selection of energy from Resources for deployment shall be based on the price Merit Order of bids received and bid ramp rate and not on the expected Market Clearing Price for Energy (MCPE). The ERCOT System Operator making Balancing Energy Service decisions shall not have access to the individual Balancing Energy Service bid prices or the expected MCPE.
- (8) If the Balancing Energy Service Up Bid Stack does not overlap with the Balancing Energy Service Down Bid Stack, and ERCOT is using Balancing Energy Service Up and needs a lesser amount of Balancing Energy, ERCOT must first recall any Balancing Energy Service Up prior to deploying any Balancing Energy Service Down, unless resolving Local Congestion.
- (9) If the Balancing Energy Service Up bid prices are lower than Balancing Energy Service Down bid prices, also known as overlap, and deployment required of Balancing Energy Service would result in an MCPE within the overlap then, the Balancing Energy Service Up and Balancing Energy Service Down or a portion of each are deployed, unless resolving Local Congestion.
- (10) If ERCOT is using Balancing Energy Service Down and needs a greater amount of Balancing Energy, ERCOT must first recall any Balancing Energy Service Down prior to deploying any Balancing Energy Service Up, subject to this subsection.
- (11) If ERCOT is using Balancing Energy Service Up and needs a lesser amount of Balancing Energy Service, ERCOT must first recall any Balancing Energy Service Up prior to deploying any Balancing Energy Service Down, subject to this subsection.
- (12) ERCOT shall not deploy Balancing Energy Service Up and Down in the same Settlement Interval in the same Congestion Zone, unless clearing an overlap in the Balancing Energy Service Up and Balancing Energy Service Down bid prices, or solving Local Congestion.
- ~~(13) ERCOT shall provide ten (10) minutes notice to the QSEs providing Balancing Energy Service Up or Balancing Energy Service Down to change deployment via the Messaging System.~~
- (13) ERCOT shall provide notice via the Messaging System to the QSE providing Balancing Energy Service Up or Balancing Energy Service Down to change deployment three (3)

minutes prior to the start of the time at which the Resource must begin to ramp up or down.

[PRR601, PRR803: Replace paragraph (13) above with the following upon system implementation:]

- (13) ~~ERCOT shall provide notice via the Messaging System to the QSE providing Balancing Energy Service Up or Balancing Energy Service Down to change deployment three (3) minutes prior to the start of the time at which the Resource must begin to ramp up or down.~~
- (14) ERCOT shall provide Notice electronically via the Messaging System to each QSE with the number of megawatts expected to be delivered as a result of Balancing Energy Service Dispatch Instructions. The Messaging System will identify requests for BUL.
- (15) LaaRs and providing Balancing Energy Service must be capable of responding to ERCOT Dispatch Instructions in a similar manner to Generation Resources. BUL is not considered to be a LaaR.
- (16) The deployment of power shall be constrained by the bidders' specified ramp rate except during Energy Emergency Alert (EEA) operations.
- (17) ~~With the exception of BUL and LaaR providing Balancing Energy Service Up, QSEs are expected to comply with Balancing Energy Service Dispatch Instructions by ramping at a constant ramp rate, as calculated in paragraph (18) below, during a fixed ramp period starting five (5) minutes prior to the start of the target service interval and ending five (5) minutes after the start of the target service interval.~~
- (17) With the exception of BUL and LaaRs providing Balancing Energy Service Up, QSEs are expected to comply with Balancing Energy Service Dispatch Instructions by ramping at a constant ramp rate, as calculated in paragraph (18) below, during a fixed ramp period starting seven (7) minutes prior to the start of the Settlement Interval covered by the Dispatch Instruction and ending seven (7) minutes after the start of the Settlement Interval covered by the Dispatch Instruction.

[PRR601, PRR803: Replace paragraph (17) above with the following upon system implementation:]

- (17) ~~With the exception of BUL and LaaRs providing Balancing Energy Service Up, QSEs are expected to comply with Balancing Energy Service Dispatch Instructions by ramping at a constant ramp rate, as calculated in paragraph (18) below, during a fixed ramp period starting seven (7) minutes prior to the start of the Settlement Interval covered by the Dispatch Instruction and ending seven (7) minutes after the start of the Settlement Interval covered by the Dispatch Instruction.~~
- (18) ~~With the exception of BUL and LaaR providing Balancing Energy Service Up, Balancing Energy Service Dispatch Instructions, inclusive of recall instructions, by ERCOT to any~~

QSE are constrained by the amount of energy that the QSE can deploy within the ten (10) minute ramp period at the ramp rates that are communicated to ERCOT in the QSE's bid. Expressed in MW/Min, the ramp rates serve as the basis for calculating the maximum change in the amount of energy that the QSE can deploy from one (1) fifteen (15) minute Settlement Interval to the next. In calculating these energy amounts, ERCOT will calculate the upper and lower limits of the Balancing Energy Service Dispatch Instruction of the target Settlement Interval as follows:

Direction of Deployment in Prior Settlement Interval	Limits to P_1
$P_0 > 0$	$P_0 + 10 \times \text{RRU}$
$P_0 > 0$	$P_0 - \text{Min} (P_0 / \text{RRU}, 10) \times \text{RRU}$ $= [10 - \text{Min} (P_0 / \text{RRU}, 10)] \times \text{RRD}$
$P_0 < 0$	$P_0 + \text{Min} (-P_0 / \text{RRD}, 10) \times \text{RRD}$ $+ [10 - \text{Min} (-P_0 / \text{RRD}, 10)] \times \text{RRU}$
$P_0 < 0$	$P_0 - 10 \times \text{RRD}$

Where:

- P_0 — MW amount of Balancing Energy Service deployed by ERCOT in the previous Settlement Interval.
- P_1 — MW amount of Balancing Energy Service deployed by ERCOT in the target Settlement Interval.
- RRU — bid ramp rate (always positive) in MW/min associated with the QSE's Balancing Up bid for the target interval. If RRU is not available for the target interval, ERCOT will use the most recent value of the QSE's RRU .
- RRD — bid ramp rate (always positive) in MW/min associated with the QSE's Balancing Down bid for the target interval. If RRD is not available for the target interval, ERCOT will use the most recent value of the QSE's RRD .
- $P_1 > P_0$ — indicates a deployment of more energy in the up direction and/or less energy in the down direction from the previous Settlement Interval to the target Settlement Interval.
- $P_1 < P_0$ — indicates a deployment of less energy in the up direction and/or more energy in the down direction from the previous Settlement Interval to the target Settlement Interval.

ERCOT will honor the limits to P_1 , as calculated above, in determining P_1 .

ERCOT will calculate the constant ramp rate for the P_1 deployment as $[P_1 - P_0]/10$.

For settlement and instructed deviation purposes, the P_1 instruction along with the constant ramp rate will be used in determining the energy deployed during the ramp period and corresponding previous and target Settlement Intervals.

- (18) With the exception of BUL and LaaRs providing Balancing Energy Service Up, Balancing Energy Service Dispatch Instructions, inclusive of recall instructions, by ERCOT to any QSE are constrained by the amount of energy that the QSE's Resource can deploy within the fourteen (14) minute ramp period at the ramp rates that are communicated to ERCOT in the QSE's bid. Expressed in MW/Min, the ramp rates serve as the basis for calculating the maximum change in the amount of energy that the QSE can deploy from one (1) fifteen (15) minute Settlement Interval to the next. In calculating these energy amounts, ERCOT will calculate the upper and lower limits of the Balancing Energy Service Dispatch instruction of the target Settlement Interval as follows:

<u>Direction of Deployment in Prior Settlement Interval</u>	<u>Limits to P_1</u>
$P_0 > 0$ and $P_1 > P_0$	$P_0 + 14 \times RRU$
$P_0 > 0$ and $P_1 < P_0$	$\frac{P_0 - \text{MIN} (P_0 / RRU, 14) \times RRU}{- \lfloor 14 - \text{Min} (P_0 / RRU, 14) \rfloor \times RRD}$
$P_0 < 0$ and $P_1 > P_0$	$\frac{P_0 + \text{MIN} (-P_0 / RRD, 14) \times RRD}{+ \lfloor 14 - \text{Min} (-P_0 / RRD, 14) \rfloor \times RRU}$
$P_0 < 0$ and $P_1 < P_0$	$P_0 - 14 \times RRD$

Where:

- P_0 MW amount of Balancing Energy Service deployed by ERCOT in the previous Settlement Interval.
- P_1 MW amount of Balancing Energy Service deployed by ERCOT in the target Settlement Interval.
- RRU bid ramp rate (always positive) in MW/min associated with the QSE's Balancing Up bid for the target interval. If RRU is not available for the target interval, ERCOT will use the most recent value of the QSE's RRU .
- RRD bid ramp rate (always positive) in MW/min associated with the QSE's Balancing Down bid for the target interval. If RRD is not available for the target interval, ERCOT will use the most recent value of the QSE's RRD .
- $P_1 > P_0$ indicates a deployment of more energy in the up direction and/or less energy in the down direction from the previous Settlement Interval to the target Settlement Interval.

$P_1 < P_0$ indicates a deployment of less energy in the up direction and/or more energy in the down direction from the previous Settlement Interval to the target Settlement Interval.

ERCOT will honor the limits to P_1 , as calculated above, in determining P_1 .

ERCOT will calculate the constant ramp rate for the P_1 deployment as $[P_1 - P_0]/14$.

For settlement and instructed deviation purposes, the P_1 instruction along with the constant ramp rate will be used in determining the energy deployed during the ramp period and corresponding previous and target Settlement Intervals.

[PRR601, PRR803: Replace paragraph (18) above with the following upon system implementation:]

- (18) With the exception of BUL and LaaRs providing Balancing Energy Service Up, Balancing Energy Service Dispatch Instructions, inclusive of recall instructions, by ERCOT to any QSE are constrained by the amount of energy that the QSE's Resource can deploy within the fourteen (14) minute ramp period at the ramp rates that are communicated to ERCOT in the QSE's bid. Expressed in MW/Min, the ramp rates serve as the basis for calculating the maximum change in the amount of energy that the QSE can deploy from one (1) fifteen (15) minute Settlement Interval to the next. In calculating these energy amounts, ERCOT will calculate the upper and lower limits of the Balancing Energy Service Dispatch instruction of the target Settlement Interval as follows:

Direction of Deployment in Prior Settlement Interval	Limits to P_1
$P_0 > 0$ and $P_1 > P_0$	$P_0 + 14 \times RRU$
$P_0 > 0$ and $P_1 < P_0$	$P_0 - \text{MIN}(P_0/RRU, 14) \times RRU$ $- 14 - \text{MIN}(P_0/RRU, 14) \times RRD$
$P_0 < 0$ and $P_1 > P_0$	$P_0 + \text{MIN}(-P_0/RRD, 14) \times RRD$ $+ 14 - \text{MIN}(-P_0/RRD, 14) \times RRU$
$P_0 < 0$ and $P_1 < P_0$	$P_0 - 14 \times RRD$

Where:

P_0 — MW amount of Balancing Energy Service deployed by ERCOT in the previous Settlement Interval.

P_1 — MW amount of Balancing Energy Service deployed by ERCOT in the target Settlement Interval.

RRU — bid ramp rate (always positive) in MW/min associated with the

QSE's Balancing Up bid for the target interval. If RRU is not available for the target interval, ERCOT will use the most recent value of the QSE's RRU.

RRD — bid ramp rate (always positive) in MW/min associated with the QSE's Balancing Down bid for the target interval. If RRD is not available for the target interval, ERCOT will use the most recent value of the QSE's RRD.

$P_t > P_0$ — indicates a deployment of more energy in the up direction and/or less energy in the down direction from the previous Settlement Interval to the target Settlement Interval.

$P_t < P_0$ — indicates a deployment of less energy in the up direction and/or more energy in the down direction from the previous Settlement Interval to the target Settlement Interval.

ERCOT will honor the limits to P_t , as calculated above, in determining P_t .

ERCOT will calculate the constant ramp rate for the P_t deployment as $[P_t - P_0]/14$.

For settlement and instructed deviation purposes, the P_t instruction along with the constant ramp rate will be used in determining the energy deployed during the ramp period and corresponding previous and target Settlement Intervals.

(19) — The QSE's instructed deviation will include the expected energy calculated using the constant ramp rate, as calculated in paragraph (18) above, during the ten (10) minute ramp period when complying with an ERCOT Balancing Energy Service Dispatch Instruction.

(19) The QSE's instructed deviation will include the expected energy calculated using the constant ramp rate, as calculated in paragraph (18) above, during the fourteen (14) minute ramp period when complying with an ERCOT Balancing Energy Service Dispatch Instruction.

[PRR601, PRR803: Replace paragraph (19) above with the following upon system implementation:]

(19) — The QSE's instructed deviation will include the expected energy calculated using the constant ramp rate, as calculated in paragraph (18) above, during the fourteen (14) minute ramp period when complying with an ERCOT Balancing Energy Service Dispatch Instruction.

(20) ERCOT may also use LaaRs qualified to provide Regulation, Responsive Reserve, Non-Spinning Reserve, or Replacement Reserve Services to provide Balancing Energy under the Out of Merit Energy (OOME) instructions and pricing structure. ERCOT shall not

use Loads qualified to provide only BUL Service under the OOME instructions and pricing structure.

- (21) The minimum number of megawatts of Balancing Energy Service that may be offered to ERCOT is one (1) MW.
- (22) Should the Bid Stack for Balancing Energy Down Service be exhausted, ERCOT may send Dispatch Instructions to select Resources for OOME Service which causes the Resources to go Off-line.
- (23) ERCOT shall automatically limit each QSE's zonal Balancing Energy Service Up bids by the sum of the High Sustainable Limits (HSLs) from the Resource Plan for the Generation Resources, by zone, less the zonal schedule for the QSE's Resources. Any reduction to the Balancing Energy Service Up bid shall be implemented starting with the highest priced bids.
- (24) ERCOT shall automatically limit each QSE's zonal Balancing Energy Service Down bids by the zonal schedule for the QSE's Resources less the sum of the Low Sustainable Limits (LSLs) from the Resource Plan for the Generation Resources, by zone. Any reduction to the Balancing Energy Service Down bid shall be to the lowest cost bids.
- (25) QSEs representing Quick Start Units that are not synchronously interconnected to the ERCOT System that are providing Quick Start Balancing Energy Service shall indicate:
 - (a) The Quick Start Unit status as On-line in the Resource Plan;
 - (b) The Quick Start Unit LSL as zero (0) in the Resource Plan;
 - (c) The Quick Start Unit as available in the Resource Plan; and
 - (d) The Quick Start Unit planned operating level as zero (0) in the Resource Plan.

ERCOT shall, for all settlements, utilize the LSL as registered with ERCOT effective for the Operating Day in lieu of the zero (0) LSL in the Resource Plan.

[PRR675: Add the language below upon system implementation:]

- (26) QSEs may submit Balancing Energy Service Up and Down bids with multiple portfolio ramp rates.

6.8 Compensation for Services Provided

6.8.1 *Payments to Providers of Ancillary Services Procured in the Day Ahead and Adjustment Periods*

6.8.1.15 Payments for Balancing Energy Provided from Uninstructed Deviation

6.8.1.15.3 *Uninstructed Charge Methodology and Equation*

Once the Uninstructed Factor is determined on a system-wide basis for the Settlement Interval, it is possible to determine the 'price' to apply to QSE uninstructions. The Uninstructed Resource Charge would be determined by QSE for each zone in which the QSE had actual metered Resources.

The first step is to determine the QSE's Total Uninstructed Deviation. Each QSE's Total Uninstructed Deviation is calculated by adding the QSE Resource Schedule and all zonal and ERCOT wide instructions, and subtracting that amount from the Metered Resource Value. A dead band will be set according to each QSE's schedule plus instructions. If the QSE's Metered Resource Value is within this dead band percentage of +/- 1.5% but not less than +/- five (5) MWh of the schedule plus instructions for a Settlement Interval, then the QSE will not be subject to the Uninstructed Resource Charge.

[PIP112: Although the formula did not change, the "BUL" language incorporates Load Resources into one of the variables (MR). The current design does not have that capability. Once reworked, the following words in this comment box could be added to the Protocols.]

The QSE's Metered Resource Value will include both Generation and Load Resources. The amount of energy provided by a Load Resource will be obtained from the information submitted on the Resource Plan and the Settlement Meter of the Load Resource. Energy from a Load Resource is calculated for each Load Resource that is indicated available on the Resource Plan according to the following formula:

$$\text{Energy from Load Resource} = \text{MAX} (0, \text{MIN} ((\text{the integral of the upper operating limit} - \text{Load Settlement Meter}), (\text{integral of the upper operating limit} - \text{integral of the lower operating limit})))$$

At the request of the QSE as specified by Section 6.10.6, Ancillary Service Deployment Performance Conditions, ERCOT will disregard energy from a Load Resource for the four consecutive Settlement Intervals following the time of the request by the QSE as it relates to the following formula.

$$TUD_{iq} = \sum_{All\ zone} (MR_{izq} - (SRURC_{izq} + INS_{izq} + DSBUL_{izq})) - \sum INS_{ewiq}$$

Where:

TUD_{iq}	Total ERCOT-wide Uninstructed Deviation for that QSE per Settlement Interval
MR_{izq}	Metered Resource Value for that QSE per Settlement Interval per zone
$SRURC_{izq}$	The Resource Schedule (with out any DC Tie import schedules) smoothed for a 10-minute ramp per Settlement Interval per zone of that QSE, plus the Dynamic Schedule per Settlement Interval per zone of that QSE, plus the DC Tie import schedules per Settlement Interval per zone of that QSE.
$SRURC_{izq}$	The Resource Schedule (with-out any DC Tie import schedules) smoothed for a fourteen (14)-minute ramp per Settlement Interval per zone of that QSE, plus the Dynamic Schedule per Settlement Interval per zone of that QSE, plus the DC Tie import schedules per Settlement Interval per zone of that QSE.

[PRR601, PRR803: Replace the definition above with the following upon system implementation:]

$SRURC_{izq}$	The Resource Schedule (with out any DC Tie import schedules) smoothed for a fourteen (14)-minute ramp per Settlement Interval per zone of that QSE, plus the Dynamic Schedule per Settlement Interval per zone of that QSE, plus the DC Tie import schedules per Settlement Interval per zone of that QSE.
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INS_{izq}	Zonal Balancing Energy instructions given to that QSE per zone per Settlement Interval
INS_{ewiq}	ERCOT-wide Instructions for that QSE per Settlement Interval
$DSBUL_{izq}$	For QSEs with Dynamically Scheduled Loads, the integrated signal for the Settlement Interval that is an estimate in Real Time representing the real power interrupted in response to the deployment of BUL. $DSBUL_{izq} =$ zero (0) if Load is not dynamically scheduled.

If the QSE's Total Uninstructed Deviation is zero (0), then the zonal Uninstructed Deviation for every zone is zero (0).

$$ZUD_{izq} = 0$$

If the QSE's Total Uninstructed Deviation is positive, then the total Uninstructed Deviation will be allocated to those zones in which the value of adding the QSE's Resource Schedule in that zone and zonal instructions in that zone, and subtracting from the Metered Resource Value in that zone is positive.

$$ZUD_{izq} = \frac{\max(0, MR_{izq} - (SRURC_{izq} + INS_{izq} + DSBUL_{izq}))}{\sum_{\text{all zone}} \max(0, MR_{izq} - (SRURC_{izq} + INS_{izq} + DSBUL_{izq}))} * TUD_{iq}$$

If the QSE's Total Uninstructed Deviation is negative, then the total Uninstructed Deviation will be allocated to those zones in which the value of adding the QSE's Resource Schedule in that zone and zonal instructions in that zone, and subtracting from the Metered Resource Value in that zone is negative.

$$ZUD_{izq} = \frac{\min(0, MR_{izq} - (SRURC_{izq} + INS_{izq} + DSBUL_{izq}))}{\sum_{\text{all zone}} \min(0, MR_{izq} - (SRURC_{izq} + INS_{izq} + DSBUL_{izq}))} * TUD_{iq}$$

Where:

i interval
q QSE
z Congestion Zone
INS_{izq} Zonal Balancing Energy instructions given to that QSE per zone per interval.
MR_{izq} Metered Resource Value for that QSE per interval per zone.

SRURC_{izq} = SRSURC_{izq} + (SRA_{izq} or SRD_{izq}) + DC Tie import schedules_{izq}

~~SRSURC_{izq} = SRSNDCCURR_{izq} + ((SRSNDCPREV_{izq} - SRSNDCCURR_{izq}) / 12) + ((SRSNDCNEXT_{izq} - SRSNDCCURR_{izq}) / 12)~~

~~SRSURC_{izq} = SRSNDCCURR_{izq} + ((SRSNDCPREV_{izq} - SRSNDCCURR_{izq}) / 8.57) + ((SRSNDCNEXT_{izq} - SRSNDCCURR_{izq}) / 8.57)~~

[PRR601, PRR803: Replace the equation above with the following upon system implementation:]

~~SRSURC_{izq} = SRSNDCCURR_{izq} + ((SRSNDCPREV_{izq} - SRSNDCCURR_{izq}) / 8.57) + ((SRSNDCNEXT_{izq} - SRSNDCCURR_{izq}) / 8.57)~~

Where:

INS_{izq} Zonal Balancing Energy instructions given to that QSE per zone per interval.
MR_{izq} Metered Resource Value for that QSE per interval per zone.

$$SRURC_{izq} = SRSURC_{izq} + (SRA_{izq} \text{ or } SRD_{izq}) + \text{DC Tie import schedules}_{izq}$$

$$SRSURC_{izq} = SRSNDCCURR_{izq} + ((SRSNDCPREV_{izq} - SRSNDCCURR_{izq}) / 12) + ((SRSNDCNEXT_{izq} - SRSNDCCURR_{izq}) / 12)$$

$$SRSURC_{izq} = \frac{SRSNDCCURR_{izq} + ((SRSNDCPREV_{izq} - SRSNDCCURR_{izq}) / 8.57) + ((SRSNDCNEXT_{izq} - SRSNDCCURR_{izq}) / 8.57)}{1}$$

[PRR601, PRR803: Replace the equation above with the following upon system implementation:]

$$SRSURC_{izq} = SRSNDCCURR_{izq} + ((SRSNDCPREV_{izq} - SRSNDCCURR_{izq}) / 8.57) + ((SRSNDCNEXT_{izq} - SRSNDCCURR_{izq}) / 8.57)$$

Where:

DC Tie import schedules _{izq}	The DC Tie imports scheduled per interval per zone of that QSE.
(SRA _{izq} or SRD _{izq})	The scheduled Resource (actual or dynamic, which ever is selected based on the dynamic scheduling logic) per interval per zone of that QSE.
SRSNDCCURR _{izq}	The scheduled Resource static minus any DC Tie import schedules, for the current interval, per interval per zone per QSE.
SRSNDCNEXT _{izq}	The scheduled Resource static minus any DC Tie import schedules for the next interval, per interval per zone per QSE.
SRSNDCPREV _{izq}	The scheduled Resource static minus any DC Tie import schedules for the previous interval, per interval, per zone, and per QSE.
SRSURC _{izq}	The scheduled Resource static (without any DC Tie import schedules) smoothed for a ten (10) minute ramp, per interval per zone of that QSE.
<u>SRSURC_{izq}</u>	<u>The scheduled Resource static (without any DC Tie import schedules) smoothed for a fourteen (14) minute ramp, per interval per zone of that QSE.</u>

[PRR601, PRR803: Replace the definition above with the following upon system implementation:]

SRSURC _{izq}	The scheduled Resource static (without any DC Tie import schedules) smoothed for a fourteen (14) minute ramp, per interval per zone of that QSE.
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~~SRURCRS_{izq} — The Resource Schedule (without any DC Tie import schedules) smoothed for a ten (10) minute ramp per interval per zone of that QSE, plus the Dynamic Schedule per interval per zone of that QSE, plus the DC Tie import schedules per interval per zone of that QSE.~~

SRURCRS_{izq} — The Resource Schedule (without any DC Tie import schedules) smoothed for a fourteen (14) minute ramp per interval per zone of that QSE, plus the Dynamic Schedule per interval per zone of that QSE, plus the DC Tie import schedules per interval per zone of that QSE.

[PRR601, PRR803: Replace the definition above with the following upon system implementation:]

SRURCRS_{izq} — The Resource Schedule (without any DC Tie import schedules) smoothed for a fourteen (14) minute ramp per interval per zone of that QSE, plus the Dynamic Schedule per interval per zone of that QSE, plus the DC Tie import schedules per interval per zone of that QSE.

TUD_{iq} — Total ERCOT wide Uninstructed Deviation for that QSE per interval.

ZUD_{izq} — Zonal Uninstructed Deviation for that QSE per interval for that zone.

DSBUL_{izq} — For QSEs with Dynamically Scheduled Loads, the integrated signal for the interval that is an estimate in Real Time representing the real power interrupted in response to the deployment of BUL. DSBUL_{izq} = zero (0) if Load is not dynamically scheduled.

The second step is to compare the market-clearing price of an interval to a benchmark in each zone and calculate the Uninstructed Resource Charge for each QSE in each zone. If the MCPE for the zone is negative, a QSE would be subject to the Uninstructed Resource Charge for under-generation. If the MCPE is positive, then a QSE is subject to the Uninstructed Resource Charge for over-generation.

The Uninstructed Resource Charge for that zone will be the product of the zonal uninstructed quantity, the MCPE for that Settlement Interval for that zone, and the previously determined Uninstructed Factor for that Settlement Interval.

This activity would be performed for every Congestion Zone for each QSE.

CASE: PRICE CHASING¹

IF $MCPE_{iz} \geq 0$ and QSE outside deadband, then:

$$URC_{izq} = (\text{Max}[0, ZUD_{izq}]) * (MCPE_{iz} \times UF_i)$$

CASE: COST OPTIMIZING²

ELSE $MCPE_{iz} < 0$ and QSE outside deadband Then:

$$URC_{izq} = (\text{Min}[0, ZUD_{izq}]) * (MCPE_{iz} \times UF_i)$$

Where:

URC_{iz}	Uninstructed Resource Charge for that QSE per zone per Settlement Interval
ZUD_{izq}	Zonal Uninstructed Deviation for that QSE per zone per Settlement Interval
$MCPE_{iz}$	Market Clearing Price for Energy in that zone of that Settlement Interval
UF_i	Uninstructed Factor determined in accordance to deployed regulation

6.10 Ancillary Service Qualification, Testing and Performance Standards**6.10.4 Ancillary Service Deployment Performance Measures****6.10.4.2 Base Power Schedule Calculation.**

For performance measurement purposes, ERCOT shall calculate for each QSE every two (2) seconds the expected power resulting from the QSE's Resource schedule less any other QSEs scheduled as a Resource. The expected power function will be calculated such that schedule changes between Settlement Intervals will be ramped during a ten (10) minute fixed ramp period starting five (5) minutes prior to the start of a Settlement Interval. ERCOT will consider energy provided outside of the Resource schedule in the Settlement Interval as a result of ramping an instructed deviation.

¹ In this case, only QSE's that overgenerate would be subject to the uninstructed charge when the price is greater than the benchmarked costs.

For performance measurement purposes, ERCOT shall calculate for each QSE every two (2) seconds the expected power resulting from the QSE's Resource schedule less any other QSEs scheduled as a Resource. The expected power function will be calculated such that schedule changes between Settlement Intervals will be ramped during a fourteen (14) minute fixed ramp period starting seven (7) minutes prior to the start of a Settlement Interval. ERCOT will consider energy provided outside of the Resource schedule in the Settlement Interval as a result of ramping an instructed deviation.

[PRR601, PRR803: Replace the paragraph above with the following upon system implementation:]

~~For performance measurement purposes, ERCOT shall calculate for each QSE every two (2) seconds the expected power resulting from the QSE's Resource schedule less any other QSEs scheduled as a Resource. The expected power function will be calculated such that schedule changes between Settlement Intervals will be ramped during a fourteen (14) minute fixed ramp period starting seven (7) minutes prior to the start of a Settlement Interval. ERCOT will consider energy provided outside of the Resource schedule in the Settlement Interval as a result of ramping an instructed deviation.~~

6.10.4.3 Balancing Energy Power Schedule

~~For performance measurement purposes, ERCOT shall calculate for each QSE the Balancing Energy power schedule for the expected power resulting from the change in deployment of Balancing Energy Service. The Balancing Energy power schedule will ramp to the new deployment level during a fixed ramp period starting five (5) minutes prior to the target service interval and ending five (5) minutes after the start of the target service interval.~~

For performance measurement purposes, ERCOT shall calculate for each QSE the Balancing Energy power schedule for the expected power resulting from the change in deployment of Balancing Energy Service. The Balancing Energy power schedule will ramp to the new deployment level during a fixed ramp period starting seven (7) minutes prior to the target service interval and ending seven (7) minutes after the start of the target service interval.

[PRR803: Replace the paragraph above with the following upon system implementation:]

~~For performance measurement purposes, ERCOT shall calculate for each QSE the Balancing Energy power schedule for the expected power resulting from the change in deployment of Balancing Energy Service. The Balancing Energy power schedule will ramp to the new deployment level during a fixed ramp period starting seven (7) minutes prior to the target service interval and ending seven (7) minutes after the start of the target service interval.~~